REMAINING STRIPPABLE COAL RESOURCES AND STRIPPABLE RESERVE BASE OF THE HANNA COAL FIELD IN SOUTHCENTRAL WYOMING

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16. Abstract

As of January 1, 1978, 674.31 million tons of strippable coal resources are estimated to remain in the Hanna Coal Field of southcentral Wyoming. Of this resource, 648.29 million tons are termed strippable reserve base. All 86 of the coal beds that make up this strippable resource occur under less than 200 feet of cover, dip at less than 25 degrees, and exhibit thicknesses of 5 feet or more. With the exception of 16 million tons of bituminous resources, all the rest of the resources are calculated for subbituminous coals.

Coal bed nomenclature is presented for the coals in four mining districts of the Hanna Coal Field. In addition, ultimate and proximate analyses, heats of combustion, ash fusion temperatures, forms of sulfur, ash composition, and concentrations of up to 32 trace elements are provided for many of the coals in the Hanna Coal Field.

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Strippable coal resources; strippable reserve base; Hanna Coal Field; Carbon County; Wyoming; Coal analyses

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GARY B. GLASS AND JAY T. ROBERTS

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TABLE OF CONTENTS

Contents — Page

Figures — Page

Figures Continued — Page

Plates

Tables

Tables Continued — Page

REMAINING STRIPPABLE COAL RESOURCES AND RESERVE BASE OF THE HANNA COAL FIELD IN SOUTHCENTRAL WYOMING

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STRIPPABLE RESOURCES AND RESERVE BASE

As of January 1, 1978, it is estimated that 674.31 million tons of strippable coal resources remain in four newly defined mining districts of the Hanna Coal Field in southcentral Wyoming (Figure 1). Of these strippable resources, 46 percent or 309.97 million tons lie between 0-100 feet of cover while the other 54 percent or 364.34 million tons lie between 100-200 feet of cover. Table 1 shows that most of these remaining strippable coal resources (79%) occur in the Hanna and Seminoe Mining Districts (Figure 2). Plates 1 to 4 show the location of strippable resources in each of the mining districts. These strippable resources include 26.02 million tons of coal in an inferred category of reliability, which are usually not considered part of the strippable reserve base (U.S. Bureau of Mines and U.S. Geological Survey, 1976).

For this reason, the remaining strippable reserve base or that part of the strippable resources from which strippable reserves are derived, is reduced to 648.29

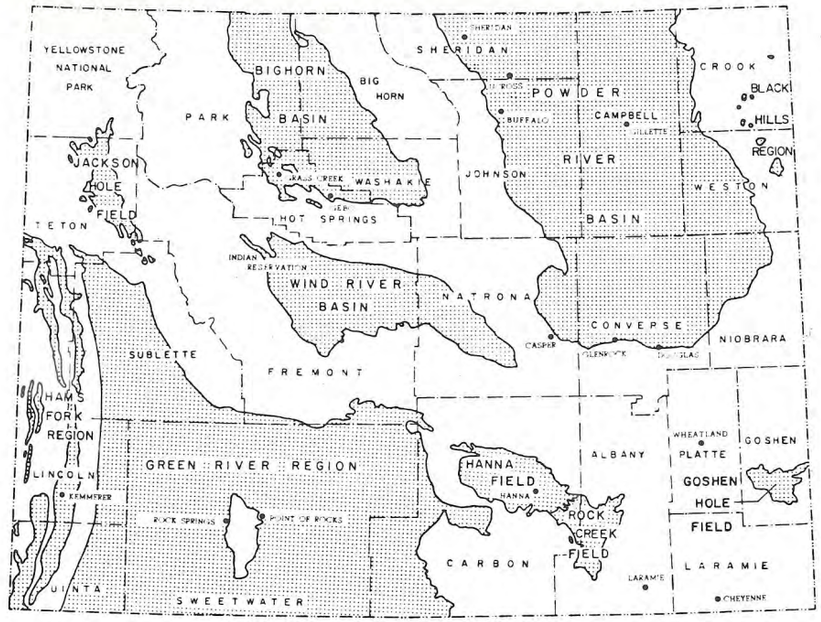

Figure 1. Coal-bearing areas of Wyoming

million tons (96 percent of strippable resources). Forty-six percent or 297.12 million tons of the reserve base occur under less than 100 feet of cover while the remaining 351.17 million tons occur under thicker cover (100-200 feet thick).

Although strippable reserves per se (recoverable reserves) were not estimated, a fair approximation is that strippable reserves equal at least 80 percent of the reserve base between 0-100 feet deep or 237.7 million tons. Although some percentage of the reserve base between 100-200

Table 1. Remaining strippable coal resources and strippable reserve base of the Hanna Coal Field by mining district, January 1, 1978 (all figures in millions of tons)

MINING DISTRICT	MEASURED RESERVE BASE Overburden thickness (feet):			INDICATED RESERVE BASE Overburden thickness (feet):			TOTAL RESERVE BASE Overburden thickness (feet):			INFERRED RESOURCES Overburden thickness (feet):			GRAND TOTAL Overburden thickness (feet):		
	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
CARBON MINING DISTRICT (11.14 feet)[1]	29.05	20.53	49.58	13.60	55.68	69.28	42.65	76.21	118.86	0.35	2.34	2.69	43.00	78.55	121.55
HANNA MINING DISTRICT (14.22 feet)[1]	86.18	85.67	171.85	43.87	58.16	102.03	130.05	143.83	273.88	2.44	2.36	4.80	132.49	146.19	278.68
SEMINOE MINING DISTRICT (9.79 feet)[1]	76.15	64.94	141.09	32.25	59.13	97.38	114.40	124.07	238.74	10.06	8.47	18.53	124.46	132.54	257.00
CORRAL CREEK MINING DISTRICT (5.9 feet)[1]	7.44	4.51	11.95	2.58	2.55	5.13	10.02	7.06	17.08	-	-	-	10.02	7.06	17.08
GRAND TOTAL FOR ALL FOUR MINING DISTRICTS (11.77 feet)[1]	198.82	175.64	374.47	98.30	175.52	273.82	297.12	351.17	648.29	12.85	13.17	26.02	309.97	364.34	674.31

[1](Weighted average thickness of coal)

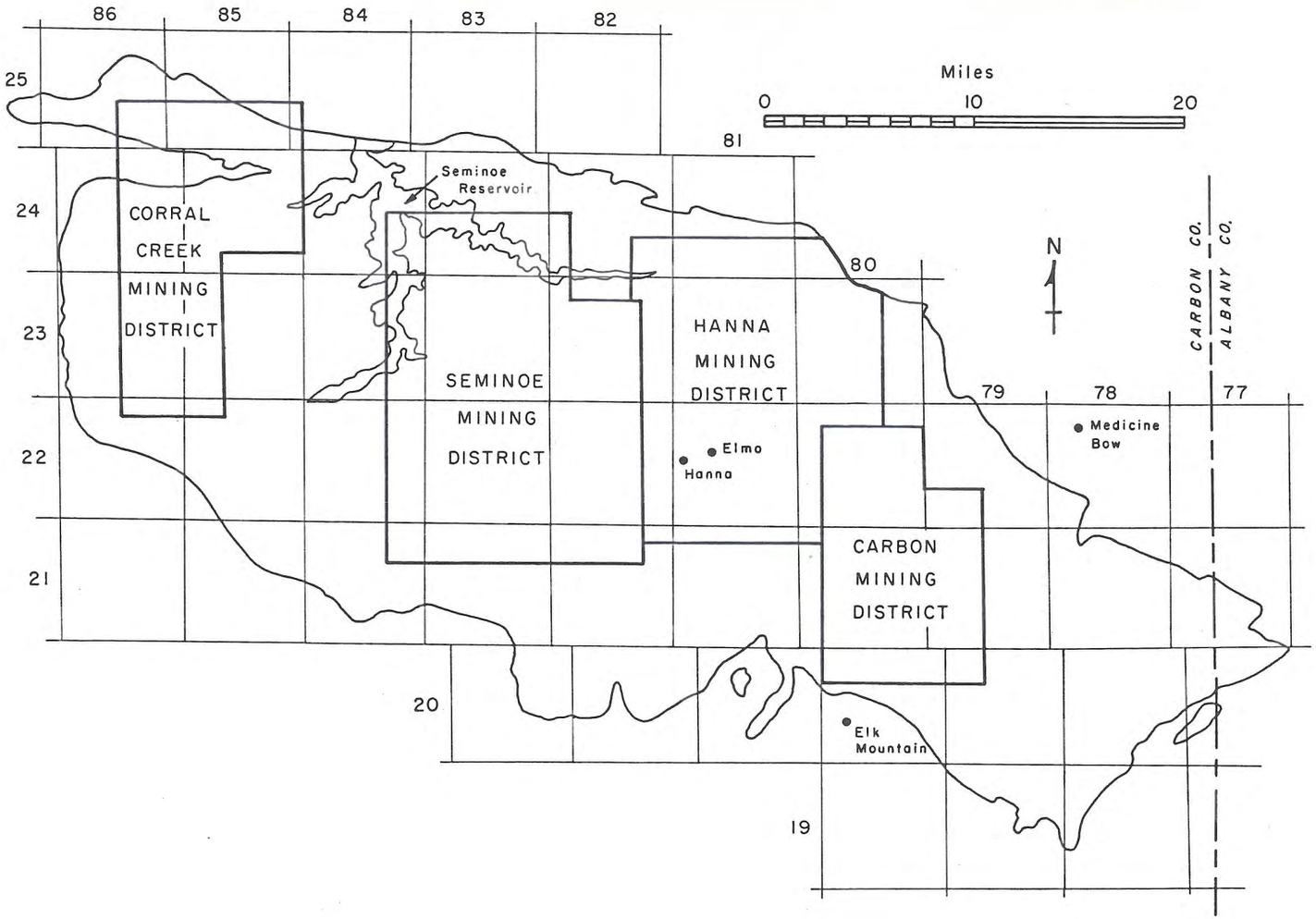

Figure 2. Coal mining districts in the Hanna Coal Field

feet deep is also recoverable, the percentage is harder to estimate. Applying the same rule of thumb that strippable reserves may equal 80 percent of that tonnage as well, another 280.94 million tons of reserves is identified for a total of 518.64 million tons of strippable reserves in the Hanna Coal Field.

A more conservative appraisal of strippable reserves in the 100-200 feet depth range is half the reserve base or 175.59 million tons, thus reducing the remaining reserves to 413.29 million tons. Unfortunately, accurate estimation of strippable reserves is highly subjective since it is based on criteria that varies from mining company to mining company.

Obviously, a portion of the inferred strippable resources will also become part of the reserve base and reserves as drilling and mapping substantiate its existence. Again the percentage of the inferred resources that will ultimately become strippable reserve base and reserves is speculative at this time.

With the exception of 9.44 million tons of strippable bituminous resources in the 0-100 feet overburden category and another 6.56 million tons in the 100-200 feet overburden category, all the strippable resources and strippable reserve base in the Hanna Coal Field are of subbituminous rank (Table 2). The bituminous reserve base of 16.0 million tons all occurs in the Corral Creek Mining District where it is tabulated for a number of poorly correlated coals in the Upper Cretaceous Almond Formation.

INTRODUCTION

The estimates of remaining strippable resources and reserve base of this report are derived from a study of 86 coal beds that with a few exceptions attain thicknesses of 5 feet or more. A few coals less than 5 feet thick are included in the tabulations because they are currently strip mined. Contrary to many reports, resources of thinner bituminous coals (coals less than five feet thick) are not included in these estimates. The few bituminous coals examined for this report are low enough in rank (high-volatile bituminous) and isolated enough that their slightly higher heat values are not believed substantial enough to warrant mining any bed less than 5 feet thick. Table 4 itemizes resources and reserve base by mining district and coal bed. Table 5 is a similar breakdown by township and range.

Of the 86 coals mentioned above, there is undoubtedly some duplication where a coal is reported under two designations or two names. This is inevitable since correlation of many coals, especially within faulted or isolated areas, is not yet established. Wherever possible tentative correlations or approximate stratigraphic equivalence of coal beds is noted (Figures 6 and 8).

Of approximately 174.2 million tons of coal mined or lost as a result of mining in the Hanna Coal Field prior to

Table 2. Remaining strippable coal resources and strippable reserve base of the Hanna Coal Field by rank, January 1, 1978 (all figures in millions of tons)

COAL RANK	MEASURED RESERVE BASE			INDICATED RESERVE BASE			TOTAL RESERVE BASE			INFERRED RESOURCES			GRAND TOTAL		
	Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):		
	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
BITUMINOUS (Only tabulated in Corral Creek Mining District)															
	6.86	4.01	10.87	2.58	2.55	5.13	9.44	6.56	16.00	-	-	-	9.44	6.56	16.0
SUBBITUMINOUS															
	191.96	171.64	363.60	95.72	172.97	268.69	287.68	344.61	632.29	12.85	13.17	26.02	300.53	357.78	658.31
TOTAL BOTH RANKS															
	198.82	175.65	374.47	98.30	175.52	273.82	297.12	351.17	648.29	12.85	13.17	26.02	309.97	364.34	674.31

January 1, 1978, at least 65.1 million tons were depleted by strip mining (this includes an estimated 13.02 million tons lost during mining). Another 109.1 million tons were removed or lost by underground mining. The remaining strippable resources and reserve base in this report exclude all this tonnage, mined or lost prior to January 1, 1978.

Currently five mining companies are operating in the Hanna Coal Field: Arch Mineral Corporation, Energy Development Company, Medicine Bow Coal Company, Resource Exploration and Mining, Inc., and Rosebud Coal Sales Company. These companies are depleting coal reserves at the rate of about 15 million tons per year (includes 20 percent mining losses for strip mining and mining losses equal to production for deep mining). Ninety-eight percent of this current production, however, is from strip mines. Although several new mines are proposed for the field, annual production is not expected to exceed 17 million tons per year by 1985. Coupled with mining losses, the annual depletion of coal reserves might approach 20 million tons per year by that same year (Table 3).

PREVIOUS INVESTIGATIONS

Dobbin, Bowen, and Hoots (1929) were the first to report detailed information on the coal resources of the Hanna Coal Field. They estimated that the field contained 4.2 billion tons of coal at depths up to 3,000 feet and that perhaps another 4 billion tons occurred at greater depths. Their estimates, however, were based on a higher weight per acre-foot than usually used for subbituminous coals and they provided no breakdown by coal thickness or reliability. In particular, they made no attempt to break their estimates down any further than 0-3000 feet of cover and greater than 3,000 feet of cover.

Twenty-two years later Berryhill and others, (1950), reexamined the coal resources of the Hanna Coal Field, relying heavily on the earlier report by Dobbin, Bowen, and Hoots (1929). In this case, however, they tabulated original resources on the bases of coal thickness, various depths of cover up to 3,000 feet, and various reliability categories. Their grand total was 3.9 billion tons or slightly less than the earlier estimate. Again, no estimate of shallow resources (between 0-200 feet) was made.

In 1971, the U.S. Bureau of Mines made the first estimate of "strippable coal reserves" in the Hanna Coal Field (U.S. Bureau of Mines, 1971). From a study of eight coal beds of the Hanna Formation, they identified 10 million tons of strippable resources. Applying an 80 percent recovery factor, they reported 8 million tons of that resource was strippable reserves. The estimate was so conservative that it provided no insight into the total strippable coal resources of the field.

Glass (1972) made a second approximation of the strippable coal resources of the coal field. That estimate, however, was derived from a simple manipulation of the

Table 3. Current and proposed coal mining activities in the Hanna Coal Field

COMPANY NAME	MINE NAME	MINE TYPE	MINING DISTRICT	PRODUCTION 1978, [1,2]	DESIGN CAPACITY[2]	ESTIMATED 1985 PRODUCTION [2]	MINED COAL BEDS
Arch Mineral Corp.	Seminoe No. 1	Strip	Seminoe	2.50	3.0	3.0	65,64*,53*, 52, 51, 50* 37, 35*, 34, 33, 31, 30, 28, 26, 25, Dana*
Arch Mineral Corp.	Seminoe No. 2	Strip	Hanna	2.83	3.0	3.0	83*, 82*, 80*, 79, Hanna No. 2, 76, 75, 74, Hanna No. 5, 72*
Arch Mineral Corp.	Hanna South	Strip	Hanna	Proposed	0.8	0.8	Hanna No. 1*, 80*, 79?*, 78* 77*
Carbon County Coal Co.	Carbon County	Deep	Hanna	Proposed	2.5	0.8	82*, 80*, 79*, Hanna No. 2*
Edison Development Co.	Carbon Basin	Strip and Deep	Carbon	Proposed	5.0	2.0	Finch*, Johnson Rider*, Johnson*
Energy Development Co.	Vanguard No. 2	Deep	Seminoe	0.41	1.0	0.5	50
Medicine Bow Coal Co.	Medicine Bow	Strip	Seminoe	3.13	3.0	3.0	65, 64, 63, 62, 61, 60, C*, F*, 129*, 127*, 124*, 51*, 123*, 122*, 46*, 44*, 34*, 33*, 31*, 25*
Resource Exploration and Mining, Inc.	Section 24 Pit	Strip	Seminoe	0.80	0.70	0.7	Hanna No. 5, ?50*

Table 3. Continued

COMPANY NAME	MINE NAME	MINE TYPE	MINING DISTRICT	PRODUCTION 1978, [1,2]	DESIGN CAPACITY[2]	ESTIMATED 1985 PRODUCTION [2]	MINED COAL BEDS
Rocky Mountain Energy Co.	Corral Canyon	Strip	Corral Creek	Proposed	?0.5	0.5	?(WH6*, WH4*, WH3*, WH2*, WH1*)
Rosebud Coal Sales Co.	Rosebud Pit Nos. 4, 5, 6, 7, 8, 9	Strip	Hanna	2.92	2.5	2.5	83*, 82, 80, 79
			TOTALS	12.59	22.0	16.8	

[1] Preliminary figures from the Wyoming State Inspector of Mines [2] Millions of tons * Coals that will be mined

Table 4. Remaining strippable coal resources and strippable reserve base of the Hanna Coal Field by coal bed, January 1, 1978 (all figures in millions of tons)

Coal Name	MEASURED RESERVE BASE			INDICATED RESERVE BASE			TOTAL RESERVE BASE			INFERRED RESOURCES			GRAND TOTAL		
Township,Range	Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):		
Thickness (feet)	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
CARBON MINING DISTRICT															
Carbon No. 6															
T21N R79W															
5	0.26	-	0.26	0.03	-	0.03	0.29	-	0.29	-	-	-	0.29	-	0.29
7	0.06	-	0.06	-	-	-	0.06	-	0.06	-	-	-	0.06	-	0.06
8	0.09	-	0.09	-	-	-	0.09	-	0.09	-	-	-	0.09	-	0.09
T21N R80W															
5	0.34	-	0.34	0.01	-	0.01	0.35	-	0.35	-	-	-	0.35	-	0.35
7	0.21	-	0.21	-	-	-	0.21	-	0.21	-	-	-	0.21	-	0.21
8	0.06	-	0.06	-	-	-	0.06	-	0.06	-	-	-	0.06	-	0.06
BED TOTALS	1.02	-	1.02	0.04	-	0.04	1.06	-	1.06	-	-	-	1.06	-	1.06
Bed No. 109															
T21N R80W															
5	2.28	1.57	3.85	1.31	2.15	3.46	3.59	3.72	7.31	-	-	-	3.59	3.72	7.31
7	1.44	0.74	2.18	1.12	1.89	3.01	2.56	2.63	5.19	-	-	-	2.56	2.63	5.19
8	0.21	0.15	0.36	-	-	-	0.21	0.15	0.36	-	-	-	0.21	0.15	0.36
BED TOTALS	3.93	2.46	6.39	2.43	4.04	6.47	6.36	6.50	12.86	-	-	-	6.36	6.50	12.86
Bed No. 105															
T21N R79W															
5	0.26	0.28	0.54	0.13	0.63	0.76	.39	.91	1.30	-	-	-	.39	.91	1.30
T21N R80W															
5	0.02	0.01	0.03	0.19	0.49	0.68	.21	.50	.71	-	-	-	.21	.50	.71
BED TOTALS	0.28	0.29	0.57	0.32	1.12	1.44	.60	1.41	2.01	-	-	-	.60	1.41	2.01

Table 4. Continued

Coal Name / Township, Range / Thickness (feet)	MEASURED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INDICATED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	TOTAL RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INFERRED RESOURCES Overburden thickness (feet): 0-100	100-200	0-200	GRAND TOTAL Overburden thickness (feet): 0-100	100-200	0-200
Finch															
T20N R80W															
5	0.35	-	0.35	0.28	-	0.28	0.63	-	0.63	-	-	-	0.63	-	0.63
7	0.85	-	0.85	0.10	-	0.10	0.95	-	0.95	-	-	-	0.95	-	0.95
9	1.74	-	1.74	-	-	-	1.74	-	1.74	-	-	-	1.74	-	1.74
11	0.84	-	0.84	-	-	-	0.84	-	0.84	-	-	-	0.84	-	0.84
12.5	0.08	-	0.08	-	-	-	0.08	-	0.08	-	-	-	0.08	-	0.08
T21N R80W															
5	0.05	-	0.05	0.55	1.07	1.62	0.60	1.07	1.67	0.30	0.48	0.78	0.90	1.55	2.45
7	0.42	-	0.42	1.21	2.50	3.71	1.63	2.50	4.13	0.05	0.42	0.47	1.68	2.92	4.60
9	0.16	0.97	1.13	0.10	2.32	2.42	0.26	3.29	3.55	-	1.44	1.44	0.26	4.73	4.99
11	0.86	0.46	1.32	0.11	0.62	0.73	0.97	1.08	2.05	-	-	-	0.97	1.08	2.05
BED TOTALS	5.35	1.43	6.78	2.35	6.51	8.86	7.70	7.94	15.64	0.35	2.34	2.69	8.05	10.28	18.33
Johnson Rider															
T20N R79W															
5	0.03	0.11	0.14	0.03	0.05	0.08	0.06	0.16	0.22	-	-	-	0.06	0.16	0.22
7	0.12	0.08	0.20	0.04	0.08	0.12	0.16	0.16	0.32	-	-	-	0.16	0.16	0.32
9	0.13	0.12	0.25	0.02	-	0.02	0.15	0.12	0.27	-	-	-	0.15	0.12	0.27
11	0.28	0.01	0.29	-	-	-	0.29	-	0.29	-	-	-	0.29	-	0.29
12.5	0.25	-	0.25	-	-	-	0.25	-	0.25	-	-	-	0.25	-	0.25
T20N R80W															
5	0.08	0.03	0.11	-	-	-	0.08	0.03	0.11	-	-	-	0.08	0.03	0.11
7	0.11	0.02	0.13	-	-	-	0.11	0.02	0.13	-	-	-	0.11	0.02	0.13
9	0.12	-	0.12	0.01	-	0.01	0.13	-	0.13	-	-	-	0.13	-	0.13
11	0.33	-	0.33	0.06	-	0.06	0.39	-	0.39	-	-	-	0.39	-	0.39

Table 4. Continued

Coal Name / Township, Range / Thickness (feet)	MEASURED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INDICATED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	TOTAL RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INFERRED RESOURCES Overburden thickness (feet): 0-100	100-200	0-200	GRAND TOTAL Overburden thickness (feet): 0-100	100-200	0-200
Johnson Rider (Cont.)															
T21N R79W															
7	0.02	-	0.02	0.05	-	0.05	0.07	-	0.07	-	-	-	0.07	-	0.07
9	0.08	-	0.08	0.05	-	0.05	0.13	-	0.13	-	-	-	0.13	-	0.13
11	0.04	-	0.04	-	-	-	0.04	-	0.04	-	-	-	0.04	-	0.04
T21N R80W															
5	-	0.06	0.06	0.12	0.30	0.42	0.12	0.36	0.48	-	-	-	0.12	0.36	0.48
7	0.04	0.10	0.14	0.11	0.80	0.91	0.15	0.90	1.05	-	-	-	0.15	0.90	1.05
9	1.65	1.00	2.65	0.54	3.01	3.55	2.19	4.01	6.20	-	-	-	2.19	4.01	6.20
11	0.36	0.70	1.06	0.45	4.07	4.52	0.81	4.77	5.58	-	-	-	0.81	4.77	5.58
12	0.49	0.32	0.81	0.55	0.35	0.90	1.04	0.67	1.71	-	-	-	1.04	0.67	1.71
BED TOTALS	4.13	2.55	6.68	2.03	8.66	10.69	6.16	11.21	17.37	-	-	-	6.16	11.21	17.37
Johnson															
T20N R79W															
5	0.26	0.05	0.31	-	-	-	0.26	0.05	0.31	-	-	-	0.26	0.05	0.31
7	0.12	0.47	0.59	-	-	-	0.12	0.47	0.59	-	-	-	0.12	0.47	0.59
9	0.03	0.11	0.14	-	0.13	0.13	0.03	0.24	0.27	-	-	-	0.03	0.24	0.27
11	0.07	0.22	0.29	-	0.06	0.06	0.07	0.28	0.35	-	-	-	0.07	0.28	0.35
13	0.16	0.01	0.17	-	-	-	0.16	0.01	0.17	-	-	-	0.16	0.01	0.17
14	0.01	-	0.01	-	-	-	0.01	-	0.01	-	-	-	0.01	-	0.01
T20N R80W															
5	0.20	0.22	0.42	0.04	0.08	0.12	0.24	0.30	0.54	-	-	-	0.24	0.30	0.54
7	0.24	0.35	0.59	0.61	0.64	1.25	0.85	0.99	1.84	-	-	-	0.85	0.99	1.84
9	0.16	0.15	0.31	0.11	1.92	2.03	0.27	2.07	2.34	-	-	-	0.27	2.07	2.34
11	0.91	1.55	2.46	0.35	2.27	2.72	1.26	3.82	5.08	-	-	-	1.26	3.82	5.08
13	1.36	1.14	2.50	0.27	0.62	0.89	1.63	1.76	3.39	-	-	-	1.63	1.76	3.39
14	0.28	0.20	0.48	-	-	-	0.28	0.20	0.48	-	-	-	0.28	0.20	0.48

Table 4. Continued

Coal Name	MEASURED RESERVE BASE			INDICATED RESERVE BASE			TOTAL RESERVE BASE			INFERRED RESOURCES			GRAND TOTAL		
Township,Range	Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):		
Thickness (feet)	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
Johnson (Cont.)															
T21N R79W															
5	0.11	0.05	0.16	0.43	0.54	0.97	0.54	0.59	1.13	-	-	-	0.54	0.59	1.13
7	0.24	0.31	0.55	0.65	0.59	1.24	0.89	0.90	1.79	-	-	-	0.89	0.90	1.79
9	0.57	0.17	0.74	1.05	1.76	2.81	1.62	1.93	3.55	-	-	-	1.62	1.93	3.55
11	1.86	0.45	2.31	0.40	2.82	3.22	2.26	3.27	5.53	-	-	-	2.26	3.27	5.53
13	2.03	0.74	2.77	0.23	0.39	0.62	2.26	1.13	3.39	-	-	-	2.26	1.13	3.39
14	0.40	-	0.40	-	-	-	0.40	-	0.40	-	-	-	0.40	-	0.40
15	-	-	-	-	0.22	0.22	-	0.22	0.22	-	-	-	-	0.22	0.22
T21N R80W															
5	0.05	0.13	0.18	-	0.04	0.04	0.50	0.17	0.22	-	-	-	0.50	0.17	0.22
7	0.04	0.14	0.18	0.03	0.02	0.05	0.07	0.16	0.23	-	-	-	0.07	0.16	0.23
9	0.26	0.12	0.38	0.09	1.11	1.20	0.35	1.23	1.58	-	-	-	0.35	1.23	1.58
11	0.73	0.20	0.93	0.10	1.85	1.95	0.83	2.05	2.88	-	-	-	0.83	2.05	2.88
13	1.57	0.56	2.13	0.25	1.61	1.86	1.82	2.17	3.99	-	-	-	1.82	2.17	3.99
15	0.61	1.94	2.55	0.30	2.07	2.37	0.91	4.01	4.92	-	-	-	0.91	4.01	4.92
17	0.46	2.77	3.23	0.68	4.55	5.23	1.14	7.32	8.46	-	-	-	1.14	7.32	8.46
19	0.48	0.68	1.16	0.68	8.24	8.92	1.16	8.92	10.08	-	-	-	1.16	8.92	10.08
21	0.31	0.27	0.58	0.09	2.16	2.25	0.40	2.43	2.83	-	-	-	0.40	2.43	2.83
23	0.18	0.21	0.39	0.02	1.62	1.64	0.20	1.83	2.03	-	-	-	0.20	1.83	2.03
BED TOTALS	13.70	13.21	26.91	6.38	35.31	41.69	20.08	48.52	68.60	-	-	-	20.08	48.52	68.60

Table 4. Continued

Coal Name Township, Range	MEASURED RESERVE BASE Overburden thickness (feet):			INDICATED RESERVE BASE Overburden thickness (feet):			TOTAL RESERVE BASE Overburden thickness (feet):			INFERRED RESOURCES Overburden thickness (feet):			GRAND TOTAL Overburden thickness (feet):		
Thickness (feet)	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
Carbon No. 4															
T22N R80W															
5	0.02	0.02	0.04	-	-	-	0.02	0.02	0.04	-	-	-	0.02	0.02	0.04
7	0.02	0.03	0.05	-	-	-	0.02	0.03	0.05	-	-	-	0.02	0.03	0.05
9	0.04	0.04	0.08	-	-	-	0.04	0.04	0.08	-	-	-	0.04	0.04	0.08
11	0.05	0.06	0.11	-	-	-	0.05	0.06	0.11	-	-	-	0.05	0.06	0.11
12.5	0.09	0.07	0.16	-	-	-	0.09	0.07	0.16	-	-	-	0.09	0.07	0.16
BED TOTALS	0.22	0.22	0.44	-	-	-	0.22	0.22	0.44	-	-	-	0.22	0.22	0.44
Carbon No. 5															
T22N R80W															
5	0.08	0.11	0.19	0.05	0.04	0.09	0.13	0.15	0.28	-	-	-	0.13	0.15	0.28
7	0.11	0.08	0.19	-	-	-	0.11	0.08	0.19	-	-	-	0.11	0.08	0.19
9	0.05	0.04	0.09	-	-	-	0.05	0.04	0.09	-	-	-	0.05	0.04	0.09
11	0.07	0.05	0.12	-	-	-	0.07	0.05	0.12	-	-	-	0.07	0.05	0.12
12.5	0.11	0.09	0.20	-	-	-	0.11	0.09	0.20	-	-	-	0.11	0.09	0.20
BED TOTALS	0.42	0.37	0.79	0.05	0.04	0.09	0.47	0.41	0.88	-	-	-	0.47	0.41	0.88
TOTALS CARBON MINING DISTRICT	29.05	20.53	49.58	13.60	55.68	69.28	42.65	76.21	118.86	.35	2.34	2.69	43.00	78.55	121.55

Table 4. Continued

Coal Name / Township, Range / Thickness (feet)	MEASURED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INDICATED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	TOTAL RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INFERRED RESOURCES Overburden thickness (feet): 0-100	100-200	0-200	GRAND TOTAL Overburden thickness (feet): 0-100	100-200	0-200
HANNA MINING DISTRICT															
Bed No. 89															
T23N R80W															
5	0.15	0.20	0.35	0.07	0.08	0.15	0.22	0.28	0.50	-	-	-	0.22	0.28	0.50
7	0.30	0.15	0.45	0.06	0.30	0.36	0.36	0.45	0.81	-	-	-	0.36	0.45	0.81
T23N R81W															
5	-	-	-	0.12	0.41	0.53	0.12	0.41	0.53	-	-	-	0.12	0.41	0.53
7	-	-	-	-	0.01	0.01	-	0.01	0.01	-	-	-	-	0.01	0.01
T24N R81W															
5	0.22	0.04	0.26	0.11	0.26	0.37	0.33	0.30	0.63	-	-	-	0.33	0.30	0.63
7	0.08	-	0.08	0.07	0.38	0.45	0.15	0.38	0.53	-	-	-	0.15	0.38	0.53
9	-	-	-	0.17	0.28	0.45	0.17	0.28	0.45	-	-	-	0.17	0.28	0.45
11	0.01	-	0.01	0.21	0.19	0.40	0.22	0.19	0.41	-	-	-	0.22	0.19	0.41
13	-	0.17	0.17	0.22	0.24	0.46	0.22	0.41	0.63	-	-	-	0.22	0.41	0.63
15	0.01	0.28	0.29	0.23	0.12	0.35	0.24	0.40	0.64	-	-	-	0.24	0.40	0.64
17	0.09	0.20	0.29	-	-	-	0.09	0.20	0.29	-	-	-	0.09	0.20	0.29
BED TOTALS	0.86	1.04	1.90	1.26	2.27	3.53	2.12	3.31	5.43	-	-	-	2.12	3.31	5.43
Bed No. RME 93															
T23N R80W															
5	0.10	-	0.10	0.04	0.04	0.08	0.14	0.40	0.18	0.04	0.03	0.07	0.18	0.70	0.25
7	0.20	0.06	0.26	0.07	0.11	0.18	0.27	0.17	0.44	0.08	0.05	0.13	0.35	0.22	0.57
9	0.11	0.37	0.48	-	0.21	0.21	0.11	0.58	0.69	0.15	0.13	0.28	0.26	0.71	0.97
11	-	0.16	0.16	-	0.18	0.18	-	0.34	0.34	0.20	0.18	0.38	0.20	0.52	0.72
13	-	-	-	-	0.09	0.09	-	0.09	0.09	0.22	0.18	0.40	0.22	0.27	0.49
15	-	-	-	-	0.01	0.01	-	0.01	0.01	-	0.08	0.08	-	0.09	0.09

Table 4. Continued

Coal Name	MEASURED RESERVE BASE			INDICATED RESERVE BASE			TOTAL RESERVE BASE			INFERRED RESOURCES			GRAND TOTAL		
Township,Range	Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):		
Thickness (feet)	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
RME 93 (Cont.)															
T23N R81W															
5	0.04	0.04	0.08	-	0.07	0.07	0.04	0.11	0.15	-	-	-	0.04	0.11	0.15
7	0.01	-	0.01	0.03	0.15	0.18	0.04	0.15	0.19	-	-	-	0.04	0.15	0.19
9	-	-	-	0.05	0.17	0.22	0.05	0.17	0.22	-	-	-	0.05	0.17	0.22
11	-	-	-	0.04	0.27	0.31	0.04	0.27	0.31	-	-	-	0.04	0.27	0.31
13	0.07	0.19	0.26	0.01	0.28	0.29	0.08	0.47	0.55	0.03	-	0.03	0.11	0.47	0.58
15	0.23	0.18	0.41	-	0.19	0.19	0.23	0.37	0.60	0.24	0.13	0.37	0.47	0.50	0.97
17	0.34	0.18	0.52	-	0.14	0.14	0.34	0.32	0.66	0.29	0.18	0.47	0.63	0.50	1.13
19	0.34	0.09	0.43	0.06	0.34	0.40	0.40	0.43	0.83	0.23	0.09	0.32	0.63	0.52	1.15
21	0.11	-	0.11	0.51	0.63	1.14	0.62	0.63	1.25	0.02	-	0.02	0.64	0.63	1.27
23	-	-	-	0.83	0.79	1.62	0.83	0.79	1.62	-	-	-	0.83	0.79	1.62
25	-	-	-	0.83	0.85	1.68	0.83	0.85	1.68	-	-	-	0.83	0.85	1.68
27	0.04	0.32	0.36	1.37	0.79	2.16	1.41	1.11	2.52	-	-	-	1.41	1.11	2.52
29	0.43	0.58	1.01	1.23	0.47	1.70	1.66	1.05	2.71	-	-	-	1.66	1.05	2.71
31	1.59	2.21	3.80	1.19	0.72	1.91	2.78	2.93	5.71	-	-	-	2.78	2.93	5.71
T24N R80W															
5	-	0.03	0.03	-	0.14	0.14	-	0.17	0.17	-	-	-	-	0.17	0.17
7	-	-	-	-	0.16	0.16	-	0.16	0.16	-	-	-	-	0.16	0.16
9	-	-	-	-	0.05	0.05	-	0.05	0.05	-	-	-	-	0.05	0.05
11	-	-	-	-	0.01	0.01	-	0.01	0.01	-	-	-	-	0.01	0.01
T24N R81W															
5	0.02	0.12	0.14	0.06	0.02	0.08	0.08	0.14	0.22	-	-	-	0.08	0.14	0.22
7	0.16	0.14	0.30	0.15	0.24	0.39	0.31	0.38	0.69	-	-	-	0.31	0.38	0.69
9	0.02	0.02	0.04	0.34	0.47	0.81	0.36	0.49	0.85	-	-	-	0.36	0.49	0.85
11	0.10	0.08	0.18	0.43	0.59	1.02	0.53	0.67	1.20	-	-	-	0.53	0.67	1.20
13	0.63	0.83	1.46	0.08	1.08	1.16	0.71	1.91	2.62	-	-	-	0.71	1.91	2.62
15	-	0.05	0.05	-	0.67	0.67	-	0.72	0.72	-	-	-	-	0.72	0.72
18.5	0.18	-	0.18	-	-	-	0.18	-	0.18	-	-	-	0.18	-	0.18

Table 4. Continued

Coal Name Township, Range Thickness (feet)	MEASURED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INDICATED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	TOTAL RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INFERRED RESOURCES Overburden thickness (feet): 0-100	100-200	0-200	GRAND TOTAL Overburden thickness (feet): 0-100	100-200	0-200
RME 93 (Cont.)															
23.5	0.15	-	0.15	-	-	-	0.15	-	0.15	-	-	-	0.15	-	0.15
BED TOTALS	4.87	5.65	10.52	7.32	9.93	17.25	12.19	15.58	27.77	1.50	1.05	2.55	13.69	16.63	30.32
Bed No. RME 92															
T23N R81W															
5	-	-	-	0.02	0.02	0.04	0.02	0.02	0.04	-	-	-	0.02	0.02	0.04
7	0.31	0.04	0.35	0.04	0.03	0.07	0.35	0.07	0.42	-	-	-	0.35	0.07	0.42
9	0.24	0.26	0.50	0.13	0.14	0.27	0.37	0.40	0.77	-	-	-	0.37	0.40	0.77
10	0.21	0.11	0.32	-	-	-	0.21	0.11	0.32	-	-	-	0.21	0.11	0.32
11	0.13	0.07	0.20	0.01	0.08	0.09	0.14	0.15	0.29	-	-	-	0.14	0.15	0.29
13	0.21	0.11	0.32	0.01	0.19	0.20	0.22	0.30	0.52	0.19	0.08	0.27	0.41	0.38	0.79
15	0.22	0.16	0.38	0.20	0.32	0.52	0.42	0.48	0.90	0.01	-	0.01	0.43	0.48	0.91
17	0.07	0.12	0.19	0.36	0.38	0.74	0.43	0.50	0.93	-	-	-	0.43	0.50	0.93
18	-	-	-	0.44	0.44	0.88	0.44	0.44	0.88	-	-	-	0.44	0.44	0.88
BED TOTALS	1.39	0.87	2.26	1.21	1.60	2.81	2.60	2.47	5.07	0.20	0.08	0.28	2.80	2.55	5.35
Bed No. 88															
T23N R81W															
5	0.04	0.02	0.06	0.02	0.03	0.05	0.06	0.05	0.11	-	-	-	0.06	0.05	0.11
7	0.07	0.06	0.13	-	-	-	0.07	0.06	0.13	-	-	-	0.07	0.06	0.13
9	0.07	0.06	0.13	-	-	-	0.07	0.06	0.13	-	-	-	0.07	0.06	0.13
BED TOTALS	0.18	0.14	0.32	0.02	0.03	0.05	0.20	0.17	0.37	-	-	-	0.20	0.17	0.37

Table 4. Continued

Coal Name	MEASURED RESERVE BASE			INDICATED RESERVE BASE			TOTAL RESERVE BASE			INFERRED RESOURCES			GRAND TOTAL		
Township,Range	Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):		
Thickness (feet)	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
Bed No. 87															
T23N R81W															
5	0.29	0.34	0.63	-	-	-	0.29	0.34	0.63	-	-	-	0.29	0.34	0.63
6.5	0.13	0.03	0.16	-	-	-	0.13	0.03	0.16	-	-	-	0.13	0.03	0.16
BED TOTALS	0.42	0.37	0.79	-	-	-	0.42	0.37	0.79	-	-	-	0.42	0.37	0.79
Bed No. 86															
T23N R81W															
5	0.04	0.33	0.73	0.12	0.22	0.34	0.52	0.55	1.07	-	-	-	0.52	0.55	1.07
6	0.08	0.15	0.23	-	-	-	0.08	0.15	0.23	-	-	-	0.08	0.15	0.23
7	0.22	0.35	0.57	0.10	0.09	0.19	0.32	0.44	0.76	-	-	-	0.32	0.44	0.76
9	0.61	0.54	1.15	0.36	0.37	0.73	0.97	0.91	1.88	-	-	-	0.97	0.91	1.88
10	0.07	0.12	0.19	0.32	0.62	0.94	0.39	0.74	1.13	-	-	-	0.39	0.74	1.13
11	0.09	0.40	0.49	-	0.03	0.03	0.90	0.43	0.52	-	-	-	0.90	0.43	0.52
BED TOTALS	1.47	1.89	3.36	0.90	1.33	2.23	2.37	3.22	5.59	-	-	-	2.37	3.22	5.59
Bed No. 84															
T23N R81W															
4.5	0.18	0.25	0.43	0.01	0.04	0.05	0.19	0.29	0.48	-	-	-	0.19	0.29	0.48
5	0.27	0.29	0.56	0.11	0.12	0.23	0.38	0.41	0.79	-	-	-	0.38	0.41	0.79
6	0.06	0.07	0.13	-	-	-	0.06	0.07	0.13	-	-	-	0.06	0.07	0.13
BED TOTALS	0.51	0.61	1.12	0.12	0.16	0.28	0.63	0.77	1.40	-	-	-	0.63	0.77	1.40

Table 4. Continued

Coal Name	MEASURED RESERVE BASE			INDICATED RESERVE BASE			TOTAL RESERVE BASE			INFERRED RESOURCES			GRAND TOTAL		
Township,Range	Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):		
Thickness (feet)	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
Bed No. 83															
T23N R80W															
4.5	-	-	-	0.49	0.15	0.64	0.49	0.15	0.64	0.19	0.35	0.54	0.68	0.50	1.18
5.5	-	-	-	0.06	0.15	0.21	0.06	0.15	0.21	-	-	-	0.06	0.15	0.21
7	-	-	-	0.09	0.03	0.12	0.09	0.03	0.12	-	-	-	0.09	0.03	0.12
9	-	-	-	-	0.03	0.03	-	0.03	0.03	-	-	-	-	0.03	0.03
T23N R81W															
4.5	0.59	0.49	1.08	0.28	0.25	0.53	0.87	0.74	1.61	-	-	-	0.87	0.74	1.61
5.5	0.41	0.41	0.82	0.61	0.42	1.03	1.02	0.83	1.85	-	-	-	1.02	0.83	1.85
7	1.18	0.96	2.14	1.34	1.45	2.79	2.52	2.41	4.93	-	-	-	2.52	2.41	4.93
9	-	0.16	0.16	-	-	-	0.00	0.16	0.16	-	-	-	-	0.16	0.16
BED TOTALS	2.18	2.02	4.20	2.87	2.48	5.35	5.05	4.50	9.55	0.19	0.35	0.54	5.24	4.85	10.09
Bed No. 82															
T23N R80W															
7	0.07	0.22	0.29	-	-	-	0.07	0.22	0.29	-	-	-	0.07	0.22	0.29
8	0.30	0.09	0.39	1.48	1.55	3.03	1.78	1.64	3.42	0.04	0.12	0.16	1.82	1.76	3.58
9	0.56	0.61	1.17	0.45	0.71	1.16	1.01	1.32	2.33	-	-	-	1.01	1.32	2.33
11	0.46	0.49	0.95	0.39	1.23	1.62	0.85	1.72	2.57	-	-	-	0.85	1.72	2.57
13	0.90	1.32	2.22	0.43	1.70	2.13	1.33	3.02	4.35	-	-	-	1.33	3.02	4.35
14.5	0.33	0.05	0.38	0.35	0.06	0.41	0.68	0.11	0.79	-	-	-	0.68	0.11	0.79
15	0.66	0.96	1.62	0.63	0.32	0.95	1.29	1.28	2.57	-	-	-	1.29	1.28	2.57
16.5	2.16	0.16	2.32	1.94	-	1.94	4.10	0.16	4.26	-	-	-	4.10	0.16	4.26
T23N R81W															
5	0.47	0.49	0.96	0.16	0.28	0.44	0.63	0.77	1.40	-	-	-	0.63	0.77	1.40
6	0.11	0.29	0.40	0.04	0.14	0.18	0.15	0.43	0.58	-	-	-	0.15	0.43	0.58
7	0.85	1.80	2.65	-	0.09	0.09	0.85	1.89	2.74	-	-	-	0.85	1.89	2.74
8	0.04	0.05	0.09	-	-	-	0.04	0.05	0.09	-	-	-	0.04	0.05	0.09

Table 4. Continued

Coal Name	MEASURED RESERVE BASE			INDICATED RESERVE BASE			TOTAL RESERVE BASE			INFERRED RESOURCES			GRAND TOTAL		
Township,Range	Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):		
Thickness (feet)	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
Bed No. 82 (Cont.)															
T23N R81W															
9	0.87	4.03	4.90	-	0.11	0.11	0.87	4.14	5.01	-	-	-	0.87	4.14	5.01
10	0.98	0.41	1.39	0.40	0.48	0.88	1.38	0.89	2.27	-	-	-	1.38	0.89	2.27
11	0.25	1.46	1.71	-	-	-	0.25	1.46	1.71	-	-	-	0.25	1.46	1.71
12	0.35	0.11	0.46	-	-	-	0.35	0.11	0.46	-	-	-	0.35	0.11	0.46
BED TOTALS	9.36	12.54	21.90	6.27	6.67	12.94	15.63	19.21	34.84	0.04	0.12	0.16	15.67	19.33	35.00
Hanna No. 1															
T22N R81W															
4	0.04	0.01	0.05	-	-	-	0.04	0.01	0.05	-	-	-	0.04	0.01	0.05
5	0.08	0.08	0.16	-	-	-	0.08	0.08	0.16	-	-	-	0.08	0.08	0.16
7	0.41	0.22	0.63	-	-	-	0.41	0.22	0.63	-	-	-	0.41	0.22	0.63
9	0.26	0.26	0.52	-	-	-	0.26	0.26	0.52	-	-	-	0.26	0.26	0.52
10	-	-	-	0.39	-	0.39	0.39	-	0.39	-	-	-	0.39	-	0.39
11	0.06	0.11	0.17	-	-	-	0.06	0.11	0.17	-	-	-	0.06	0.11	0.17
13	0.55	0.20	0.75	-	-	-	0.55	0.20	0.75	-	-	-	0.55	0.20	0.75
15	0.80	0.35	1.15	-	-	-	0.80	0.35	1.15	-	-	-	0.80	0.35	1.15
17	1.07	0.48	1.55	-	-	-	1.07	0.48	1.55	-	-	-	1.07	0.48	1.55
18	0.75	0.40	1.15	-	-	-	0.75	0.40	1.15	-	-	-	0.75	0.40	1.15
19	3.46	1.18	4.64	0.52	0.22	0.74	3.98	1.40	5.38	-	-	-	3.98	1.40	5.38
20	0.39	0.16	0.55	-	-	-	0.39	0.16	0.55	-	-	-	0.39	0.16	0.55
21	1.79	2.05	3.84	0.66	0.25	0.91	2.45	2.30	4.75	-	-	-	2.45	2.30	4.75
22	0.24	-	0.24	-	-	-	0.24	-	0.24	-	-	-	0.24	-	0.24
23	1.38	0.86	2.24	0.12	-	0.12	1.50	0.86	2.36	-	-	-	1.40	0.86	2.36
24	0.04	-	0.04	-	-	-	0.04	-	0.04	-	-	-	0.04	-	0.04

Table 4. Continued

Coal Name	MEASURED RESERVE BASE			INDICATED RESERVE BASE			TOTAL RESERVE BASE			INFERRED RESOURCES			GRAND TOTAL		
Township,Range	Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):		
Thickness (feet)	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
Hanna No. 1 (Cont.)															
T22N R81W															
25	0.17	0.09	0.26	-	-	-	0.17	0.09	0.26	-	-	-	0.17	0.09	0.26
26	0.10	0.08	0.18	-	-	-	0.10	0.08	0.18	-	-	-	0.10	0.08	0.18
27	0.13	-	0.13	-	-	-	0.13	-	0.13	-	-	-	0.13	-	0.13
BED TOTALS	11.72	6.53	18.25	1.69	0.47	2.16	13.41	7.00	20.41	-	-	-	13.41	7.00	20.41
Bed No. 80															
T23N R80W															
5	0.29	0.31	0.60	0.02	0.02	0.04	0.31	0.33	0.64	-	-	-	0.31	0.33	0.64
7	0.15	0.55	0.70	0.03	0.41	0.44	0.18	0.96	1.14	-	-	-	0.18	0.96	1.14
9	0.73	1.07	1.80	0.13	0.18	0.31	0.86	1.25	2.11	-	-	-	0.86	1.25	2.11
11	0.23	0.18	0.41	0.33	0.71	1.04	0.56	0.89	1.45	-	-	-	0.56	0.89	1.45
13	0.60	0.23	0.83	1.02	1.92	2.94	1.62	2.15	3.77	-	-	-	1.62	2.15	3.77
15	0.62	-	0.62	1.05	1.63	2.68	1.67	1.63	3.30	0.14	0.13	0.27	1.81	1.76	3.57
T23N R81W															
7	0.02	0.05	0.07	-	0.04	0.04	0.02	0.09	0.11	-	-	-	0.02	0.09	0.11
9	0.03	-	0.03	0.21	0.37	0.58	0.24	0.37	0.61	-	-	-	0.24	0.37	0.61
11	0.33	0.28	0.61	0.39	0.77	1.16	0.72	1.05	1.77	-	-	-	0.72	1.05	1.77
13	0.19	0.52	0.71	0.34	0.33	0.67	0.53	0.85	1.38	-	-	-	0.53	0.85	1.38
15	0.15	0.57	0.72	0.22	0.59	0.81	0.37	1.16	1.53	-	-	-	0.37	1.16	1.53
17	0.06	1.11	1.17	0.03	0.03	0.06	0.09	1.14	1.23	-	-	-	0.09	1.14	1.23
18	-	0.29	0.29	-	-	-	-	0.29	0.29	-	-	-	-	0.29	0.29
19	0.30	0.55	0.85	-	-	-	0.30	0.55	0.85	-	-	-	0.30	0.55	0.85
21	0.76	2.83	3.59	-	0.49	0.49	0.76	3.32	4.08	-	-	-	0.76	3.32	4.08
23	1.23	2.22	3.45	0.14	-	0.14	1.37	2.22	3.59	-	-	-	1.37	2.22	3.59
25	3.32	2.91	6.23	0.33	0.13	0.46	3.65	3.04	6.69	-	-	-	3.65	3.04	6.69
26	0.63	0.71	1.34	0.11	0.13	0.24	0.74	0.84	1.58	-	-	-	0.74	0.84	1.58
T23N R82W															
5	0.19	0.21	0.40	0.28	0.34	0.62	0.47	0.55	1.02	-	-	-	0.47	0.55	1.02

Table 4. Continued

Coal Name / Township, Range / Thickness (feet)	MEASURED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INDICATED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	TOTAL RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INFERRED RESOURCES Overburden thickness (feet): 0-100	100-200	0-200	GRAND TOTAL Overburden thickness (feet): 0-100	100-200	0-200
Bed No. 80 (Cont.)															
T23N R82W															
7	0.19	0.28	0.47	0.06	0.08	0.14	0.25	0.36	0.61	-	-	-	0.25	0.36	0.61
9	0.01	-	0.01	-	-	-	0.01	-	0.01	-	-	-	0.01	-	0.01
BED TOTALS	10.03	14.87	24.90	4.69	8.17	12.86	14.72	23.04	37.76	0.14	0.13	0.27	14.86	23.17	38.03
Bed No. 79															
T22N R81W															
5	0.50	0.25	0.75	0.17	0.30	0.47	0.67	0.55	1.22	-	-	-	0.67	0.55	1.22
7	0.22	0.13	0.35	0.45	0.40	0.85	0.67	0.53	1.20	-	-	-	0.67	0.53	1.20
9	1.25	0.07	1.32	0.58	0.76	1.34	1.83	0.83	2.66	-	-	-	1.83	0.83	2.66
11	0.73	0.66	1.39	0.18	1.93	2.11	0.91	2.59	3.50	-	-	-	0.91	2.59	3.50
13	0.10	0.27	0.37	0.43	0.34	0.77	0.53	0.61	1.14	-	-	-	0.53	0.61	1.14
15	0.21	0.56	0.77	0.18	0.15	0.33	0.39	0.71	1.10	-	-	-	0.39	0.71	1.10
17	0.44	0.47	0.91	0.04	-	0.04	0.48	0.47	0.95	-	-	-	0.48	0.47	0.95
T23N R80W															
5	0.02	0.07	0.27	0.15	0.15	0.30	0.35	0.22	0.57	0.01	-	0.01	0.36	0.22	0.58
7	0.15	0.35	0.50	0.05	0.11	0.16	0.20	0.46	0.66	-	-	-	0.20	0.46	0.66
T23N R81W															
5	-	-	-	0.09	0.02	0.11	0.09	0.02	0.11	0.10	-	0.10	0.19	0.02	0.21
7	-	-	-	0.13	0.25	0.38	0.13	0.25	0.38	0.24	0.58	0.82	0.37	0.83	1.20
11	0.10	0.03	0.13	0.26	0.04	0.30	0.36	0.07	0.43	-	-	-	0.36	0.07	0.43
12	-	0.01	0.01	-	-	-	-	0.01	0.01	-	-	-	-	0.01	0.01
13	0.04	0.66	0.70	0.44	0.51	0.95	0.48	1.17	1.65	-	-	-	0.48	1.17	1.65
14	0.15	0.17	0.32	-	-	-	0.15	0.17	0.32	-	-	-	0.15	0.17	0.32
15	0.54	1.20	1.74	0.44	1.95	2.39	0.98	3.15	4.13	-	-	-	0.98	3.15	4.13
17	0.64	1.05	1.69	1.17	1.29	2.46	1.81	2.34	4.15	-	-	-	1.81	2.34	4.15
19	0.45	1.40	1.85	0.58	1.00	1.58	1.03	2.40	3.43	-	-	-	1.03	2.40	3.43
21	0.33	0.20	0.53	-	-	-	0.33	0.20	0.53	-	-	-	0.33	0.20	0.53
23	0.73	0.27	1.00	-	-	-	0.73	0.27	1.00	-	-	-	0.73	0.27	1.00

Table 4. Continued

Coal Name	MEASURED RESERVE BASE			INDICATED RESERVE BASE			TOTAL RESERVE BASE			INFERRED RESOURCES			GRAND TOTAL		
Township,Range	Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):		
Thickness (feet)	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
Bed No. 79 (Cont.)															
T23N R82W															
5	0.02	0.02	0.04	-	-	-	0.02	0.02	0.04	-	-	-	0.02	0.02	0.04
7	0.04	0.02	0.06	-	0.01	0.01	0.04	0.03	0.07	-	-	-	0.04	0.03	0.07
9	0.01	-	0.01	0.07	0.06	0.13	0.08	0.06	0.14	-	-	-	0.08	0.06	0.14
11	-	-	-	0.10	0.10	0.20	0.10	0.10	0.20	-	-	-	0.10	0.10	0.20
13	0.14	0.13	0.27	0.02	-	0.02	0.16	0.13	0.29	-	-	-	0.16	0.13	0.29
15	0.07	-	0.07	-	-	-	0.07	-	0.07	-	-	-	0.07	-	0.07
BED TOTALS	7.06	7.99	15.05	5.53	9.37	14.90	12.59	17.36	29.95	0.35	0.58	0.93	12.94	17.94	30.88
Bed No. 78															
T22N R81W															
5	0.26	0.17	0.43	0.10	-	0.10	0.36	0.17	0.53	-	-	-	0.36	0.17	0.53
7	1.30	0.89	2.19	0.46	0.43	0.89	1.76	1.32	3.08	-	-	-	1.76	1.32	3.08
8	0.04	0.06	0.10	-	-	-	0.04	0.06	0.10	-	-	-	0.04	0.06	0.10
9	0.82	0.75	1.57	0.66	0.63	1.29	1.48	1.38	2.86	-	-	-	1.48	1.38	2.86
10	0.06	-	0.06	0.68	0.49	1.17	0.74	0.49	1.23	-	-	-	0.74	0.49	1.23
11	2.86	2.24	5.10	0.35	0.55	0.90	3.21	2.79	6.00	-	-	-	3.21	2.79	6.00
12	0.10	0.20	0.30	-	-	-	0.10	0.20	0.30	-	-	-	0.10	0.20	0.30
13	0.66	0.66	1.32	0.14	0.10	0.24	0.80	0.76	1.56	-	-	-	0.80	0.76	1.56
15	0.36	0.45	0.81	0.10	0.29	0.39	0.46	0.74	1.20	-	-	-	0.46	0.74	1.20
17	0.22	0.25	0.47	0.07	0.28	0.35	0.29	0.53	0.82	-	-	-	0.29	0.53	0.82
19	0.22	0.17	0.39	-	0.34	0.34	0.22	0.51	0.73	-	-	-	0.22	0.51	0.73
21	0.25	0.48	0.73	-	0.30	0.30	0.25	0.78	1.03	-	-	-			
BED TOTALS	7.15	6.32	13.47	2.56	3.41	5.97	9.71	9.73	19.44	-	-	-	9.71	9.73	19.44

Table 4. Continued

Coal Name / Township, Range / Thickness (feet)	MEASURED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INDICATED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	TOTAL RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INFERRED RESOURCES Overburden thickness (feet): 0-100	100-200	0-200	GRAND TOTAL Overburden thickness (feet): 0-100	100-200	0-200
Bed No. 77															
T22N R81W															
5	1.06	0.63	1.69	0.08	0.17	0.25	1.14	0.80	1.94	-	-	-	1.14	0.80	1.94
6	0.11	0.12	0.23	-	-	-	0.11	0.12	0.23	-	-	-	0.11	0.12	0.23
7	0.79	0.99	1.78	0.42	0.81	1.23	1.21	1.80	3.01	-	-	-	1.21	1.80	3.01
8	0.02	-	0.02	-	-	-	0.02	-	0.02	-	-	-	0.02	-	0.02
9	0.38	0.54	0.92	0.02	0.24	0.26	0.40	0.78	1.18	-	-	-	0.40	0.78	1.18
BED TOTALS	2.36	2.28	4.64	0.52	1.22	1.74	2.88	3.50	6.38	-	-	-	2.88	3.50	6.38
Hanna No. 2															
T22N R81W															
27	0.30	-	0.30	0.09	-	0.09	0.39	-	0.39	-	-	-	0.39	-	0.39
29	0.13	-	0.13	0.27	-	0.27	0.40	-	0.40	-	-	-	0.40	-	0.40
31	0.28	0.24	0.52	0.37	0.07	0.44	0.65	0.31	0.96	-	-	-	0.65	0.31	0.96
33	0.64	0.04	0.68	0.49	0.40	0.89	1.13	0.44	1.57	-	-	-	1.13	0.44	1.57
35	-	0.16	0.16	0.53	0.19	0.72	0.53	0.35	0.88	-	-	-	0.53	0.35	0.88
37	0.03	0.54	0.57	0.55	0.03	0.58	0.58	0.57	1.15	-	-	-	0.58	0.57	1.15
38	0.49	0.07	0.56	0.40	-	0.40	0.89	0.07	0.96	-	-	-	0.89	0.07	0.96
T22N R82W															
5	0.04	0.03	0.07	-	-	-	0.04	0.03	0.07	-	-	-	0.04	0.03	0.07
7	0.02	0.01	0.03	-	-	-	0.02	0.01	0.03	-	-	-	0.02	0.01	0.03
9	0.01	0.02	0.03	-	-	-	0.01	0.02	0.03	-	-	-	0.01	0.02	0.03
11	0.02	0.02	0.04	-	-	-	0.02	0.02	0.04	-	-	-	0.02	0.02	0.04
13	0.03	0.04	0.07	-	-	-	0.03	0.04	0.07	-	-	-	0.03	0.04	0.07
15	0.04	0.03	0.07	-	-	-	0.04	0.03	0.07	-	-	-	0.04	0.03	0.07
17	0.10	0.09	0.19	-	-	-	0.10	0.09	0.19	-	-	-	0.10	0.09	0.19
19	0.11	0.07	0.18	-	-	-	0.11	0.07	0.18	-	-	-	0.11	0.07	0.18
21	0.11	-	0.11	-	-	-	0.11	-	0.11	-	-	-	0.11	-	0.11

Table 4. Continued

Coal Name	MEASURED RESERVE BASE			INDICATED RESERVE BASE			TOTAL RESERVE BASE			INFERRED RESOURCES			GRAND TOTAL		
Township,Range	Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):		
Thickness (feet)	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
Hanna No. 2 (Cont.)															
T22N R82W															
23	-	-	-	0.09	-	0.09	0.09	-	0.09	-	-	-	0.09	-	0.09
25	-	-	-	0.16	-	0.16	0.16	-	0.16	-	-	-	0.16	-	0.16
27	-	-	-	0.16	-	0.16	0.16	-	0.16	-	-	-	0.16	-	0.16
29	-	-	-	0.08	-	0.08	0.08	-	0.08	-	-	-	0.08	-	0.08
T23N R81W															
5	0.09	0.07	0.16	0.03	0.07	0.10	0.12	0.14	0.26	-	-	-	0.12	0.14	0.26
7	-	0.03	0.03	0.13	0.22	0.35	0.13	0.25	0.38	-	-	-	0.13	0.25	0.38
8	-	-	-	-	0.02	0.02	-	0.02	0.02	-	-	-	-	0.02	0.02
9	-	0.37	0.37	0.06	0.13	0.19	0.06	0.50	0.56	-	-	-	0.06	0.50	0.56
11	-	0.08	0.08	0.04	0.01	0.05	0.04	0.09	0.13	-	-	-	0.04	0.09	0.13
13	0.02	0.07	0.09	0.06	-	0.06	0.08	0.07	0.15	-	-	-	0.08	0.07	0.15
15	0.07	0.09	0.16	0.09	-	0.09	0.16	0.09	0.25	-	-	-	0.16	0.09	0.25
17	0.06	0.12	0.18	0.05	-	0.05	0.11	0.12	0.23	-	-	-	0.11	0.12	0.23
19	0.01	0.22	0.23	-	-	-	0.01	0.22	0.23	-	-	-	0.01	0.22	0.23
21	-	0.25	0.25	-	-	-	-	0.25	0.25	-	-	-	-	0.25	0.25
23	-	0.66	0.66	-	-	-	-	0.66	0.66	-	-	-	-	0.66	0.66
25	-	0.74	0.74	-	-	-	-	0.74	0.74	-	-	-	-	0.74	0.74
BED TOTALS	2.60	4.06	6.66	3.65	1.14	4.79	6.25	5.20	11.45	-	-	-	6.25	5.20	11.45
Bed No. 76															
T22N R81W															
9	0.31	0.36	0.67	-	0.06	0.06	0.31	0.42	0.73	-	-	-	0.31	0.42	0.73
10	0.53	-	0.53	-	-	-	0.53	-	0.53	-	-	-	0.53	-	0.53
11	0.67	0.12	0.79	0.03	0.13	0.16	0.70	0.25	0.95	-	-	-	0.70	0.25	0.95
13	0.74	0.26	1.00	0.11	0.15	0.26	0.85	0.41	1.26	-	-	-	0.85	0.41	1.26
15	1.07	0.48	1.55	0.13	0.16	0.29	1.20	0.64	1.84	-	-	-	1.20	0.64	1.84
17	2.11	0.97	3.08	0.14	0.39	0.53	2.25	1.36	3.61	-	-	-	2.25	1.36	3.61
19	0.78	0.14	0.92	0.05	0.36	0.41	0.83	0.50	1.33	-	-	-	0.83	0.50	1.33

Table 4. Continued

Coal Name	MEASURED RESERVE BASE			INDICATED RESERVE BASE			TOTAL RESERVE BASE			INFERRED RESOURCES			GRAND TOTAL		
Township,Range	Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):		
Thickness (feet)	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
Bed No. 76 (Cont.)															
T22N R81W															
21	1.09	0.42	1.51	0.10	0.23	0.33	1.19	0.65	1.84	-	-	-	1.19	0.65	1.84
23	0.55	1.03	1.58	0.23	0.81	1.04	0.78	1.84	2.62	-	-	-	0.78	1.84	2.62
25	0.35	0.15	0.50	-	0.26	0.26	0.35	0.41	0.76	-	-	-	0.35	0.41	0.76
27	0.26	0.07	0.33	-	0.27	0.27	0.26	0.34	0.60	-	-	-	0.26	0.34	0.60
28	0.27	0.01	0.28	-	0.24	0.24	0.27	0.25	0.52	-	-	-	0.27	0.25	0.52
T23N R81W															
7	-	-	-	0.12	-	0.12	0.12	-	0.12	-	-	-	0.12	-	0.12
9	1.67	0.81	2.48	0.24	-	0.24	1.91	0.81	2.72	-	-	-	1.91	0.81	2.72
11	0.21	0.60	0.81	-	-	-	0.21	0.60	0.81	-	-	-	0.21	0.60	0.81
13	0.04	0.39	0.43	-	-	-	0.04	0.39	0.43	-	-	-	0.04	0.39	0.43
15	-	0.18	0.18	-	-	-	-	0.18	0.18	-	-	-	-	0.18	0.18
BED TOTALS	10.65	5.99	16.64	1.15	3.06	4.21	11.80	9.05	20.85	-	-	-	11.80	9.05	20.85
Bed No. 75															
T22N R81W															
4	0.04	-	0.04	-	-	-	0.04	-	0.04	-	-	-	0.04	-	0.04
5	0.29	0.24	0.53	0.01	0.02	0.03	0.30	0.26	0.56	-	-	-	0.30	0.26	0.56
7	0.53	0.44	0.97	0.03	0.24	0.27	0.56	0.68	1.24	-	-	-	0.56	0.68	1.24
9	0.95	1.72	2.67	0.56	1.63	2.19	1.51	3.35	4.86	-	-	-	1.51	3.35	4.86
11	0.09	0.05	0.14	-	-	-	0.09	0.05	0.14	-	-	-	0.09	0.05	0.14
T23N R81W															
4	0.01	-	0.01	-	-	-	0.01	-	0.01	-	-	-	0.01	-	0.01
5	0.11	0.01	0.12	0.33	0.03	0.36	0.44	0.04	0.48	-	-	-	0.44	0.04	0.48
7	0.25	0.30	0.55	0.34	0.95	1.29	0.59	1.25	1.84	-	-	-	0.59	1.25	1.84
BED TOTALS	2.27	2.76	5.03	1.27	2.87	4.14	2.54	5.63	9.17	-	-	-	3.54	5.63	9.17

Table 4. Continued

Coal Name / Township, Range / Thickness (feet)	MEASURED RESERVE BASE Overburden thickness (feet):			INDICATED RESERVE BASE Overburden thickness (feet):			TOTAL RESERVE BASE Overburden thickness (feet):			INFERRED RESOURCES Overburden thickness (feet):			GRAND TOTAL Overburden thickness (feet):		
	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
Bed No. 74															
T22N R81W															
5	-	-	-	0.09	0.23	0.32	0.09	0.23	0.32	0.02	0.05	0.07	0.11	0.28	0.39
7	0.38	0.37	0.75	0.14	0.32	0.46	0.52	0.69	1.21	-	-	-	0.52	0.69	1.21
9	0.53	0.48	1.01	0.42	0.83	1.25	0.95	1.31	2.26	-	-	-	0.95	1.31	2.26
11	0.48	0.51	0.99	0.09	0.20	0.29	0.57	0.71	1.28	-	-	-	0.57	0.71	1.28
T23N R81W															
5	0.16	0.31	0.47	0.26	0.41	0.67	0.42	0.72	1.14	-	-	-	0.42	0.72	1.14
6	0.26	0.07	0.33	-	-	-	0.26	0.07	0.33	-	-	-	0.26	0.07	0.33
7	0.23	0.29	0.52	0.05	0.11	0.16	0.28	0.40	0.68	-	-	-	0.28	0.40	0.68
BED TOTALS	2.04	2.03	4.07	1.05	2.10	3.15	3.09	4.13	7.22	0.02	0.05	0.07	3.11	4.18	7.29
Bed No. 73															
T23N R81W															
5	0.06	0.05	0.11	0.16	0.11	0.27	0.22	0.16	0.38	-	-	-	0.22	0.16	0.38
7	0.19	0.20	0.39	0.08	-	0.08	0.27	0.20	0.47	-	-	-	0.27	0.20	0.47
8	0.15	0.10	0.25	0.02	-	0.02	0.17	0.10	0.27	-	-	-	0.17	0.10	0.27
BED TOTALS	0.40	0.35	0.75	0.26	0.11	0.37	0.66	0.46	1.12	-	-	-	0.66	0.46	1.12
Hanna No. 5															
T22N R81W															
6	0.14	0.21	0.35	0.22	0.19	0.41	0.36	0.40	0.76	-	-	-	0.36	0.40	0.76
7	0.24	0.18	0.42	0.16	0.09	0.25	0.40	0.27	0.67	-	-	-	0.40	0.27	0.67
9	0.67	0.43	1.10	-	-	-	0.67	0.43	1.10	-	-	-	0.67	0.43	1.10
11	0.49	0.85	1.34	-	-	-	0.49	0.85	1.34	-	-	-	0.49	0.85	1.34

Table 4. Continued

Coal Name / Township, Range / Thickness (feet)	MEASURED RESERVE BASE Overburden thickness (feet):			INDICATED RESERVE BASE Overburden thickness (feet):			TOTAL RESERVE BASE Overburden thickness (feet):			INFERRED RESOURCES Overburden thickness (feet):			GRAND TOTAL Overburden thickness (feet):		
	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
Hanna No. 5 (Cont.)															
T22N R81W															
12	0.01	0.13	0.14	-	-	-	0.01	0.13	0.14	-	-	-	0.01	0.13	0.14
13	0.16	0.02	0.18	-	-	-	0.16	0.02	0.18	-	-	-	0.16	0.02	0.18
14	0.16	-	0.16	-	-	-	0.16	-	0.16	-	-	-	0.16	-	0.16
T22N R82W															
5	0.03	-	0.03	0.02	0.02	0.04	0.05	0.02	0.07	-	-	-	0.05	0.02	0.07
6	-	-	-	0.01	-	0.01	0.01	-	0.01	-	-	-	0.01	-	0.01
7	0.12	0.06	0.18	0.06	0.03	0.09	0.18	0.09	0.27	-	-	-	0.18	0.09	0.27
9	0.13	0.12	0.25	-	-	-	0.13	0.12	0.25	-	-	-	0.13	0.12	0.25
11	0.17	0.17	0.34	-	-	-	0.17	0.17	0.34	-	-	-	0.17	0.17	0.34
13	0.21	0.21	0.42	-	-	-	0.21	0.21	0.42	-	-	-	0.21	0.21	0.42
14	0.03	-	0.03	-	-	-	0.03	-	0.03	-	-	-	0.03	-	0.03
15	0.19	0.12	0.31	0.04	0.03	0.07	0.23	0.15	0.38	-	-	-	0.23	0.15	0.38
17	0.20	0.06	0.26	0.02	0.10	0.12	0.22	0.16	0.38	-	-	-	0.22	0.16	0.38
19	0.19	0.28	0.47	-	-	-	0.19	0.28	0.47	-	-	-	0.19	0.28	0.47
21	0.67	0.46	1.13	0.16	0.02	0.18	0.83	0.48	1.31	-	-	-	0.83	0.48	1.31
23	0.51	0.31	0.82	0.20	0.22	0.42	0.71	0.53	1.24	-	-	-	0.71	0.53	1.24
25	0.43	0.50	0.93	-	0.23	0.23	0.43	0.73	1.16	-	-	-	0.43	0.73	1.16
27	0.30	0.39	0.69	-	-	-	0.30	0.39	0.69	-	-	-	0.30	0.39	0.69
29	0.26	0.19	0.45	-	-	-	0.26	0.19	0.45	-	-	-	0.26	0.19	0.45
31	0.18	0.11	0.29	-	-	-	0.18	0.11	0.29	-	-	-	0.18	0.11	0.29
R23N R81W															
5	0.04	0.42	0.46	-	0.01	0.01	0.04	0.43	0.47	-	-	-	0.04	0.43	0.47
7	0.06	0.13	0.19	-	-	-	0.06	0.13	0.19	-	-	-	0.06	0.13	0.19
8	-	0.01	0.01	-	-	-	-	0.01	0.01	-	-	-	-	0.01	0.01
9	0.02	0.06	0.08	-	-	-	0.02	0.06	0.08	-	-	-	0.02	0.06	0.08
T23N R82W															
5	0.07	0.01	0.08	-	-	-	0.07	0.01	0.08	-	-	-	0.07	0.01	0.08
7	0.12	-	0.12	-	-	-	0.12	-	0.12	-	-	-	0.12	-	0.12

Table 4. Continued

Coal Name Township, Range Thickness (feet)	MEASURED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INDICATED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	TOTAL RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INFERRED RESOURCES Overburden thickness (feet): 0-100	100-200	0-200	GRAND TOTAL Overburden thickness (feet): 0-100	100-200	0-200
Hanna No. 5 Cont.)															
T23N R82W															
BED TOTALS	5.80	5.43	11.23	0.89	0.94	1.83	6.69	6.37	13.06	-	-	-	6.69	6.37	13.06
Hanna No. 5 Lower Bench															
T22N R81W															
8	0.77	0.80	1.57	0.15	0.23	0.38	0.92	1.03	1.95	-	-	-	0.92	1.03	1.95
T22N R82W															
8	0.23	0.02	0.25	0.01	-	0.01	0.24	0.02	0.26	-	-	-	0.24	0.02	0.26
T23N R81W															
5	0.05	0.06	0.11	-	-	-	0.05	0.06	0.11	-	-	-	0.05	0.06	0.11
6	0.03	0.04	0.07	-	-	-	0.03	0.04	0.07	-	-	-	0.03	0.04	0.07
BED TOTALS	1.08	0.92	2.00	0.16	0.23	0.39	1.24	1.15	2.39	-	-	-	1.24	1.15	2.39
Bed No. 72															
T22N R81W															
5	0.13	0.13	0.26	0.08	0.13	0.21	0.21	0.26	0.47	-	-	-	0.21	0.26	0.47
7	0.03	0.02	0.05	0.10	0.01	0.11	0.13	0.03	0.16	-	-	-	0.13	0.03	0.16
T23N R81W															
5	0.18	0.33	0.51	0.03	0.17	0.20	0.21	0.50	0.71	-	-	-	0.21	0.50	0.71
7	0.46	0.05	0.51	0.09	0.01	0.10	0.55	0.06	0.61	-	-	-	0.55	0.06	0.61
T23N R82W															
5	0.05	0.06	0.11	-	-	-	0.05	0.06	0.11	-	-	-	0.05	0.06	0.11
7	0.10	0.03	0.13	-	-	-	0.10	0.03	0.13	-	-	-	0.10	0.03	0.13
BED TOTALS	0.95	0.62	1.57	0.30	0.32	0.62	1.25	0.94	2.19	-	-	-	1.25	0.94	2.19

Table 4. Continued

Coal Name / Township, Range / Thickness (feet)	MEASURED RESERVE BASE Overburden thickness (feet):			INDICATED RESERVE BASE Overburden thickness (feet):			TOTAL RESERVE BASE Overburden thickness (feet):			INFERRED RESOURCES Overburden thickness (feet):			GRAND TOTAL Overburden thickness (feet):		
	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
Bed No. 71															
T22N R81W															
5	0.04	0.03	0.07	0.04	0.19	0.23	0.08	0.22	0.30	-	-	-	0.08	0.22	0.30
7	0.05	0.09	0.14	-	-	-	0.05	0.09	0.14	-	-	-	0.05	0.09	0.14
T22N R82W															
5	0.23	0.10	0.33	0.05	0.09	0.14	0.28	0.19	0.47	-	-	-	0.28	0.19	0.47
7	0.51	0.17	0.68	0.09	-	0.09	0.60	0.17	0.77	-	-	-	0.60	0.17	0.77
BED TOTALS	0.83	0.39	1.22	0.18	0.28	0.46	1.01	0.67	1.68	-	-	-	1.01	0.67	1.68
TOTALS HANNA MINING DISTRICT	86.18	85.67	171.85	43.87	58.16	102.03	130.05	143.83	273.88	2.44	2.36	4.80	132.49	146.19	278.68

Table 4. Continued

Coal Name	MEASURED RESERVE BASE			INDICATED RESERVE BASE			TOTAL RESERVE BASE			INFERRED RESOURCES			GRAND TOTAL		
Township,Range	Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):		
Thickness (feet)	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
SEMINOE MINING DISTRICT															
Brooks Bed															
T22N R82W															
5	0.59	0.67	1.26	0.66	0.76	1.42	1.25	1.43	2.68	-	-	-	1.25	1.43	2.68
7	0.52	0.92	1.44	0.01	0.24	0.25	0.53	1.16	1.69	-	-	-	0.53	1.16	1.69
8	0.08	0.62	0.70	-	0.24	0.24	0.08	0.86	0.94	-	-	-	0.08	0.86	0.94
BED TOTALS	1.19	2.21	3.40	0.67	1.24	1.91	1.86	3.45	5.31	-	-	-	1.86	3.45	5.31
Bed No. 66															
T22N R83W															
5	0.49	-	0.49	-	-	-	0.49	-	0.49	-	-	-	0.49	-	0.49
T23N R83W															
5	0.09	0.14	0.23	0.10	0.11	0.21	0.19	0.25	0.44	-	-	-	0.19	0.25	0.44
6.5	0.46	0.64	1.10	0.07	0.03	0.10	0.53	0.67	1.20	-	-	-	0.53	0.67	1.20
BED TOTALS	1.04	0.78	1.82	0.17	0.14	0.31	1.21	0.92	2.13	-	-	-	1.21	0.92	2.13
Bed No. 65															
T22N R82W															
7	-	-	-	0.11	0.13	0.24	0.11	0.13	0.24	-	-	-	0.11	0.13	0.24
9	-	-	-	0.17	0.15	0.32	0.17	0.15	0.32	-	-	-	0.17	0.15	0.32
11	0.70	0.62	1.32	0.24	0.44	0.68	0.94	1.06	2.00	-	-	-	0.94	1.06	2.00
12	0.09	0.20	0.29	-	-	-	0.09	0.20	0.29	-	-	-	0.09	0.20	0.29

Table 4. Continued

Coal Name / Township, Range / Thickness (feet)	MEASURED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INDICATED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	TOTAL RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INFERRED RESOURCES Overburden thickness (feet): 0-100	100-200	0-200	GRAND TOTAL Overburden thickness (feet): 0-100	100-200	0-200
Bed No. 65 (Cont.)															
T22N R83W															
7	0.46	-	0.46	0.08	-	0.08	0.54	-	0.54	-	-	-	0.54	-	0.54
9	2.17	1.14	3.31	1.12	0.92	2.04	3.29	2.06	5.35	-	-	-	3.29	2.06	5.35
11	0.52	1.05	1.57	0.01	0.16	0.17	0.53	1.21	1.74	-	-	-	0.53	1.21	1.74
12	-	0.07	0.07	-	-	-	-	0.07	0.07	-	-	-	-	0.07	0.07
T23N R83W															
5	1.31	0.42	1.73	1.28	1.45	2.73	2.59	1.87	4.46	-	-	-	2.59	1.87	4.46
7	-	-	-	0.36	0.42	0.78	0.36	0.42	0.78	-	-	-	0.36	0.42	0.78
9	1.28	-	1.28	0.75	0.31	1.06	2.03	0.31	2.34	-	-	-	2.03	0.31	2.34
10	0.05	-	0.05	0.24	-	0.24	0.29	-	0.29	-	-	-	0.29	-	0.29
BED TOTALS	6.58	3.50	10.08	4.36	3.98	8.34	10.94	7.48	18.42	-	-	-	10.94	7.48	18.42
Bed No. 64															
T22N R83W															
5	1.04	0.21	1.25	0.87	0.62	1.49	1.91	0.83	2.74	-	-	-	1.91	0.83	2.74
7	1.60	0.51	2.11	1.51	0.87	2.38	3.11	1.38	4.49	-	-	-	3.11	1.38	4.49
8	-	0.18	0.18	-	-	-	-	0.18	0.18	-	-	-	-	0.18	0.18
T23N R83W															
4	0.23	0.19	0.42	0.20	0.88	1.08	0.43	1.07	1.50	-	-	-	0.43	1.07	1.50
5	1.83	0.46	2.29	1.38	0.93	2.31	3.21	1.39	4.60	-	-	-	3.21	1.39	4.60
6	0.40	0.41	0.81	0.33	0.13	0.46	0.73	0.54	1.27	-	-	-	0.73	0.54	1.27
7	0.90	-	0.90	-	-	-	0.90	-	0.90	-	-	-	0.90	-	0.90
BED TOTALS	6.00	1.96	7.96	4.29	3.43	7.72	10.29	5.39	15.68	-	-	-	10.29	5.39	15.68

Table 4. Continued

Coal Name	MEASURED RESERVE BASE			INDICATED RESERVE BASE			TOTAL RESERVE BASE			INFERRED RESOURCES			GRAND TOTAL		
Township,Range	Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):		
Thickness (feet)	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
Bed No. 63															
T23N R83W															
4	0.53	0.41	0.94	0.13	0.13	0.26	0.66	0.54	1.20	-	-	-	0.66	0.54	1.20
4.5	1.07	0.60	1.67	0.65	0.75	1.40	1.72	1.35	3.07	-	-	-	1.72	1.35	3.07
5	0.32	0.09	0.41	1.40	1.27	2.67	1.72	1.36	3.08	-	-	-	1.72	1.36	3.08
5.5	0.28	-	0.28	-	-	-	0.28	-	0.28	-	-	-	0.28	-	0.28
BED TOTALS	2.20	1.10	3.30	2.18	2.15	4.33	4.38	3.25	7.63	-	-	-	4.38	3.25	7.63
Bed No. 62															
T23N R83W															
5	0.78	0.54	1.32	0.38	0.80	1.18	1.16	1.34	2.50	-	-	-	1.16	1.34	2.50
7	0.08	0.07	0.15	0.05	0.11	0.16	0.13	0.18	0.31	-	-	-	0.13	0.18	0.31
9	-	0.22	0.22	-	0.08	0.08	-	0.30	0.30	-	-	-	-	0.30	0.30
BED TOTALS	0.86	0.83	1.69	0.43	0.99	1.42	1.29	1.82	3.11	-	-	-	1.29	1.82	3.11
Bed No. 61A															
T22N R82W															
5	0.45	0.24	0.69	0.31	0.31	0.62	0.76	0.55	1.31	-	-	-	0.76	0.55	1.31
BED TOTALS	0.45	0.24	0.69	0.31	0.31	0.62	0.76	0.55	1.31	-	-	-	0.76	0.55	1.31
Bed No. 61															
T23N R83W															
5	1.06	0.40	1.46	0.54	0.38	0.92	1.60	0.78	2.38	-	0.11	0.11	1.60	0.89	2.49

Table 4. Continued

Coal Name	MEASURED RESERVE BASE			INDICATED RESERVE BASE			TOTAL RESERVE BASE			INFERRED RESOURCES			GRAND TOTAL		
Township,Range	Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):		
Thickness (feet)	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
Bed No. 61 (Cont.)															
T23N R83W															
7	1.46	0.79	2.25	0.32	1.02	1.34	1.78	1.81	3.59	-	-	-	1.78	1.81	3.59
9	0.53	1.01	1.54	0.50	0.92	1.42	1.03	1.93	2.96	-	-	-	1.03	1.93	2.96
11	-	0.57	0.57	-	0.11	0.11	-	0.68	0.68	-	-	-	-	0.68	0.68
BED TOTALS	3.05	2.77	5.82	1.36	2.43	3.79	4.41	5.20	9.61	-	0.11	0.11	4.41	5.31	9.72
Bed No. 60															
T23N R83W															
4	0.15	0.11	0.26	-	-	-	0.15	0.11	0.26	-	-	-	0.15	0.11	0.26
4.5	1.30	1.11	2.41	1.02	1.75	2.77	2.32	2.86	5.18	-	-	-	2.32	2.86	5.18
5	0.10	0.23	0.33	0.11	0.23	0.34	0.21	0.46	0.67	-	-	-	0.21	0.46	0.67
5.5	0.41	0.29	0.70	0.11	0.08	0.19	0.52	0.37	0.89	-	-	-	0.52	0.37	0.89
6.5	0.35	0.01	0.36	0.17	0.07	0.24	0.52	0.08	0.60	-	-	-	0.52	0.08	0.60
BED TOTALS	2.31	1.75	4.06	1.41	2.13	3.54	3.72	3.88	7.60	-	-	-	3.72	3.88	7.60
Bed No. 58															
T22N R83W															
5	0.06	0.11	0.17	-	-	-	0.06	0.11	0.17	-	-	-	0.06	0.11	0.17
6.5	0.06	0.06	0.12	-	-	-	0.06	0.06	0.12	-	-	-	0.06	0.06	0.12
BED TOTALS	0.12	0.17	0.29	-	-	-	0.12	0.17	0.29	-	-	-	0.12	0.17	0.29
Bed No. 56															
T22N R82W															
5	0.21	0.11	0.32	0.07	0.16	0.23	0.28	0.27	0.55	-	-	-	0.28	0.27	0.55

Table 4. Continued

Coal Name Township, Range Thickness (feet)	MEASURED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INDICATED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	TOTAL RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INFERRED RESOURCES Overburden thickness (feet): 0-100	100-200	0-200	GRAND TOTAL Overburden thickness (feet): 0-100	100-200	0-200
Bed No. 56 (Cont.)															
T22N R82W															
7	0.42	0.60	1.02	0.27	0.27	0.54	0.69	0.87	1.56	-	-	-	0.69	0.87	1.56
9	0.06	0.10	0.16	0.33	0.41	0.74	0.39	0.51	0.90	-	-	-	0.39	0.51	0.90
11	-	-	-	0.29	0.26	0.55	0.29	0.26	0.55	-	-	-	0.29	0.26	0.55
13	0.15	0.09	0.24	0.20	0.29	0.49	0.35	0.38	0.73	-	-	-	0.35	0.38	0.73
15	0.49	0.52	1.01	0.05	0.12	0.17	0.54	0.64	1.18	-	-	-	0.54	0.64	1.18
BED TOTALS	1.33	1.42	2.75	1.21	1.51	2.72	2.54	2.93	5.47	-	-	-	2.54	2.93	5.47
Bed No. 54															
T22N R83W															
5	0.43	0.90	1.33	0.02	0.10	0.12	0.45	1.00	1.45	-	-	-	0.45	1.00	1.45
7	-	0.28	0.28	-	0.24	0.24	-	0.52	0.52	-	-	-	-	0.52	0.52
9	-	0.07	0.07	-	-	-	-	0.07	0.07	-	-	-	-	0.07	0.07
BED TOTALS	0.43	1.25	1.68	0.02	0.34	0.36	0.45	1.59	2.04	-	-	-	0.45	1.59	2.04
Bed No. 53															
T22N R83W															
5	0.18	0.33	0.51	0.06	0.50	0.56	0.24	0.83	1.07	-	-	-	0.24	0.83	1.07
T23N R83W															
5	0.26	0.08	0.34	0.04	0.22	0.26	0.30	0.30	0.60	-	-	-	0.30	0.30	0.60
BED TOTALS	0.44	0.41	0.85	0.10	0.72	0.82	0.54	1.13	1.67	-	-	-	0.54	1.13	1.67

Table 4. Continued

Coal Name	MEASURED RESERVE BASE			INDICATED RESERVE BASE			TOTAL RESERVE BASE			INFERRED RESOURCES			GRAND TOTAL		
Township,Range	Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):		
Thickness (feet)	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
Bed No. 51															
T22N R83W															
5	0.16	0.20	0.36	0.37	0.29	0.66	0.53	0.49	1.02	-	-	-	0.53	0.49	1.02
7	0.42	1.83	2.25	0.08	1.90	1.98	0.50	3.73	4.23	-	-	-	0.50	3.73	4.23
T23N R83W															
5	0.52	0.59	1.11	0.02	0.15	0.17	0.54	0.74	1.28	-	-	-	0.54	0.74	1.28
7	0.90	0.99	1.89	0.27	1.16	1.43	1.17	2.15	3.32	-	-	-	1.17	2.15	3.32
8	0.26	-	0.26	-	-	-	0.26	-	0.26	-	-	-	0.26	-	0.26
9	0.51	0.42	0.93	0.13	0.76	0.89	0.64	1.18	1.82	-	-	-	0.64	1.18	1.82
10	-	0.14	0.14	-	0.15	0.15	-	0.29	0.29	-	-	-	-	0.29	0.29
T23N R84W															
4	0.19	0.02	0.21	-	-	-	0.19	0.02	0.21	-	-	-	0.19	0.02	0.21
5	0.44	0.09	0.53	-	-	-	0.44	0.09	0.53	-	-	-	0.44	0.09	0.53
7	0.20	0.06	0.26	-	-	-	0.20	0.06	0.26	-	-	-	0.20	0.06	0.26
9	0.52	-	0.52	-	-	-	0.52	-	0.52	-	-	-	0.52	-	0.52
BED TOTALS	4.12	4.34	8.46	0.87	4.41	5.28	4.99	8.75	13.74	-	-	-	4.99	8.75	13.74
Bed No. 50															
T22N R82W															
5	-	-	-	0.10	0.11	0.21	0.10	0.11	0.21	-	-	-	0.10	0.11	0.21
7	0.23	0.37	0.60	0.50	0.54	1.04	0.73	0.91	1.64	-	-	-	0.73	0.91	1.64
9	0.33	0.42	0.75	-	0.01	0.01	0.33	0.43	0.76	-	-	-	0.33	0.43	0.76
11	0.35	0.11	0.46	-	-	-	0.35	0.11	0.46	-	-	-	0.35	0.11	0.46
13	0.07	0.04	0.11	0.01	0.02	0.03	0.08	0.06	0.14	-	-	-	0.08	0.06	0.14
15	0.01	0.28	0.29	0.04	0.05	0.09	0.05	0.33	0.38	-	-	-	0.05	0.33	0.38
17	0.09	0.39	0.48	-	-	-	0.09	0.39	0.48	-	-	-	0.09	0.39	0.48
18	0.08	0.14	0.22	-	-	-	0.08	0.14	0.22	-	-	-	0.08	0.14	0.22

Table 4. Continued

Coal Name / Township, Range / Thickness (feet)	MEASURED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INDICATED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	TOTAL RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INFERRED RESOURCES Overburden thickness (feet): 0-100	100-200	0-200	GRAND TOTAL Overburden thickness (feet): 0-100	100-200	0-200
Bed No. 50 (Cont.)															
T22N R82W															
19	0.53	0.50	1.03	-	-	-	0.53	0.50	1.03	-	-	-	0.53	0.50	1.03
21	0.38	0.31	0.69	-	-	-	0.38	0.31	0.69	-	-	-	0.38	0.31	0.69
22	-	0.04	0.04	-	-	-	-	0.04	0.04	-	-	-	-	0.04	0.04
T22N R83W															
5	0.08	0.07	0.15	0.14	0.13	0.27	0.22	0.20	0.42	-	-	-	0.22	0.20	0.42
7	0.93	0.98	1.91	0.09	0.09	0.18	1.02	1.07	2.09	-	-	-	1.02	1.07	2.09
9	0.89	0.05	0.94	-	-	-	0.89	0.05	0.94	-	-	-	0.89	0.05	0.94
11	0.06	0.10	0.16	-	-	-	0.06	0.10	0.16	-	-	-	0.06	0.10	0.16
13	0.86	0.82	1.68	0.44	0.35	0.79	1.30	1.17	2.47	-	-	-	1.30	1.17	2.47
15	0.35	0.09	0.44	0.20	0.34	0.54	0.55	0.43	0.98	-	-	-	0.55	0.43	0.98
17	-	-	-	0.66	0.51	1.17	0.66	0.51	1.17	-	-	-	0.66	0.51	1.17
19	0.25	0.30	0.55	0.32	0.33	0.65	0.57	0.63	1.20	-	-	-	0.57	0.63	1.20
21	0.25	0.29	0.54	0.11	0.06	0.17	0.36	0.35	0.71	-	-	-	0.36	0.35	0.71
BED TOTALS	5.74	5.30	11.04	2.61	2.54	5.15	8.35	7.84	16.19	-	-	-	8.35	7.84	16.19
Bed No. 46															
T23N R83W															
5	-	-	-	-	0.05	0.05	-	0.05	0.05	-	-	-	-	0.05	0.05
7	-	-	-	-	0.10	0.10	-	0.10	0.10	-	-	-	-	0.10	0.10
T23N R84W															
5	0.34	0.09	0.43	0.01	0.20	0.21	0.35	0.29	0.64	0.04	0.05	0.09	0.39	0.34	0.73
7	0.15	0.01	0.16	0.21	0.27	0.48	0.36	0.28	0.64	0.24	0.19	0.43	0.60	0.47	1.07
9	0.97	0.41	1.38	0.08	0.60	0.68	1.05	1.01	2.06	0.15	0.22	0.37	1.20	1.23	2.43
BED TOTALS	1.46	0.51	1.97	0.30	1.22	1.52	1.76	1.73	3.49	0.43	0.46	0.89	2.19	2.19	4.38

Table 4. Continued

Coal Name	MEASURED RESERVE BASE			INDICATED RESERVE BASE			TOTAL RESERVE BASE			INFERRED RESOURCES			GRAND TOTAL		
Township,Range	Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):		
Thickness (feet)	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
Bed No. 44															
T23N R84W															
5	0.16	0.12	0.28	0.20	0.20	0.40	0.36	0.32	0.68	0.12	0.15	0.27	0.48	0.47	0.95
7	0.68	0.35	1.03	0.29	0.68	0.97	0.97	1.03	2.00	-	-	-	0.97	1.03	2.00
BED TOTALS	0.84	0.47	1.31	0.49	0.88	1.37	1.33	1.35	2.68	0.12	0.15	0.27	1.45	1.50	2.95
Bed No. 38															
T22N R83W															
4.5	0.17	0.11	0.28	0.03	0.03	0.06	0.20	0.14	0.34	-	-	-	0.20	0.14	0.34
5	0.17	0.12	0.29	-	-	-	0.17	0.12	0.29	-	-	-	0.17	0.12	0.29
BED TOTALS	0.34	0.23	0.57	0.03	0.03	0.06	0.37	0.26	0.63	-	-	-	0.37	0.26	0.63
Bed No. 37															
T22N R83W															
5	0.10	0.05	0.15	0.16	0.15	0.31	0.26	0.20	0.46	-	-	-	0.26	0.20	0.46
7	0.11	0.31	0.42	0.02	0.03	0.05	0.13	0.34	0.47	-	-	-	0.13	0.34	0.47
9	0.06	0.17	0.23	-	-	-	0.06	0.17	0.23	-	-	-	0.06	0.17	0.23
BED TOTALS	0.27	0.53	0.80	0.18	0.18	0.36	0.45	0.71	1.16	-	-	-	0.45	0.71	1.16

Table 4. Continued

Coal Name / Township, Range / Thickness (feet)	MEASURED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INDICATED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	TOTAL RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INFERRED RESOURCES Overburden thickness (feet): 0-100	100-200	0-200	GRAND TOTAL Overburden thickness (feet): 0-100	100-200	0-200
Bed No. 35 (?)															
T22N R84W															
5	0.23	0.29	0.52	-	-	-	0.23	0.29	0.52	-	-	-	0.23	0.29	0.52
BED TOTALS	0.23	0.29	0.52	-	-	-	0.23	0.29	0.52	-	-	-	0.23	0.29	0.52
Bed No. 34 (?)															
T22N R84W															
5	0.03	0.10	0.13	-	-	-	0.03	0.10	0.13	-	-	-	0.03	0.10	0.13
T23N R84W															
5	0.22	0.35	0.57	-	-	-	0.22	0.35	0.57	-	-	-	0.22	0.35	0.57
BED TOTALS	0.25	0.45	0.70	-	-	-	0.25	0.45	0.70	-	-	-	0.25	0.45	0.70
Bed No. 33															
T22N R84W															
5	-	-	-	0.09	0.07	0.16	0.09	0.07	0.16	-	-	-	0.09	0.07	0.16
7	-	0.01	0.01	-	0.08	0.08	-	0.09	0.09	-	-	-	-	0.09	0.09
8	-	0.20	0.20	-	-	-	-	0.20	0.20	-	-	-	-	0.20	0.20
T23N R84W															
8	0.66	0.86	1.52	-	0.19	0.19	0.66	1.05	1.71	-	-	-	0.66	1.05	1.71
11	0.18	0.30	0.48	0.12	0.35	0.47	0.30	0.65	0.95	0.10	0.08	0.18	0.40	0.73	1.13
13	2.43	1.45	3.88	0.09	0.67	0.76	2.52	2.12	4.64	0.05	0.22	0.27	2.57	2.34	4.91
15	0.51	0.37	0.88	0.79	0.45	1.24	1.30	0.82	2.12	0.18	0.37	0.55	1.48	1.19	2.67
17	0.20	0.19	0.39	0.14	0.05	0.19	0.34	0.24	0.58	0.33	0.35	0.68	0.67	0.59	1.26
19	0.33	0.35	0.68	0.34	0.52	0.86	0.67	0.87	1.54	0.84	0.07	0.91	1.51	0.94	2.45
21	0.38	0.09	0.47	-	-	-	0.38	0.09	0.47	-	-	-	0.38	0.09	0.47

Table 4. Continued

Coal Name	MEASURED RESERVE BASE			INDICATED RESERVE BASE			TOTAL RESERVE BASE			INFERRED RESOURCES			GRAND TOTAL		
Township,Range	Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):		
Thickness (feet)	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
Bed No. 33 (Cont.)															
T23N R84W															
23	0.20	-	0.20	-	-	-	0.20	-	0.20	-	-	-	0.20	-	0.20
25	0.05	-	0.05	-	-	-	0.05	-	0.05	-	-	-	0.05	-	0.05
BED TOTALS	4.94	3.82	8.76	1.57	2.38	3.95	6.51	6.20	12.71	1.50	1.09	2.59	8.01	7.29	15.30
Bed No. 31															
T22N R82W															
5	0.03	0.03	0.06	-	-	-	0.03	0.03	0.06	-	-	-	0.03	0.03	0.06
T22N R83W															
5	0.01	0.02	0.03	-	-	-	0.01	0.02	0.03	-	-	-	0.01	0.02	0.03
7	0.06	0.09	0.15	-	-	-	0.06	0.09	0.15	-	-	-	0.06	0.09	0.15
9	0.31	0.47	0.78	-	0.08	0.08	0.31	0.55	0.86	-	-	-	0.31	0.55	0.86
11	1.88	1.39	3.27	-	-	-	1.88	1.39	3.27	-	-	-	1.88	1.39	3.27
12	0.01	-	0.01	-	-	-	0.01	-	0.01	-	-	-	0.01	-	0.01
T23N R84W															
4	0.05	0.04	0.09	-	-	-	0.05	0.04	0.09	-	-	-	0.05	0.04	0.09
7	0.15	0.10	0.25	-	-	-	0.15	0.10	0.25	-	-	-	0.15	0.10	0.25
9	0.33	0.22	0.55	-	0.10	0.10	0.33	0.32	0.65	-	-	-	0.33	0.32	0.65
11	1.49	0.72	2.21	0.81	0.59	1.40	2.30	1.31	3.61	1.25	0.30	1.55	3.55	1.61	5.16
13	0.37	0.35	0.72	0.07	0.52	0.59	0.44	0.87	1.31	0.34	0.56	0.90	0.78	1.43	2.21
15	0.35	0.29	0.64	-	-	-	0.35	0.29	0.64	-	-	-	0.35	0.29	0.64
17	0.36	0.34	0.70	-	-	-	0.36	0.34	0.70	-	-	-	0.36	0.34	0.70
18	0.19	0.23	0.42	-	-	-	0.19	0.23	0.42	-	-	-	0.19	0.23	0.42
BED TOTALS	5.59	4.29	9.88	0.88	1.29	2.17	6.47	5.58	12.05	1.59	0.86	2.45	8.06	6.44	14.50

Table 4. Continued

Coal Name Township, Range Thickness (feet)	MEASURED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INDICATED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	TOTAL RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INFERRED RESOURCES Overburden thickness (feet): 0-100	100-200	0-200	GRAND TOTAL Overburden thickness (feet): 0-100	100-200	0-200
Bed No. 30															
T22N R83W															
5	0.28	0.45	0.73	-	-	-	0.28	0.45	0.73	-	-	-	0.28	0.45	0.73
7	0.15	0.14	0.29	-	0.01	0.01	0.15	0.15	0.30	-	-	-	0.15	0.15	0.30
8	0.14	0.28	0.42	-	-	-	0.14	0.28	0.42	-	-	-	0.14	0.28	0.42
BED TOTALS	0.57	0.87	1.44	-	0.01	0.01	0.57	0.88	1.45	-	-	-	0.57	0.88	1.45
Bed No. 28															
T22N R82W															
5	0.04	0.01	0.05	-	-	-	0.04	0.01	0.05	-	-	-	0.04	0.01	0.05
T22N R83W															
4.5	0.29	0.42	0.71	-	0.11	0.11	0.29	0.53	0.82	-	-	-	0.29	0.53	0.82
5	0.20	0.13	0.33	0.29	0.28	0.57	0.49	0.41	0.90	-	-	-	0.49	0.41	0.90
7	0.09	0.21	0.30	0.16	0.12	0.28	0.25	0.33	0.58	-	-	-	0.25	0.33	0.58
8	0.26	0.04	0.30	0.02	-	0.02	0.28	0.04	0.32	-	-	-	0.28	0.04	0.32
T23N R84W															
7	0.27	0.01	0.28	0.01	0.09	0.10	0.28	0.10	0.38	0.46	0.82	1.28	0.74	0.92	1.66
9	0.11	0.27	0.38	-	0.09	0.09	0.11	0.36	0.47	0.49	0.22	0.71	0.60	0.58	1.18
11	-	-	-	0.55	0.67	1.22	0.55	0.67	1.22	0.11	-	0.11	0.66	0.67	1.33
13	0.41	0.36	0.77	0.07	0.17	0.24	0.48	0.53	1.01	-	-	-	0.48	0.53	1.01
15	0.43	0.37	0.80	-	0.15	0.15	0.43	0.52	0.95	-	-	-	0.43	0.52	0.95
17	0.10	0.23	0.33	0.09	0.21	0.30	0.19	0.44	0.63	0.18	-	0.18	0.37	0.44	0.81
18	0.06	0.30	0.36	-	-	-	0.06	0.30	0.36	0.46	0.05	0.51	0.52	0.35	0.87
BED TOTALS	2.26	2.35	4.61	1.19	1.89	3.08	3.45	4.24	7.69	1.70	1.09	2.79	5.15	5.33	10.48
Bed No. 27															
T23N R84W															
5	-	0.07	0.07	-	0.10	0.10	-	0.17	0.17	0.22	0.12	0.34	0.22	0.29	0.51
7	-	-	-	0.10	0.52	0.62	0.10	0.52	0.62	0.26	0.01	0.27	0.36	0.53	0.89

Table 4. Continued

Coal Name	MEASURED RESERVE BASE			INDICATED RESERVE BASE			TOTAL RESERVE BASE			INFERRED RESOURCES			GRAND TOTAL		
Township,Range	Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):		
Thickness (feet)	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
Bed No. 27 (Cont.)															
T23N R84W															
9	0.04	-	0.04	0.49	0.66	1.15	0.53	0.66	1.19	0.22	-	0.22	0.75	0.66	1.41
11	0.36	0.30	0.66	-	0.11	0.11	0.36	0.41	0.77	0.11	0.22	0.33	0.47	0.63	1.10
BED TOTALS	0.40	0.37	0.77	0.59	1.39	1.98	0.99	1.76	2.75	0.81	0.35	1.16	1.80	2.11	3.91
Bed No. 26															
T21N R82W															
5	0.05	0.04	0.09	0.12	0.08	0.20	0.17	0.12	0.29	-	-	-	0.17	0.12	0.29
T22N R82W															
5	0.14	0.12	0.26	0.16	0.16	0.32	0.30	0.28	0.58	-	-	-	0.30	0.28	0.58
7	0.08	0.14	0.22	0.41	0.45	0.86	0.49	0.59	1.08	-	-	-	0.49	0.59	1.08
9	0.26	0.44	0.70	0.26	0.42	0.68	0.52	0.86	1.38	-	-	-	0.52	0.86	1.38
10	0.21	0.10	0.31	0.14	0.11	0.25	0.35	0.21	0.56	-	-	-	0.35	0.21	0.56
T22N R83W															
5	0.02	0.02	0.04	0.02	0.01	0.03	0.04	0.03	0.07	-	-	-	0.04	0.03	0.07
7	0.08	0.04	0.12	-	-	-	0.08	0.04	0.12	-	-	-	0.08	0.04	0.12
9	0.45	0.64	1.09	0.09	0.15	0.24	0.54	0.79	1.33	-	-	-	0.54	0.79	1.33
11	1.01	0.43	1.44	-	-	-	1.01	0.43	1.44	-	-	-	1.01	0.43	1.44
12	0.30	0.19	0.49	-	-	-	0.30	0.19	0.49	-	-	-	0.30	0.19	0.49
BED TOTALS	2.60	2.16	4.76	1.20	1.38	2.58	3.80	3.54	7.34	-	-	-	3.80	3.54	7.34

Table 4. Continued

Coal Name	MEASURED RESERVE BASE			INDICATED RESERVE BASE			TOTAL RESERVE BASE			INFERRED RESOURCES			GRAND TOTAL		
Township,Range	Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):		
Thickness (feet)	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
Bed No. 25															
T22N R82W															
5	-	-	-	0.03	0.03	0.06	0.03	0.03	0.06	-	-	-	0.03	0.03	0.06
7	0.39	0.36	0.75	0.14	0.15	0.29	0.53	0.51	1.04	-	-	-	0.53	0.51	1.04
9	-	-	-	0.25	0.26	0.51	0.25	0.26	0.51	0.10	0.09	0.19	0.35	0.35	0.70
T22N R83W															
8.5	0.31	0.35	0.66	0.38	0.41	0.79	0.69	0.76	1.45	-	-	-	0.69	0.76	1.45
9	0.38	0.37	0.75	0.57	0.44	1.01	0.95	0.81	1.76	-	-	-	0.95	0.81	1.76
10	0.16	0.17	0.33	-	-	-	0.16	0.17	0.33	-	-	-	0.16	0.17	0.33
11	0.22	0.28	0.50	0.36	0.31	0.67	0.58	0.59	1.17	-	-	-	0.58	0.59	1.17
12.5	0.20	0.22	0.42	-	0.06	0.06	0.20	0.28	0.48	-	-	-	0.20	0.28	0.48
T23N R84W															
5	0.31	0.23	0.54	-	-	-	0.31	0.23	0.54	-	-	-	0.31	0.23	0.54
6	0.02	0.06	0.08	-	-	-	0.02	0.06	0.08	-	-	-	0.02	0.06	0.08
BED TOTALS	1.99	2.04	4.03	1.73	1.66	3.39	3.72	3.70	7.42	0.10	0.09	0.19	3.82	3.79	7.61
Dana Bed															
T21N R82W															
11	0.16	0.13	0.29	-	-	-	0.16	0.13	0.29	-	-	-	0.16	0.13	0.29
12	0.12	0.15	0.27	-	-	-	0.12	0.15	0.27	-	-	-	0.12	0.15	0.27
T22N R82W															
5	0.31	0.30	0.61	0.26	0.27	0.53	0.57	0.57	1.14	-	-	-	0.57	0.57	1.14
7	0.06	0.05	0.11	-	-	-	0.06	0.05	0.11	-	-	-	0.06	0.05	0.11
8	0.06	0.04	0.10	-	-	-	0.06	0.04	0.10	-	-	-	0.06	0.04	0.10
9	0.03	-	0.03	-	-	-	0.03	-	0.03	-	-	-	0.03	-	0.03
11	0.16	0.06	0.22	-	-	-	0.16	0.06	0.22	-	-	-	0.16	0.06	0.22
12	-	0.11	0.11	-	-	-	-	0.11	0.11	-	-	-	-	0.11	0.11
BED TOTALS	0.90	0.84	1.74	0.26	0.27	0.53	1.16	1.11	2.27	-	-	-	1.16	1.11	2.27

Table 4. Continued

Coal Name	MEASURED RESERVE BASE			INDICATED RESERVE BASE			TOTAL RESERVE BASE			INFERRED RESOURCES			GRAND TOTAL		
Township,Range	Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):		
Thickness (feet)	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
Bed C															
T23N R83W															
5	0.17	0.39	0.56	0.76	0.53	1.29	0.93	0.92	1.85	0.43	0.19	0.62	1.36	1.10	2.47
T24N R83W															
5	0.24	0.15	0.39	0.08	0.06	0.14	0.32	0.21	0.53	-	-	-	0.32	0.21	0.53
BED TOTALS	0.41	0.54	0.95	0.84	0.59	1.43	1.25	1.13	2.38	0.43	0.19	0.62	1.68	1.32	3.00
Bed F															
T23N R83W															
6	0.73	0.31	1.04	0.52	0.64	1.16	1.25	0.95	2.20	-	-	-	1.25	0.95	2.20
BED TOTALS	0.73	0.31	1.04	0.52	0.64	1.16	1.25	0.95	2.20	-	-	-	1.25	0.95	2.20
Bed B															
T23N R83W															
8	0.70	0.72	1.42	0.44	0.75	1.19	1.14	1.47	2.61	-	-	-	1.14	1.47	2.61
BED TOTALS	0.70	0.72	1.42	0.44	0.75	1.19	1.14	1.47	2.61	-	-	-	1.14	1.47	2.61
Bed No. 130															
T23N R83W															
5	0.59	0.26	0.85	-	0.52	0.52	0.59	0.78	1.37	-	-	-	0.59	0.78	1.37
6	0.21	0.54	0.75	0.49	0.67	1.16	0.70	1.21	1.91	-	-	-	0.70	1.21	1.91
T24N R83W															
5	0.12	0.06	0.18	-	-	-	0.12	0.06	0.18	-	-	-	0.12	0.06	0.18
BED TOTALS	0.92	0.86	1.78	0.49	1.19	1.68	1.41	2.05	3.46	-	-	-	1.41	2.05	3.46

Table 4. Continued

Coal Name / Township, Range / Thickness (feet)	MEASURED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INDICATED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	TOTAL RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INFERRED RESOURCES Overburden thickness (feet): 0-100	100-200	0-200	GRAND TOTAL Overburden thickness (feet): 0-100	100-200	0-200
Bed No. 129															
T23N R83W															
5	0.48	0.16	0.64	0.15	-	0.15	0.63	0.16	0.79	-	0.04	0.04	0.63	0.20	0.83
7	0.41	0.49	0.90	0.02	-	0.02	0.43	0.49	0.92	-	-	-	0.43	0.49	0.92
9	0.13	0.96	1.09	0.04	0.15	0.19	0.17	1.11	1.28	-	-	-	0.17	1.11	1.28
11	-	0.65	0.65	-	0.82	0.82	-	1.47	1.47	-	-	-	-	1.47	1.47
12	-	-	-	-	0.16	0.16	-	0.16	0.16	-	-	-	-	0.16	0.16
T23N R84W															
5	0.11	0.01	0.12	-	0.01	0.01	0.11	0.02	0.13	-	0.01	0.01	0.11	0.03	0.14
7	0.51	0.17	0.68	-	0.12	0.12	0.51	0.29	0.80	-	-	-	0.51	0.29	0.80
9	0.13	0.24	0.37	-	0.20	0.20	0.13	0.44	0.57	-	-	-	0.13	0.44	0.57
T24N R83W															
5	0.22	-	0.22	0.21	0.27	0.48	0.43	0.27	0.70	0.33	0.27	0.60	0.76	0.54	1.30
7	0.64	0.38	1.02	0.17	0.20	0.37	0.81	0.58	1.39	-	-	-	0.81	0.58	1.39
9	0.59	0.27	0.86	0.03	0.24	0.27	0.62	0.51	1.13	-	-	-	0.62	0.51	1.13
11	0.38	0.40	0.78	-	-	-	0.38	0.40	0.78	-	-	-	0.38	0.40	0.78
T24N R84W															
5	-	-	-	-	-	-	-	-	-	0.23	0.02	0.25	0.23	0.02	0.25
BED TOTALS	3.60	3.73	7.33	0.62	2.17	2.79	4.22	5.90	10.12	0.56	0.34	0.90	4.78	6.24	11.02
Bed No. 128															
T23N R83W															
5	0.15	0.30	0.45	0.06	0.03	0.09	0.21	0.33	0.54	-	-	-	0.21	0.33	0.54
T23N R84W															
5	0.56	0.18	0.74	0.02	0.48	0.50	0.58	0.66	1.24	0.08	-	0.08	0.66	0.66	1.32
BED TOTALS	0.71	0.48	1.19	0.08	0.51	0.59	0.79	0.99	1.78	0.08	-	0.08	0.87	0.99	1.86

Table 4. Continued

Coal Name	MEASURED RESERVE BASE			INDICATED RESERVE BASE			TOTAL RESERVE BASE			INFERRED RESOURCES			GRAND TOTAL		
Township,Range	Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):		
Thickness (feet)	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
Bed No. 127															
T23N R83W															
7	-	0.36	0.36	0.04	0.38	0.42	0.04	0.74	0.78	-	-	-	0.04	0.74	0.78
T24N R83W															
5	-	-	-	-	0.03	0.03	-	0.03	0.03	0.05	-	0.05	0.05	0.03	0.08
7	1.02	0.11	1.13	1.01	1.44	2.45	2.03	1.55	3.58	0.01	0.01	0.02	2.04	1.56	3.60
9	-	-	-	0.40	0.29	0.69	0.40	0.29	0.69	-	-	-	0.40	0.29	0.69
11	0.93	0.26	1.19	0.16	0.19	0.35	1.09	0.45	1.54	-	-	-	1.09	0.45	1.54
13	0.42	0.33	0.75	0.43	0.21	0.64	0.85	0.54	1.39	-	0.15	0.15	0.85	0.69	1.54
15	0.22	0.06	0.28	-	-	-	0.22	0.06	0.28	0.12	0.18	0.30	0.34	0.24	0.58
T24N R84W															
5	0.03	-	0.03	0.09	0.26	0.35	0.12	0.26	0.38	-	-	-	0.12	0.26	0.38
7	0.53	0.07	0.60	-	0.10	0.10	0.53	0.17	0.70	-	-	-	0.53	0.17	0.70
BED TOTALS	3.15	1.19	4.34	2.13	2.90	5.03	5.28	4.09	9.37	0.18	0.34	0.52	5.46	4.43	9.89
Bed No. 124															
T24N R83W															
5	0.06	0.09	0.15	0.12	0.16	0.28	0.18	0.25	0.43	-	-	-	0.18	0.25	0.43
7	0.33	0.41	0.74	0.01	0.09	0.10	0.34	0.50	0.84	0.08	0.12	0.20	0.42	0.62	1.04
9	1.68	0.39	2.07	0.38	0.93	1.31	2.06	1.32	3.38	-	-	-	2.06	1.32	3.38
11	0.25	0.29	0.54	0.34	1.49	1.83	0.59	1.78	2.37	-	-	-	0.59	1.78	2.37
T24N R84W															
5	0.29	0.24	0.53	0.06	0.01	0.07	0.35	0.25	0.60	-	-	-	0.35	0.25	0.60
7	0.06	0.29	0.35	0.17	0.33	0.50	0.23	0.62	0.85	-	-	-	0.23	0.62	0.85
9	0.28	0.03	0.31	0.01	0.21	0.22	0.29	0.24	0.53	0.03	0.16	0.19	0.32	0.40	0.72
11	-	-	-	-	-	-	-	-	-	0.20	0.06	0.26	0.20	0.06	0.26
BED TOTALS	2.95	1.74	4.69	1.09	3.22	4.31	4.04	4.96	9.00	0.31	0.34	0.65	4.35	5.30	9.65

Table 4. Continued

Coal Name	MEASURED RESERVE BASE			INDICATED RESERVE BASE			TOTAL RESERVE BASE			INFERRED RESOURCES			GRAND TOTAL		
Township,Range	Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):		
Thickness (feet)	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
Bed No. 123															
T24N R83W															
5	0.04	0.06	0.10	-	-	-	0.04	0.06	0.10	-	-	-	0.04	0.06	0.10
7	0.06	0.11	0.17	-	-	-	0.06	0.11	0.17	-	-	-	0.06	0.11	0.17
9	0.02	0.03	0.05	0.04	0.12	0.16	0.06	0.15	0.21	-	-	-	0.06	0.15	0.21
11	0.10	0.14	0.24	-	0.07	0.07	0.10	0.21	0.31	-	-	-	0.10	0.21	0.31
13	0.26	0.33	0.59	-	-	-	0.26	0.33	0.59	-	-	-	0.26	0.33	0.59
15	0.39	0.54	0.93	0.07	0.12	0.19	0.46	0.66	1.12	-	-	-	0.46	0.66	1.12
17	0.02	0.54	0.56	0.04	0.70	0.74	0.06	1.24	1.30	-	-	-	0.06	1.24	1.30
19	-	-	-	-	0.83	0.83	-	0.83	0.83	-	-	-	-	0.83	0.83
20	-	-	-	-	0.13	0.13	-	0.13	0.13	-	-	-	-	0.13	0.13
23	-	-	-	-	0.25	0.25	-	0.25	0.25	-	-	-	-	0.25	0.25
27	-	-	-	-	0.25	0.25	-	0.25	0.25	-	-	-	-	0.25	0.25
33	-	0.03	0.03	-	0.43	0.43	-	0.46	0.46	-	-	-	-	0.46	0.46
37	-	0.07	0.07	-	0.23	0.23	-	0.30	0.30	-	-	-	-	0.30	0.30
40	-	0.06	0.06	-	0.05	0.05	-	0.11	0.11	-	-	-	-	0.11	0.11
T24N R84W															
17	-	-	-	0.11	-	0.11	0.11	-	0.11	-	-	-	0.11	-	0.11
19	0.05	-	0.05	0.07	0.05	0.12	0.12	0.05	0.17	-	-	-	0.12	0.05	0.17
23	0.11	0.08	0.19	0.22	0.04	0.26	0.33	0.12	0.45	0.27	-	0.27	0.60	0.12	0.72
27	0.27	0.22	0.49	0.32	0.01	0.33	0.59	0.23	0.82	0.15	0.21	0.36	0.74	0.44	1.18
33	0.23	0.60	0.83	0.27	0.62	0.89	0.50	1.22	1.72	-	0.21	0.21	0.50	1.43	1.93
37	-	1.13	1.13	-	0.88	0.88	-	2.01	2.01	-	0.23	0.23	-	2.24	2.24
40	-	1.46	1.46	-	1.16	1.16	-	2.62	2.62	-	0.33	0.33	-	2.95	2.95
BED TOTALS	1.55	5.40	6.95	1.14	5.94	7.08	2.79	11.34	14.03	0.42	0.98	1.40	3.11	12.32	15.43

Table 4. Continued

Coal Name / Township, Range / Thickness (feet)	MEASURED RESERVE BASE Overburden thickness (feet):			INDICATED RESERVE BASE Overburden thickness (feet):			TOTAL RESERVE BASE Overburden thickness (feet):			INFERRED RESOURCES Overburden thickness (feet):			GRAND TOTAL Overburden thickness (feet):		
	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
Bed No. 122															
T24N R83W															
5	0.05	0.07	0.12	-	0.09	0.09	0.05	0.16	0.21	0.28	0.09	0.37	0.33	0.25	0.58
6	0.07	0.01	0.08	-	-	-	0.07	0.01	0.08	0.02	0.01	0.03	0.09	0.02	0.11
7	0.18	0.18	0.36	0.04	0.02	0.06	0.22	0.20	0.42	0.18	0.24	0.42	0.40	0.44	0.84
9	0.10	0.12	0.22	0.07	-	0.07	0.17	0.12	0.29	0.43	0.23	0.66	0.60	0.35	0.95
11	0.18	0.04	0.22	-	-	-	0.18	0.04	0.22	0.06	0.15	0.21	0.24	0.19	0.43
13	0.21	0.07	0.28	-	-	-	0.21	0.07	0.28	0.06	0.26	0.32	0.27	0.33	0.60
15	0.22	0.14	0.36	-	-	-	0.22	0.14	0.36	0.04	0.18	0.22	0.26	0.32	0.58
17	0.14	0.10	0.24	-	-	-	0.14	0.10	0.24	-	-	-	0.14	0.10	0.24
T24N R84W															
5	-	-	-	-	-	-	-	-	-	0.21	0.16	0.37	0.21	0.16	0.37
BED TOTALS	1.15	0.73	1.88	0.11	0.11	0.22	1.26	0.84	2.10	1.28	1.32	2.60	2.54	2.16	4.70
Bed No. 121															
T24N R83W															
8	-	0.16	0.16	0.31	0.10	0.41	0.31	0.26	0.57	-	-	-	0.31	0.26	0.57
BED TOTALS	-	0.16	0.16	0.31	0.10	0.41	0.31	0.26	0.57	-	-	-	0.31	0.26	0.57
Bed E															
T23N R84W															
5	0.47	0.36	0.83	0.35	0.71	1.06	0.82	1.07	1.89	-	-	-	0.82	1.07	1.89
BED TOTALS	0.47	0.36	0.83	0.35	0.71	1.06	0.82	1.07	1.89	-	-	-	0.82	1.07	1.89

Table 4. Continued

Coal Name Township, Range Thickness (feet)	MEASURED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INDICATED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	TOTAL RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INFERRED RESOURCES Overburden thickness (feet): 0-100	100-200	0-200	GRAND TOTAL Overburden thickness (feet): 0-100	100-200	0-200
Bed D															
T23N R84W															
5	0.46	0.43	0.89	0.38	0.46	0.84	0.84	0.89	1.73	-	-	-	0.84	0.89	1.73
BED TOTALS	0.46	0.43	0.89	0.38	0.46	0.84	0.84	0.89	1.73	-	-	-	0.84	0.89	1.73
Bed A															
T23N R84W															
9	0.58	0.88	1.46	1.34	0.94	2.28	1.92	1.82	3.74	-	-	-	1.92	1.82	3.74
BED TOTALS	0.58	0.88	1.46	1.34	0.94	2.28	1.92	1.82	3.74	-	-	-	1.92	1.82	3.74
Bed H															
T24N R84W															
5	0.07	0.01	0.08	-	-	-	0.07	0.01	0.08	0.22	0.13	0.35	0.29	0.14	0.43
BED TOTALS	0.07	0.01	0.08	-	-	-	0.07	0.01	0.08	0.22	0.13	0.35	0.29	0.14	0.43
Bed G															
T24N R84W															
10	0.20	0.15	0.35	-	-	-	0.20	0.15	0.35	0.33	0.63	0.96	0.53	0.78	1.31
BED TOTALS	0.20	0.15	0.35	-	-	-	0.20	0.15	0.35	0.33	0.63	0.96	0.53	0.78	1.31
TOTALS SEMINOE MINING DISTRICT	76.15	64.94	141.09	38.25	59.13	97.38	114.40	124.07	238.74	10.06	8.47	18.53	124.46	132.54	257.00

Table 4. Continued

Coal Name	MEASURED RESERVE BASE			INDICATED RESERVE BASE			TOTAL RESERVE BASE			INFERRED RESOURCES			GRAND TOTAL		
Township,Range	Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):		
Thickness (feet)	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
CORRAL CREEK MINING DISTRICT															
Bed WH 10 (Medicine Bow Fm.)															
T25N R85W															
5	0.17	-	0.17	-	-	-	0.17	-	0.17	-	-	-	0.17	-	0.17
BED TOTAL	0.17	-	0.17	-	-	-	0.17	-	0.17	-	-	-	0.17	-	0.17
Penn - Wyoming Bed															
T25N R85W															
5	0.04	0.06	0.10	-	-	-	0.04	0.06	0.10	-	-	-	0.04	0.06	0.10
7	0.12	0.16	0.28	-	-	-	0.12	0.16	0.28	-	-	-	0.12	0.16	0.28
9	0.12	0.17	0.29	-	-	-	0.12	0.17	0.29	-	-	-	0.12	0.17	0.29
BED TOTAL	0.28	0.39	0.67	-	-	-	0.28	0.39	0.67	-	-	-	0.28	0.39	0.67
Bed MB 18 (Medicine Bow Fm.)															
T24N R85W															
6	0.13	0.11	0.24	-	-	-	0.13	0.11	0.24	-	-	-	0.13	0.11	0.24
BED TOTAL	0.13	0.11	0.24	-	-	-	0.13	0.11	0.24	-	-	-	0.13	0.11	0.24

Table 4. Continued

Coal Name	MEASURED RESERVE BASE			INDICATED RESERVE BASE			TOTAL RESERVE BASE			INFERRED RESOURCES			GRAND TOTAL		
Township,Range	Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):		
Thickness (feet)	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
Bed LH 8 (Almond Fm.)															
T23N R85W															
5	0.34	0.22	0.56	-	-	-	0.34	0.22	0.56	-	-	-	0.34	0.22	0.56
6.5	0.01	0.07	0.08	-	-	-	0.01	0.07	0.08	-	-	-	0.01	0.07	0.08
7	0.14	0.13	0.27	-	-	-	0.14	0.13	0.27	-	-	-	0.14	0.13	0.27
T23N R86W															
5	0.03	0.01	0.04	0.12	0.12	0.24	0.15	0.13	0.28	-	-	-	0.15	0.13	0.28
6.5	0.26	0.20	0.46	-	-	-	0.26	0.20	0.46	-	-	-	0.26	0.20	0.46
BED TOTAL	0.78	0.63	1.41	0.12	0.12	0.24	0.90	0.75	1.65	-	-	-	0.90	0.75	1.65
Bed LH 4 (Almond Fm.)															
T23N R86W															
5	0.60	0.05	0.65	0.51	1.09	1.60	1.11	1.14	2.25	-	-	-	1.11	1.14	2.25
7	0.64	-	0.64	0.63	0.05	0.68	1.27	0.05	1.32	-	-	-	1.27	0.05	1.32
BED TOTAL	1.24	0.05	1.29	1.14	1.14	2.28	2.38	1.19	3.57	-	-	-	2.38	1.19	3.57
Bed WH 6 (Almond Fm.)															
T24N R86W															
5	0.20	0.27	0.47	0.16	0.11	0.27	0.36	0.38	0.74	-	-	-	0.36	0.38	0.74
7	0.33	0.14	0.47	-	-	-	0.33	0.14	0.47	-	-	-	0.33	0.14	0.47
9	0.25	-	0.25	-	-	-	0.25	-	0.25	-	-	-	0.25	-	0.25
10	0.02	-	0.02	-	-	-	0.02	-	0.02	-	-	-	0.02	-	0.02
BED TOTAL	0.80	0.41	1.21	0.16	0.11	0.27	0.96	0.52	1.48	-	-	-	0.96	0.52	1.48

Table 4. Continued

Coal Name / Township, Range / Thickness (feet)	MEASURED RESERVE BASE Overburden thickness (feet):			INDICATED RESERVE BASE Overburden thickness (feet):			TOTAL RESERVE BASE Overburden thickness (feet):			INFERRED RESOURCES Overburden thickness (feet):			GRAND TOTAL Overburden thickness (feet):		
	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
Bed WH 4 (Almond Fm.)															
T24N R86W															
5	0.13	0.10	0.23	0.12	0.18	0,30	0.25	0.28	0.53	-	-	-	0.25	0.28	0.53
BED TOTAL	0.13	0.10	0.23	0.12	0.18	0.30	0.25	0.28	0.53	-	-	-	0.25	0.28	0.53
Bed WH 3 (Almond Fm.)															
T24N R86W															
5	0.03	0.03	0.06	-	-	-	0.03	0.03	0.06	-	-	-	0.03	0.03	0.06
5.5	0.36	0.32	0.68	0.18	0.21	0.39	0.54	0.53	1.07	-	-	-	0.54	0.53	1.07
6.5	0.25	0.20	0.45	-	0.03	0.03	0.25	0.23	0.48	-	-	-	0.25	0.23	0.48
BED TOTAL	0.64	0.55	1.19	0.18	0.24	0.42	0.82	0.79	1.61	-	-	-	0.82	0.79	1.61
Bed WH 2 (Almond Fm.)															
T24N R86W															
5	1.38	1.13	2.51	0.07	0.13	0.20	1.45	1.26	2.71	-	-	-	1.45	1.26	2.71
7	0.37	0.13	0.50	0.01	-	0.01	0.38	0.13	0.51	-	-	-	0.38	0.13	0.51
BED TOTAL	1.75	1.26	3.01	0.08	0.13	0.21	1.83	1.39	3.22	-	-	-	1.83	1.39	3.22

Table 4. Continued

Coal Name Township, Range Thickness (feet)	MEASURED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INDICATED RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	TOTAL RESERVE BASE Overburden thickness (feet): 0-100	100-200	0-200	INFERRED RESOURCES Overburden thickness (feet): 0-100	100-200	0-200	GRAND TOTAL Overburden thickness (feet): 0-100	100-200	0-200
Bed WH 1 (Almond Fm.)															
T24N R86W															
5	1.00	0.54	1.54	0.19	0.26	0.45	1.19	0.80	1.99	-	-	-	1.19	0.80	1.99
7	0.14	0.13	0.27	0.53	0.37	0.90	0.67	0.50	1.17	-	-	-	0.67	0.50	1.17
8.5	0.38	0.34	0.72	0.06	-	0.06	0.44	0.34	0.78	-	-	-	0.44	0.34	0.78
BED TOTAL	1.52	1.01	2.53	0.78	0.63	1.41	2.30	1.64	3.94	-	-	-	2.30	1.64	3.94
TOTALS CORRAL CREEK MINING DISTRICT	7.44	4.51	11.95	2.58	2.55	5.13	10.02	7.06	17.08	-	-	-	10.02	7.06	17.08
GRAND TOTAL ALL DISTRICTS AND COAL BEDS	198.82	175.65	347.47	98.30	175.52	273.82	297.12	351.17	648.29	12.85	13.17	26.02	309.97	364.34	674.31

Table 5. Remaining strippable coal resources and strippable reserve base of the Hanna Coal Field by township and range, January 1, 1978 (all figures in millions of tons)

Township, Range	MEASURED RESERVE BASE			INDICATED RESERVE BASE			TOTAL RESERVE BASE			INFERRED RESOURCES			GRAND TOTAL		
	Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):			Overburden thickness (feet):		
	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
T20N R79W	1.46	1.18	2.64	0.09	0.32	0.41	1.55	1.50	3.05	-	-	-	1.55	1.50	3.05
T20N R80W	7.65	3.66	11.31	1.83	5.53	7.36	9.48	9.19	18.67	-	-	-	9.48	9.19	18.67
T21N R79W	6.02	2.00	8.02	3.02	6.95	9.97	9.04	8.95	17.99	-	-	-	9.04	8.95	17.99
T21N R80W	13.28	13.10	26.38	8.61	42.84	51.45	21.89	55.94	77.83	0.35	2.34	2.69	22.24	58.28	80.52
T21N R82W	0.33	0.32	0.65	0.12	0.08	0.20	0.45	0.40	0.85	-	-	-	0.45	0.40	0.85
T22N R80W	0.64	0.59	1.23	0.05	0.04	0.09	0.69	0.63	1.32	-	-	-	0.69	0.63	1.32
T22N R81W	41.46	29.30	70.76	12.38	17.04	29.42	53.84	46.34	100.18	0.02	0.05	0.07	53.86	46.39	100.25
T22N R82W	12.67	12.63	25.30	6.16	7.10	13.26	18.83	19.73	38.56	0.10	0.09	0.19	18.93	19.82	38.75
T22N R83W	18.68	16.75	35.43	8.18	9.60	17.78	26.86	26.35	53.21	-	-	-	26.86	26.35	53.21
T22N R84W	0.59	0.89	1.48	0.09	0.15	0.24	0.68	1.04	1.72	-	-	-	0.68	1.04	1.72
T23N R80W	9.27	7.60	16.87	9.33	12.08	21.41	18.60	19.68	38.28	1.07	1.25	2.32	19.67	20.93	40.60
T23N R81W	27.70	42.47	70.17	18.41	22.81	41.22	46.11	65.28	111.39	1.35	1.06	2.41	47.46	66.34	113.80
T23N R82W	1.01	0.76	1.77	0.53	0.59	1.12	1.54	1.35	2.89	-	-	-	1.54	1.35	2.89
T23N R83W	20.99	16.07	37.06	13.07	19.20	32.27	34.06	35.27	69.33	0.43	0.34	0.77	34.49	35.61	70.10

Table 5. Continued

Township, Range	MEASURED RESERVE BASE Overburden thickness (feet):			INDICATED RESERVE BASE Overburden thickness (feet):			TOTAL RESERVE BASE Overburden thickness (feet):			INFERRED RESOURCES Overburden thickness (feet):			GRAND TOTAL Overburden thickness (feet):		
	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200	0-100	100-200	0-200
T23N R84W	16.70	11.58	28.28	6.55	11.08	17.63	23.25	22.66	45.91	6.23	4.01	10.24	29.48	26.67	56.15
T23N R85W	0.49	0.42	0.91	-	-	-	0.49	0.42	0.91	-	-	-	0.49	0.42	0.91
T23N R86W	1.53	0.26	1.79	1.26	1.26	2.52	2.79	1.52	4.31	-	-	-	2.79	1.52	4.31
T24N R80W	-	0.03	0.03	-	0.36	0.36	-	0.39	0.39	-	-	-	-	0.39	0.39
T24N R81W	1.67	1.93	3.60	2.07	4.54	6.61	3.74	6.47	10.21	-	-	-	3.74	6.47	10.21
T24N R83W	9.14	6.00	15.14	3.91	8.99	12.90	13.05	14.99	28.04	1.66	1.89	3.55	14.71	16.88	31.59
T24N R84W	2.12	4.28	6.40	1.32	3.67	4.99	3.44	7.95	11.39	1.64	2.14	3.78	5.08	10.09	15.17
T24N R85W	0.13	0.11	0.24	-	-	-	0.13	0.11	0.24	-	-	-	0.13	0.11	0.24
T24N R86W	4.84	3.33	8.17	1.32	1.29	2.61	6.16	4.62	10.78	-	-	-	6.16	4.62	10.78
T25N R85W	0.45	0.39	0.84	-	-	-	0.45	0.39	0.84	-	-	-	0.45	0.39	0.84
GRAND TOTAL FOR ALL TOWNSHIPS	198.22	175.65	374.47	98.30	175.52	273.82	297.12	351.17	648.29	12.85	13.17	26.02	309.97	364.34	674.31

earlier resource figures provided by Berryhill and others, 1950. Glass (1972) estimated that strippable resources were equal to one-tenth of the remaining original resources for bituminous coal over 42 inches thick and under less than 1,000 feet of cover plus one-tenth of the resources for subbituminous coal over five feet thick and under less than 1,000 feet of cover. This crude approximation suggested that there were 312.98 million tons of strippable resources in the Hanna Coal Field. Since resource reliability categories were ignored, Glass' (1972) estimate was at best a strippable coal resource rather than strippable reserve base.

In 1975, a U.S. Department of Interior study near Seminoe Reservoir in the Seminoe Mining District identified 41.21 million tons of "strippable resources" in a 9.6 square mile area (Bureau of Land Management, 1975). All these resources were between 0-200 feet of cover. The report did not identify the individual coal beds or the number of coal beds included in the study, but they were all Ferris Formation coals. For comparison, this report shows 173.01 million tons of strippable resources underlying the townships included in the Department of Interior study. It must be remembered, however, that the earlier estimate only applied to a 9.6 square mile portion of those four townships.

A series of U.S. Geological Survey open-file reports, prepared by Texas Instruments, might have provided the most recent estimates of strippable resources, but contract requirements forbid calculation of any coal resources or reserves for any lands other than unleased Federal mineral lands (Texas Instruments, 1978a-u). Because of this stipulation and numerous other stipulations, the resource and reserve estimates provided in these open-file reports provide little insight into the total strippable resources of the Hanna Coal Field.

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DEFINITIONS

In this report, strippable coal resources are resources tabulated for all coal beds that (1) are five feet or more thick, regardless of rank, (2) dip at 25 degrees or less, and (3) occur at depths between 0-200 feet below the surface. All these resources fall into measured, indicated, or inferred categories of reliability as defined by the U.S. Geological Survey (Averitt, 1975).

Reserve base, on the other hand, is identical to the strippable resources except that it excludes all strippable resources in the inferred category of reliability. As defined by the U.S. Bureau of Mines and U.S. Geological Survey (1976), strippable reserves are derived from this reserve base by multiplying the reserve base by a recovery factor. For example, the strippable reserves lying between 0-100 feet of cover are usually equated to 80 percent of the reserve base. Whether or not an 80 percent recovery factor is equally applicable to the deeper strippable reserve base (between 100-200 feet of cover) is a matter of personal choice. Because the weighted average thickness of coals in this field is only 11.77 feet, 50 percent is perhaps a more conservative recovery factor to apply to the deeper reserve base. This choice better approximates the limits suggested by the current overburden to coal ratios attained by active mines in the coal field. With a few exceptions, acceptable overburden to coal ratios are presently less than 15:1.

In actual practice, strippable reserves are based on more than overburden to coal ratios or simply a recovery factor. Reserve estimates will vary with coal quality and market price, as well as the production capabilities of the mining company evaluating them. Because of these variabilities, strippable reserve estimates per se are not included in this report.

For the purposes of this report, remaining resources and remaining reserve base excludes any coal removed or lost to mining before these estimates were made. The estimates in this report, therefore, refer to the coal

resources still in the ground on January 1, 1978.

METHODOLOGY OF RESOURCE ESTIMATES

Sources of Information

Data for estimating coal thicknesses and elevations were obtained from published reports, from mine maps, from company records, from government drilling, and from other records and notes on file at the Geological Survey of Wyoming. In addition, black and white as well as colored aerial photography were used to delimit the extent of burned-out areas, surface-mined areas, and some coal outcrops. During the field work associated with this project, coal beds were sampled for analysis, coal and overburden thicknesses were measured, some coal correlations were substantiated, and some fault locations were verified. Coal sampling techniques were those of Glass (1975).

The distribution of control points was adequate for a fairly reliable inventory of strippable coal resources over most of the coal field. Areas were omitted when data were deemed too sparse for reliable estimates.

Mined-out areas were taken from various maps and plats on file with the Geological Survey of Wyoming. These maps and plats were acquired from various state and federal agencies as well as from individual mining companies.

Delineation of Coal Outcrops

The reliability of coal bed outcrops on Plates 1 through 4 varies considerably. Areas for which recent geologic maps are available provide the highest degree of reliability (Hyden and McAndrews, 1967; Merewether, 1971; Merewether, 1972; Merewether, 1973). Outcrops in other areas for which only the Dobbin, Bowen, and Hoots (1929) publication was available, are less reliable. The reliability of outcrops in these latter areas, however, is enhanced by post - 1929 drilling, reconnaissance mapping, company mine maps and geologic maps, and the availability of excellent colored photography. Using this new data, the traces of many coal bed outcrops no longer agree with those depicted in Dobbin, Bowen, and Hoots (1929).

On Plates 1 to 4, the trace of a coal outcrop is dashed where the coal is not of minable thickness or where the reliability of the outcrop's position is poor. Generally, the trace of a coal outcrop is not depicted for any great distance beyond where it is of minable thickness even though its outcrop might be mappable. For this reason, Plates 1 to 4 do not provide the total outcrop area of many of the coals depicted on the plates.

Mined-out Areas

Areas where coal has been removed by mining are depicted on Plates 1 to 4. Areas of both surface and underground mining are shown. The mined-out areas for many of the smaller underground mines in the coal field, however,

are omitted because there are no maps available for them.

Boundaries of depicted underground mines are approximate at best, not only because of inaccuracies in the mine maps themselves, but also because of optical distortions inherent in reducing the original maps to a 1:24,000 scale. Boundaries of all the active mines, both strip and underground, are only current through January 1, 1978. Any mining since then is probably not shown or is only partially shown.

Only the mined-out portions or pit acreage of strip mines are included on Plates 1 to 4. Spoils, which are often dumped on undisturbed areas outside the pit acreage, are not shown because they are not areas where coal has been removed. Similarly, some strippable resources are still depicted in areas where a shallower coal has already been mined-out. The existence of deeper strippable resources in these areas is not eliminated simply because a shallower coal was already mined. In fact, the removal of the shallower coal in some cases is prerequisite to the economical mining of the underlying coal.

Burned-out Areas

There are areas in the Hanna Coal Field where coal beds have burned in place. These natural burns were probably started by spontaneous combustion, lightning, or grass fires and are prehistoric in age. Rocks overlying these burned-out areas are baked and even melted. These baked rocks or "clinker beds" are recognizable by their characteristically reddish color and their relative resistance to erosion. In this report, most burned-out areas were mapped from color photography. While the larger burned-out areas are depicted on Plates 1 to 3, narrower bands, where only the trace of the coal bed outcrop burned, are usually not shown. Subsidence is commonly associated with the burned-out areas since the overlying rocks collapse into the void left by the incinerated coal.

In some cases, the entire height of a thick coal bed is not burned, leaving some of the lower portion of the bed intact. Because it is impossible to recognize these remnants without drilling, no resources are calculated for burned-out coal beds. The strippable resources shown in clinkered areas on Plates 1 to 3 refer to coal beds that lie at some distance below the burned-out beds.

There are also a few areas that have burned in more recent times. In fact, there is an active underground fire near the old townsite of Carbon in the Carbon Mining District. These modern fires started in old underground coal mines. In some cases they spread beyond the mine boundaries before they were extinguished by the lack of fuel or air. These burned-out areas are relatively small in comparison to some of the natural burns in the coal field.

Thickness of Coal Beds

Although coal thickness is not shown on Plates 1 to 4, Table 4 details the range in coal thickness and the

weighted average thickness on a bed by bed basis. Table 1 gives the weighted average thickness of coal in each of the four mining districts and for the field as a whole. Isopach maps of coal thickness were constructed and used in conjunction with structure and overburden maps to derive the resource estimates tabulated in Tables 1, 2, 4, and 5.

With one exception, isopach lines were constructed for each two feet increment of thickness. The exception was for a thick coal (Hanna No. 1 coal bed) where five feet increments were substituted for the normal two feet intervals. The two feet increments began with four feet and progressed as 6, 8, 10, 12, etc. Thus the average thickness of coal between each isopach line was an odd number or 5, 7, 9, 11, etc. Sometimes exceptions to this procedure were necessitated, particularly in two extreme situations i.e., (1) where data was so abundant that it was obvious that an even number was a better choice and (2) where data was so sparse that it was better to use the actual measured thickness rather than an interpolated thickness.

Minable thicknesses were determined at each control point. Where rock partings occurred, they were not subtracted from the coal thickness if they were deemed too thin for economic removal. As a rule of thumb, partings less than four inches thick were considered part of the coal. It was reasoned that partings this thin would be mined with the coal and reported as ash since Wyoming coals are not generally cleaned before shipment. Where partings were greater than four inches thick, the overlying and underlying coals were only added together when they exceeded the parting thickness. For examples, where a 7 feet thick coal was separated from a lower 8 feet thick coal by less than 8 feet of rock, the minable coal thickness was reported as 15 feet thick. If the lower bed had been 4 feet thick and the intervening rock 7 feet thick, the minable thickness would have been 7 feet. In the first example, if the upper bed had only been 4 feet thick, the minable thickness would have been 8 feet. Minable coal beds (greater than 5 feet thick) separated by more than 20 feet of rock were treated as separate coals.

Overburden Categories

Two overburden thickness categories are shown on Plates 1 to 4 by isopach lines drawn at 100 feet intervals of depth. These isopach lines therefore show overburden thickness categories of 0-100 feet and 100-200 feet. In selecting these overburden categories, it is recognized that some mines in the coal field are stripping 200 feet or more overburden while others are not. The 0-100 feet category, however, is well within current strippable limits, particularly where coals are close enough together, stratigraphically, to allow multiple bed mining. It also seems appropriate to include the deeper resources (between 100-200 feet of cover) since they are not only within technologic reach of strip mining, but also are within the economic limits of at least some of the mining companies now

operating in the Hanna Coal Field.

The actual isopach lines on Plates 1 to 4, which delineate the two overburden categories, were constructed by subtracting contour elevations of surface topography from contour elevations drawn on the tops of the various coal beds. While surface topography was obtained from U.S. Geological Survey topographic maps at a scale of 1:24,000, coal elevations were derived from structure contour maps constructed from the outcrop and drill hole data provided by published reports, mine maps, company records, government drilling, etc. In as much as these data varied in quality and distribution, the overburden isopachs shown on Plates 1 to 4 may be subject to significant errors.

Because many minable coal beds in the Hanna Coal Field occur less than 100 feet above or below one another, there is considerable overlap of overburden thickness categories on Plates 1 to 4. For simplicity, only the shallowest strippable resources are depicted on those plates. This means that an area depicted as containing resources between 0-100 feet of cover could be underlain by more than one coal bed within that interval as well as by coals in the 100-200 feet category of overburden thickness. Table 4, however, tabulates all the strippable resources by depth of cover and does not exclude any resources that happen to overlap one another on Plates 1 to 4.

Reliability Categories

Coal resources are usually divided into categories that indicate the reliability of an estimate. In this report, strippable resources were divided into the three categories of reliability used by the U.S. Geological Survey: measured, indicated, and inferred (Averitt, 1975).

Measured resources are those resources where thickness measurements are no more than one-half mile apart (Figure 3). Computed tonnages for measured resources are judged to

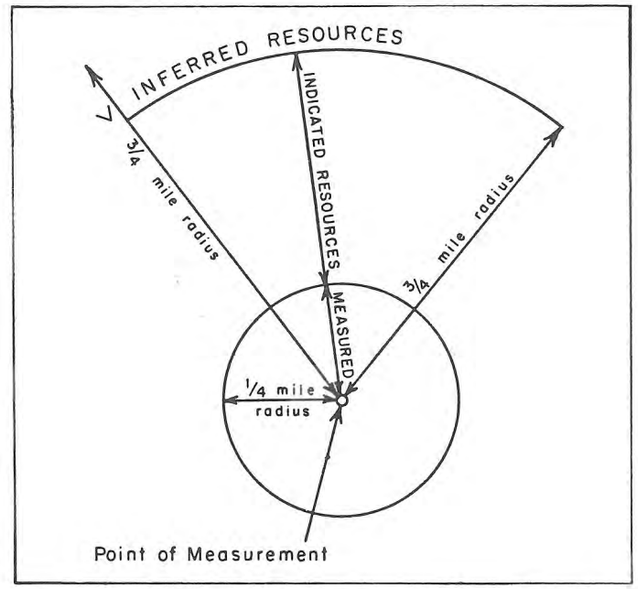

Figure 3. Reliability categories for resources and reserve base

be accurate within 20 percent of true tonnage. Indicated resources are resources where thickness measurements are more widely spaced, usually between 1-1.5 miles apart. Obviously, the degree of reliability for indicated resources is considerably less than that of the measured resources. Inferred resources are the least reliable, with thickness measurements generally more than 1.5 miles apart.

In this study, reserve base is restricted to resources in the measured and indicated categories of reliability after the U.S. Bureau of Mines and U.S. Geological Survey (1976). Taken collectively, these two categories are sometimes referred to as demonstrated resources.

Because of their proximity to a large reservoir in the Seminoe Mining District, some measured and indicated strippable resources are rather arbitrarily placed in the inferred category of reliability. These resources all occur within a 500 feet wide buffer zone that parallels the shoreline of Seminoe Reservoir. This was done because, it seems very unlikely that strip mining will be permitted that close to the reservoir.

It is also worthy of note that no strippable resources or reserve base are calculated beneath the built-up areas of Hanna and Elmo in the Hanna Mining District. Although some shallow coal resources underlie both townsites, it is unlikely that any strip mining will occur in those areas. It is not unusual for strippable coal resource estimates to exclude or omit resources such as these.

Techniques and Assumptions

The acreage determinations for the various thickness, overburden, and reliability categories were all made with a compensating polar planimeter. All tonnage estimates were based on the assumptions that an acre-foot of subbituminous coals weighs 1770 tons and that an acre-foot of bituminous coal weighs 1800 tons. These values conform to those used by the U.S. Geological Survey (Averitt, 1975). It is further assumed that all coals within the Hanna Coal Field are subbituminous in rank except those in the Mesaverde Group, which are bituminous coals. All resource and reserve base estimates are rounded to the nearest 10,000 tons, and are reported in Tables 1, 2, 4, and 5 as millions of tons.

COAL MINING DISTRICTS

For purposes of this report, the Hanna Coal Field is divided into four newly defined mining districts. The boundaries of these districts are shown on Figure 2. These district boundaries which were defined on a geographic basis rather than a geologic or stratigraphic basis, define four discrete mining regions in the Hanna Coal Field that are separated from one another by areas barren of strippable coal. With additional exploration, these boundaries may require revision or additional districts may be warranted. Presently, all significant past, current, and proposed coal mining fall within one or the other of these districts.

It is also noteworthy that although these four districts contain all the known strippable coal resources

of the Hanna Coal Field that dip at 25 degrees or less, they also contain some coals that dip more steeply. Resources of these more steeply dipping coals, however, are not calculated. Significant underground coal resources also underlie all four districts although no estimate of those resources was made for this report either.

GEOLOGY OF THE HANNA COAL FIELD

Structure

Most simply, the Hanna Coal Field (Figure 1) coincides with a small but deep structural trough in southcentral Wyoming. This trough is divided into two separate basins by a large northeast-trending anticline (Saddleback Hills). The Hanna Basin lies to the north; the Carbon Basin lies to the south. Like other intermontane basins in Wyoming, this trough formed during the Laramide Orogeny, some 38-65 million years ago. The Hanna Basin, however, is rather atypical in that it is not only extremely deep for its size (30,000-35,000 feet of sedimentary rock overlie its crystalline basement), but most of its sedimentary rocks are tightly folded and faulted. Even the youngest coal-bearing rocks (Eocene age) steepen to vertical dips on the flanks of the basin, especially in the north. In contrast, dips are flatter in the central portion of the basin, averaging 3-15 degrees.

Faulting is quite common in all four of the field's mining districts (Plates 1 to 4). Vertical displacement on these faults varies from a few feet to as much as several hundred feet. Cross-faulting between the major northwest-southeast trending faults of the Hanna and Seminoe Mining Districts is also common.

Coal-bearing Rocks and Coal Beds

By convention, the outcrop of the oldest coal-bearing rocks in any coal-bearing area of Wyoming defines its extent. In this case, the base of the Upper Cretaceous Mesaverde Group defines the boundaries of what is formally called the Hanna Coal Field (Figure 4). By doing this, all other coal-bearing rocks occur within this outcrop limit since they all overlie the Mesaverde Group.

Coal beds occur in a rock interval up to an estimated 28,000 feet thick (Figure 5). Coal, of course, accounts for only a minor portion of this great thickness of rock. Coal beds are most numerous in the upper 12,000 feet of rock, which comprise the Hanna Formation and the upper portion of the Ferris Formation. These Tertiary age coals are the youngest coals in the field (38-65 million years old) and also the most exploited coals. Mining of Tertiary coals in the Hanna Coal Field, which dates back to the 1860's, is still occurring today. In fact, all the active coal mining in the field is on coals of the Hanna and Ferris formations.

Although the 2,400-8,000 feet thick Hanna Formation apparently contains at least thirty-two subbituminous coals greater than 5 feet thick, correlation problems could account for some duplication among the beds i.e., two

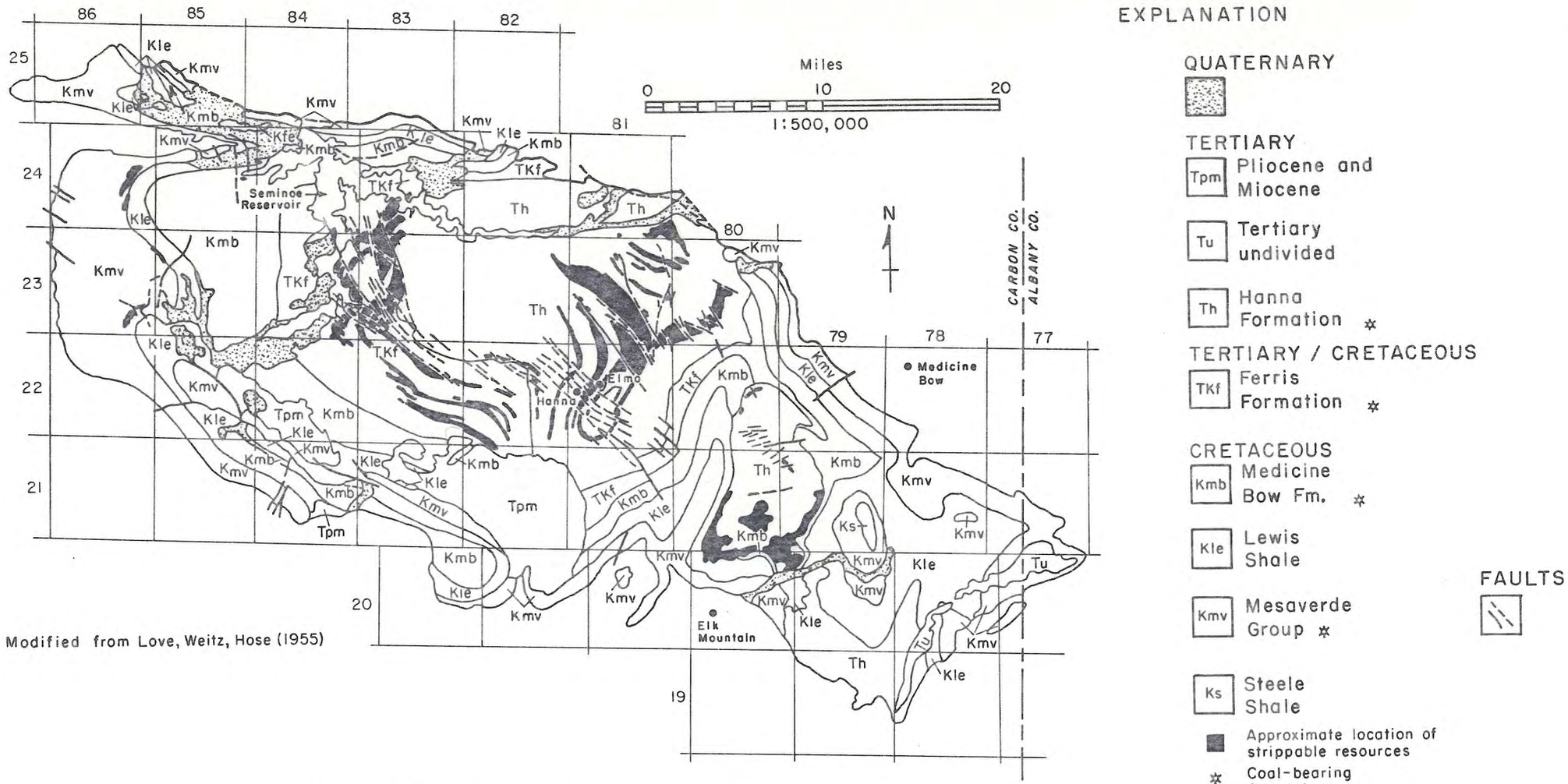

Figure 4. Geologic map of the Hanna Coal Field

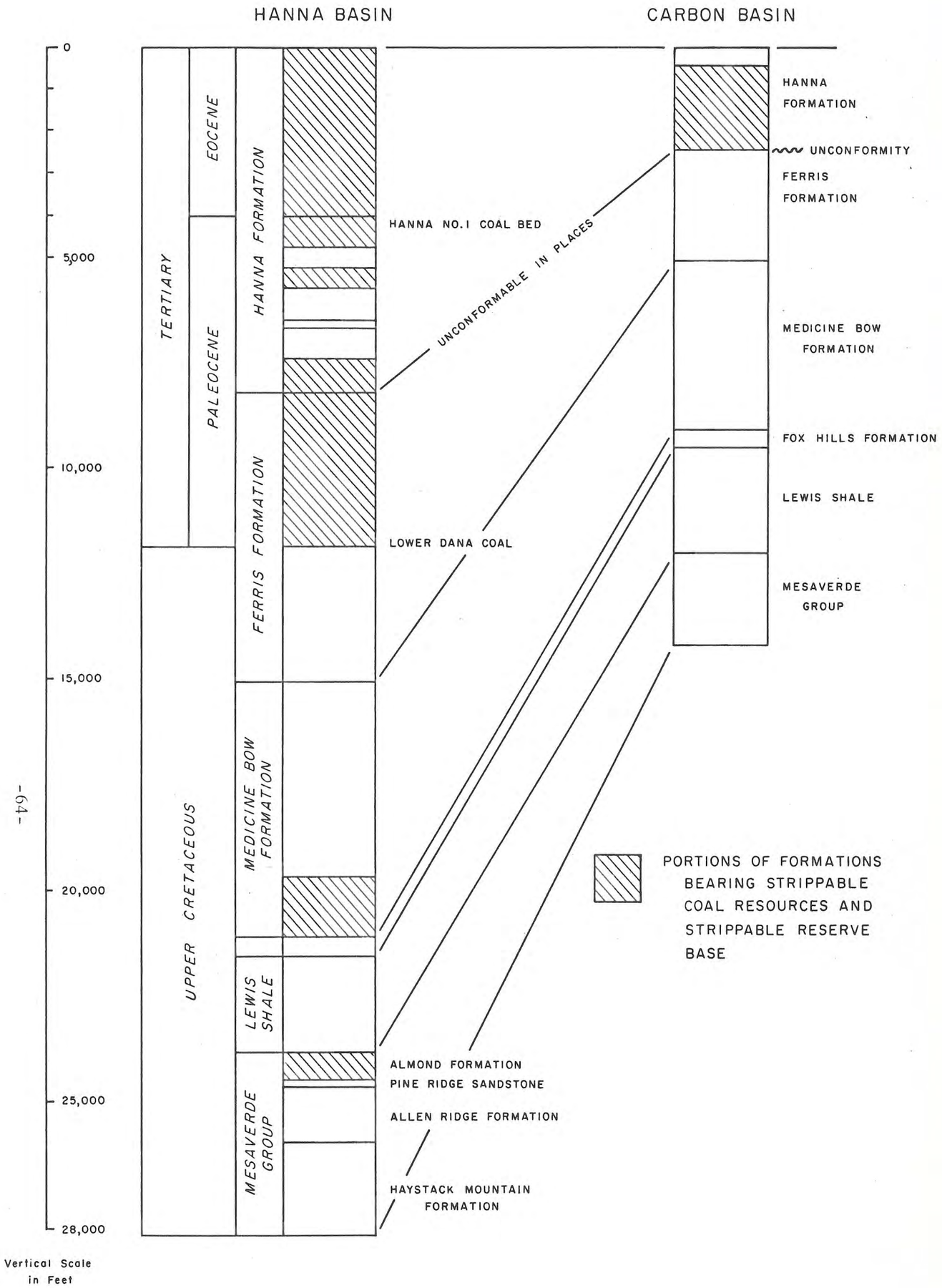

Figure 5. Generalized stratigraphic columns for the Hanna Coal Field of southcentral Wyoming

names applied to the same coal in separated areas. In particular, Hanna Formation coals of the Hanna Mining District have never been correlated with those in the Carbon District. For this reason, coals in the two districts are treated as separate beds. There is some evidence, incidentally, that suggests there may not be any direct correlation of coals between the two basins (Ryan, 1977).

While the thicker, strippable, Hanna Formation coals are 20-38 feet thick, most strippable coals in this formation are much thinner, probably better characterized as 5 to 11 feet thick. On the basis of calculated strippable resources, the weighted average thickness of Hanna Formation coals is 14.22 feet in the Hanna Mining District and 11.14 feet in the Carbon Mining District.

Various of the Eocene to Paleocene age coals of the Hanna Formation occur in three of the mining districts of the Hanna Coal Field: the Carbon, Hanna, and Seminoe districts. The stratigraphic position of fourteen mappable Hanna Formation coals in the Carbon Mining District (Plate 1) are shown in Figure 6. This figure uses the coal bed nomenclature of Glass (1978). Strippable resources are calculated for eight of these coal beds although as depicted on Figure 6, two of the coals are probably correlative with other coals in the district. The thickest of these coals are the Johnson and Finch beds, which are up to 23 feet and 12.5 feet thick, respectively, where strippable. A coal zone between the Johnson and

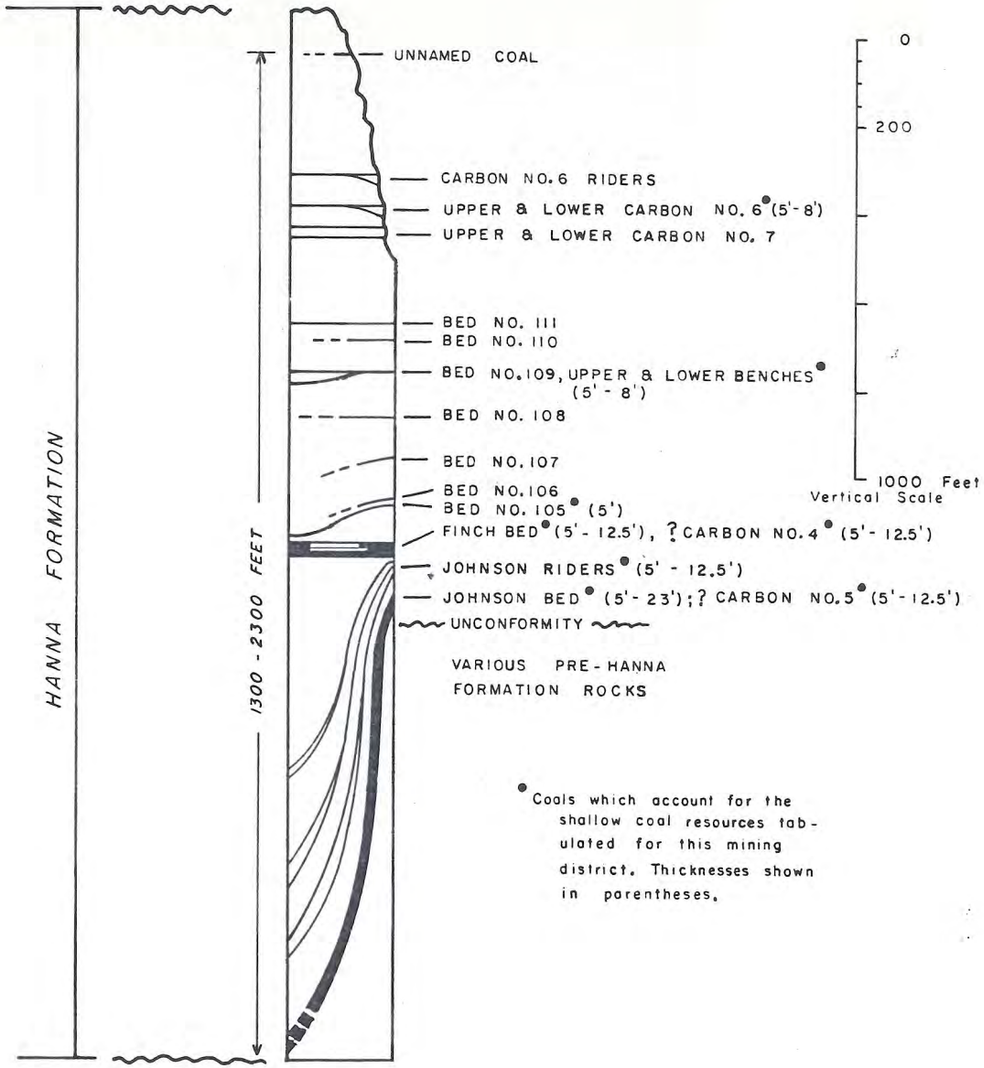

Figure 6. Coal nomenclature in the Carbon Mining District of the Hanna Coal Field

Finch coal beds, called the Johnson Rider bed for simplicity, is locally characterized by up to 12.5 feet of minable coal. Detailed descriptions of each of the eight coals for which resources are delimited are provided in Appendix A. Coal quality information is also presented.

Most of the strippable Hanna Formation coals occur in the Hanna Mining District (Plate 2). Strippable resources are tabulated for 23 out of 25 persistent coals in that district (Figure 7). Of these 23 coal beds, 8 exceed 20 feet in thickness (Bed No. RME 93, Hanna No. 1, Bed No. 80, Bed No. 79, Bed No. 78, Hanna No. 2, Bed No. 76, and Hanna No. 5). The other coal beds are generally less than twelve feet thick. In places the thickest coals, Bed No. RME 93, Hanna No. 2, and Hanna No. 5, all exceed 30 feet in thickness. Coal quality information and coal bed descriptions are provided in Appendix A.

Although as many as five Hanna Formation coals occur in the Seminoe Mining District (Figure 8), only the Brooks coal bed is thick enough to provide strippable coal resources (Plate 3). Again, detailed descriptions and analytical information on the Brooks coal bed are included in Appendix A.

Beneath the Hanna Formation, the upper portion or Paleocene part of the 7,000 feet thick Ferris Formation contains at least 28 minable subbituminous coal beds. Extensive faulting in the Seminoe Mining District (Plate 3) where these coals are mined, makes correlation difficult

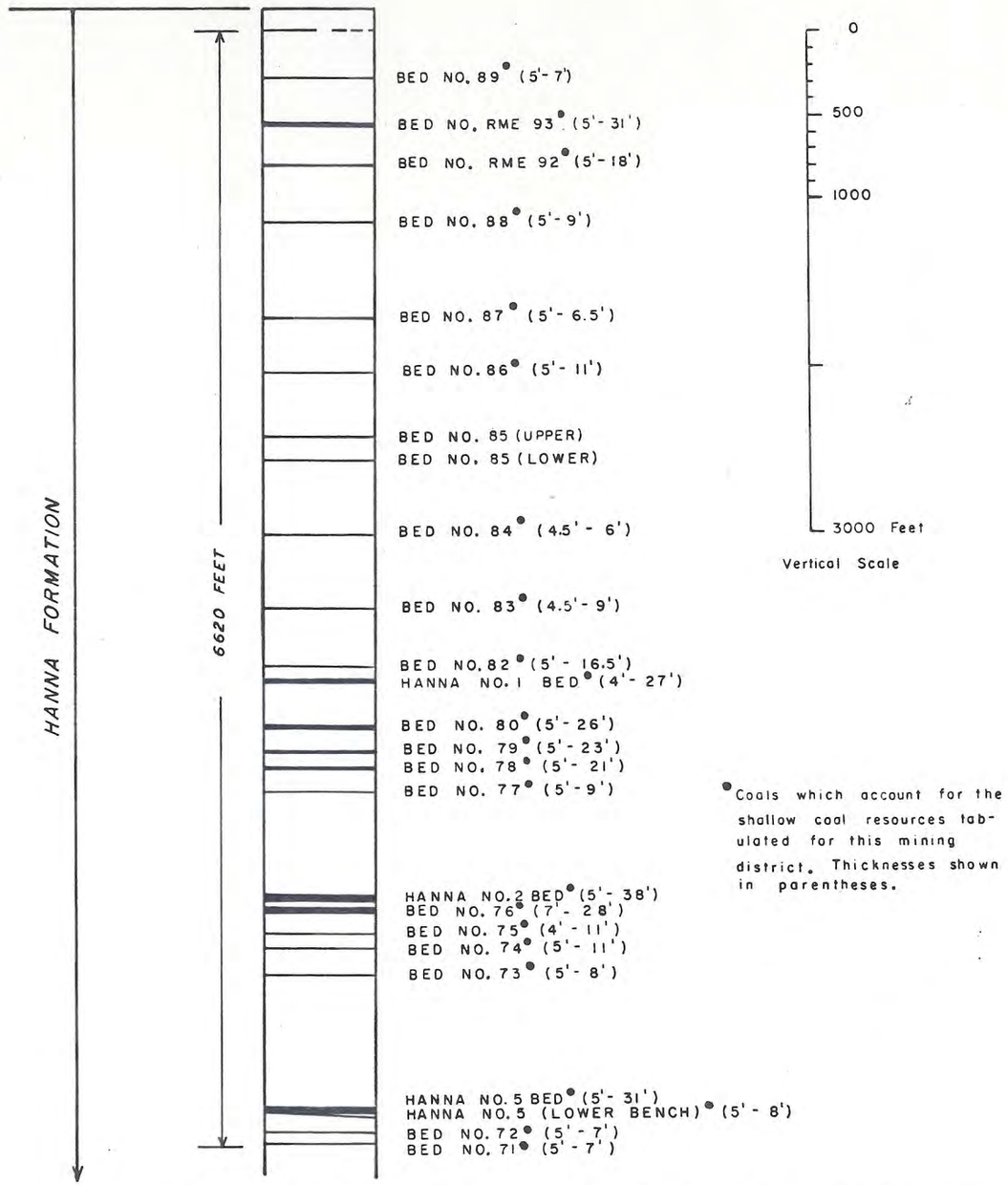

Figure 7. Coal nomenclature in the Hanna Mining District of the Hanna Coal Field

and accounts for more than one name being given to the same coal. Because of this duplication, more coals are identified than really exist. Figure 8 includes an attempt to show the approximate stratigraphic position of uncorrelated or isolated coal beds in the northwestern portion of the Seminoe Mining District. Because of these problems in correlation, strippable resources are calculated for 45 coals in the Seminoe Mining District. All the strippable resources and reserve base calculated for the Ferris Formation coals, incidentally, fall within the Seminoe Mining District. Descriptions and analyses of the strippable coals in the Ferris Formation are included in Appendix A.

Most minable coals in the Ferris Formation are thinner than those in the Hanna Formation. In fact, the majority of the coals in the Ferris Formation are only 5-10 feet thick. Based on the calculated strippable resources, the weighted average thickness of strippable Ferris coals is 9.79 feet, compared to 11.14-14.22 feet for Hanna coals. Thicker Ferris Formation coals are Bed No. 50, which is up to 22 feet thick, Bed No. 33, which is up to 25 feet thick, and Bed No. 123, which at least locally is over 40 feet thick (Blanchard and Pike, 1977). In the case of Bed No. 123, its thickest expression may coincide with an area where an underlying coal (Bed No. 122) has coalesced with it. Other coals also coalesce and become quite thick in places. For example, Bed Nos. 28 through 32 apparently do this in the vicinity of the Seminoe No. 1 strip mine (Plate 3).

The next older coal-bearing unit below the Ferris Formation is the Upper Cretaceous Medicine Bow Formation (Figure 5). Persistent, minable, subbituminous coals, however, are fewer in number than the coals of the Hanna and Ferris Formations. Medicine Bow coal beds are usually limited to the lower 900-2,600 feet of that formation (Merewether, 1971, 1972, and 1973). Although as many as thirty Medicine Bow Formation coals are mapped in the Corral Creek Mining District, there are only three that are strippable (Figures 9 and 10). Because these coals occur in two isolated areas of the Corral Creek Mining District, correlation between the two areas is currently impossible (Plate 4). The thickest of the three coals is the Penn-Wyoming coal bed, which is up to nine feet thick (Figure 10). The other two beds are unnamed and only 5 to 6 feet thick. With one exception, the informal bed designations in Figures 9 and 10 are those of Texas Instruments (19781 and 1978u) and not formal names. The Penn-Wyoming bed is formally given that name by this report. The name is derived from an old underground mine by that name, which operated on this bed.

In the Corral Creek Mining District and other portions of the Hanna Coal Field, there are additional Medicine Bow Formation coals that at least locally exceed five feet in thickness. But because these other beds dip at greater than 25 degrees, they are not included in this report.

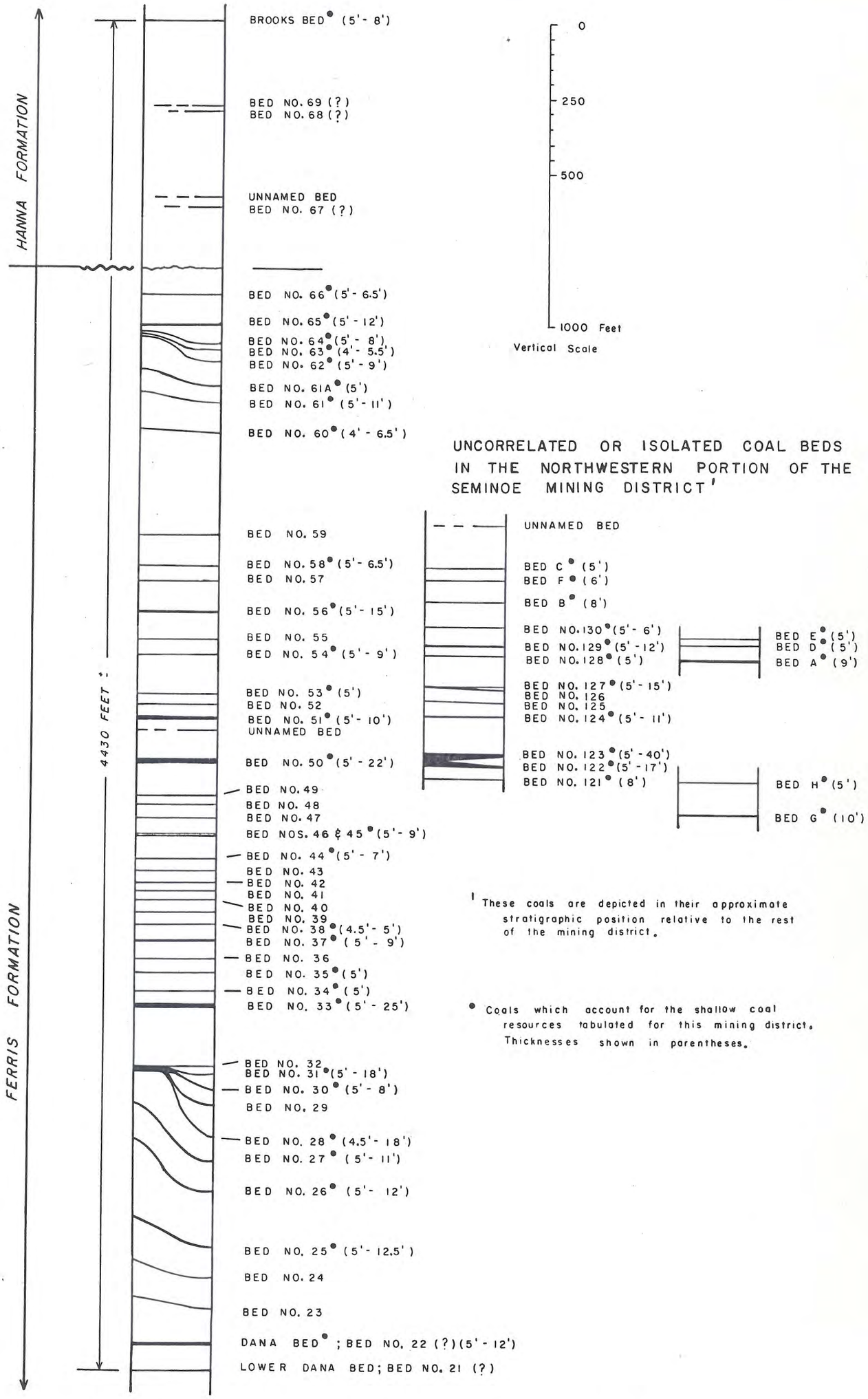

Figure 8. Coal nomenclature in the Seminoe Mining District of the Hanna Coal Field

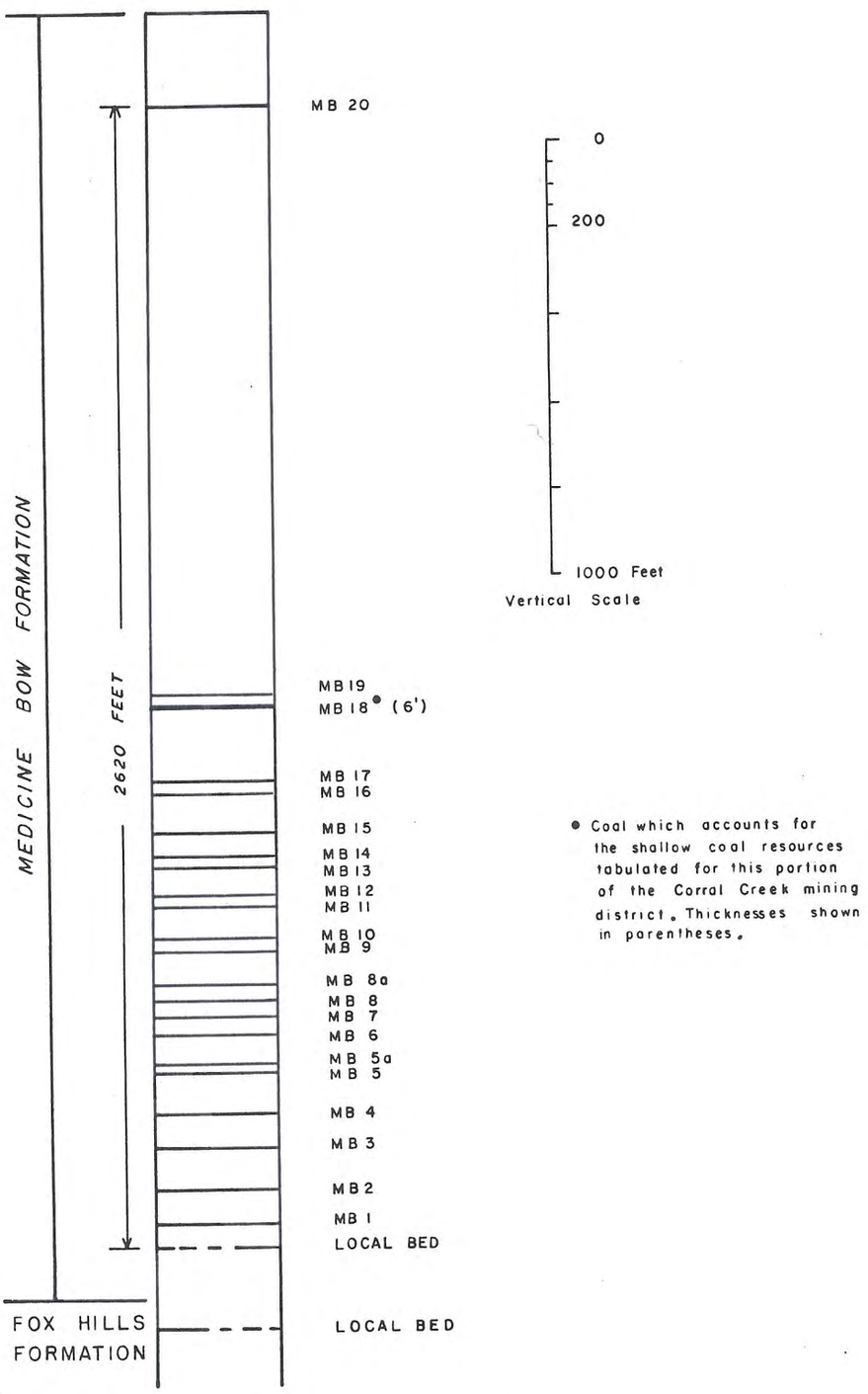

Figure 9. Coal nomenclature in the eastern portion of the Corral Creek Mining District of the Hanna Coal Field (modified from U.S.G.S. Open-file Report 78-060)

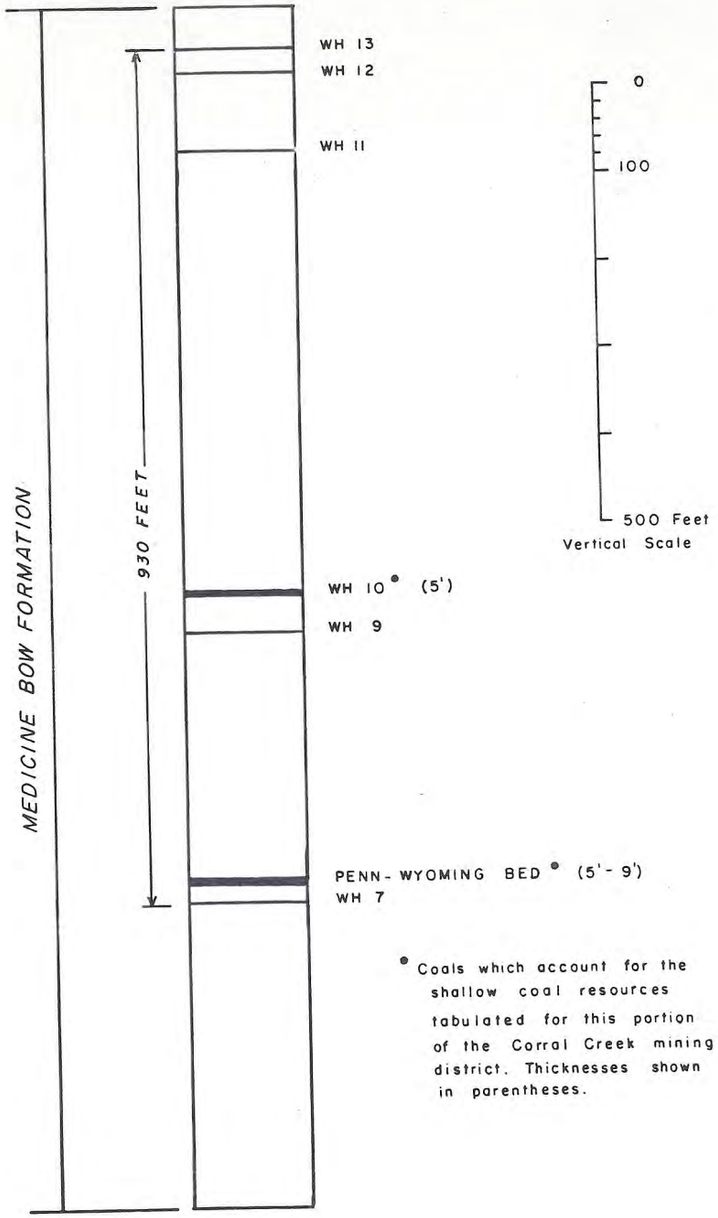

Figure 10. Coal nomenclature in the northern portion of the Corral Creek Mining District of the Hanna Coal Field (modified from U.S.G.S. Open-file Report 78-061)

The oldest coals in the Hanna Coal Field are found in Upper Cretaceous rocks of the Mesaverde Group (Figure 5). Strippable coals, however, are only recognized in the uppermost formation of that group, the Almond Formation (Gill, Merewether, and Cobban, 1970). The Almond Formation has as many as seven persistent coal beds that reach minable thickness (5 feet or greater). With the exception of the Corral Creek Mining District, however, these coals dip at such steep angles that strippable resources are minimal to nonexistent. In the Corral Creek Mining District (Plate 4), Almond Formation coal beds occur in two separated areas at shallow enough dips for strip mining (less than 25 degrees). In those areas several unnamed Almond Formation coals vary between 5-10 feet in thickness, averaging closer to 6 feet thick. Because the two areas are isolated from one another, correlation between them is impossible at this time. There is every likelihood that some of the coal beds in these two areas are correlative with one another. Until the correlations are substantiated, strippable resources must be tabulated as if there are seven separate beds. Unlike the younger coal beds in the Hanna Coal Field, these Almond coals are bituminous in rank.

For discussion purposes, Almond Formation coals in the Corral Creek Mining District are given the informal designations shown in Figures 11 and 12. These designations are those of Texas Instruments (19781 and 1978u) and are not formal names at this time.

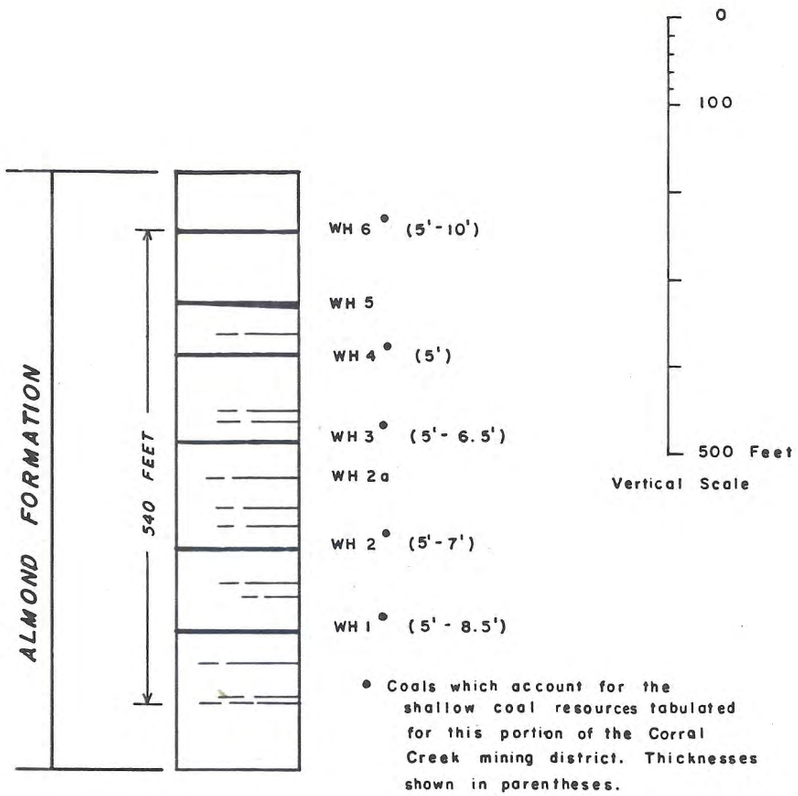

Figure 11. Coal nomenclature in the central portion of the Corral Creek Mining District of the Hanna Coal Field (modified from U.S.G.S. Open-file Report 78-061)

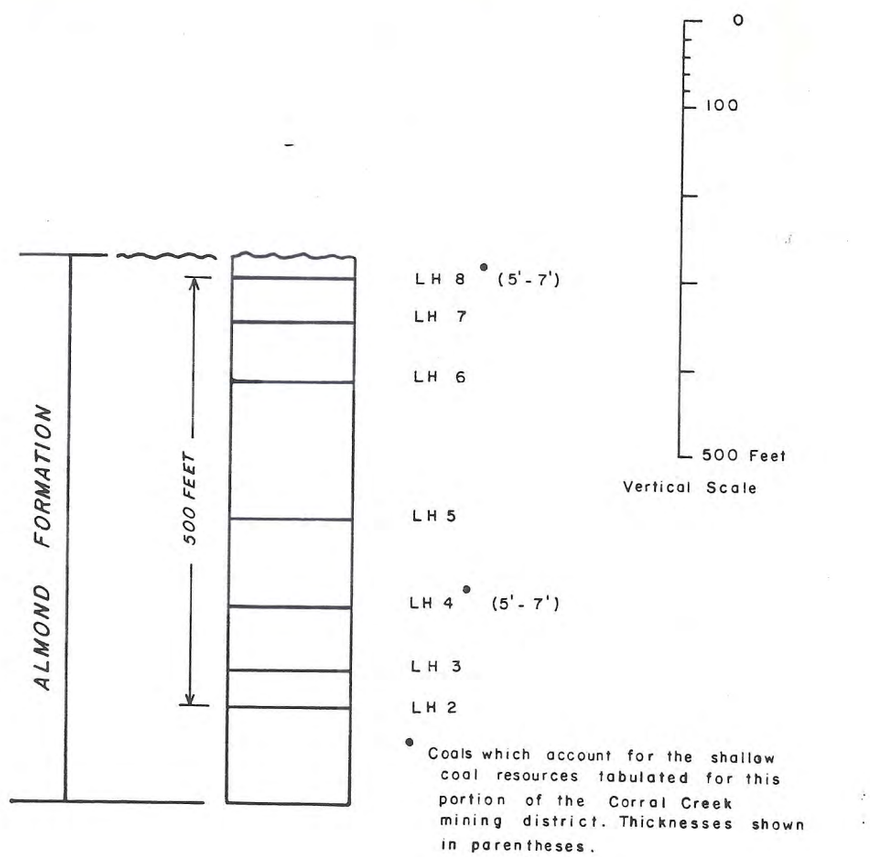

Figure 12. Coal nomenclature in the southern portion of the Corral Creek Mining District of the Hanna Coal Field (modified from U.S.G.S. Open-file Report 78-062)

Some final comments about the coal geology are necessary. Particularly because of extensive faulting, many coal bed correlations in other reports do not agree with those in this report. For this reason, the coal bed nomenclature of this report does not necessarily agree with the coal bed designations of some mining companies or some published reports. Every attempt, however, was made to adhere to the nomenclature set up by Dobbin, Bowen, and Hoots (1929). Whenever possible, other names applied to the same coal bed are reported in the bed by bed descriptions in Appendix A.

History of Coal Deposition

With the possible exception of all or part of the uppermost Medicine Bow Formation, Upper Cretaceous coals in the Hanna Coal Field are probably all derived from telmatic peat swamps that accumulated in close proximity to a sea some 70-130 million years ago. The coals of the Mesaverde Almond Formation, in particular, are probably the remnants of transgressive and regressive swamps that grew along the shoreline of a widespread Cretaceous seaway that periodically advanced and retreated across vast portions of Wyoming and adjacent states, including the area now occupied by the Hanna Coal Field.

The Upper Cretaceous Medicine Bow Formation was deposited during and after the final regression of the Cretaceous sea from the Western Interior. Although coals may have been paralic at the base of the Medicine Bow Formation, the upper part of the Medicine Bow Formation became more continental in nature as the sea retreated beyond even Wyoming's borders. The uppermost Medicine Bow Formation contains only a few coals, which are probably derived from swamps growing on a vast plain of low relief, characterized by meandering streams and even fresh-water lakes.

By Paleocene time, Wyoming was marked by widespread erosion and orogenic activity that partitioned the state into various intermontane basins, one of which was the area now known as the Hanna Basin. The seaways of the Cretaceous were long gone and the Cretaceous rocks were being folded and faulted within the basins as mountains rose around them. Clastic Tertiary sediments were carried into the basins by rivers and deposited over these older rocks.

During this period, peat swamps frequently accumulated over large areas of the intermontane basins, including the Hanna Basin. It is these peats and their associated sediments that became the thick, Tertiary age, continental sequences of rock now called the Hanna and Ferris formations. Rocks observed in these formations indicate a depositional complex of alluvial-fan and braided stream deposits, some lacustrine deposits, and flood-plain deposits. Although most of the Hanna and Ferris coals are apparently derived from peat swamps associated with the flood-plain deposits, others may be more closely allied with braided streams and shorelines of fresh-water lakes.

Table 6. Summary table of ultimate and proximate analyses, heats of combustion, and major oxides of coal ash for coals of the Hanna Coal Field

	Hanna Formation Hanna District		Hanna Formation Carbon District		Ferris Formation		Medicine Bow Formation		Mesaverde Formation	
	Mean	#Samples	Mean	#Samples	Mean	#Samples	Mean	#Samples	Mean	#Samples
Moisture (%)	12.76	155	10.00	50	12.58	139	13.49	29	12.07	2
Volatile Matter (%)	36.68	"	36.71	"	34.30	"	35.48	"	34.65	"
Fixed Carbon (%)	41.82	"	39.55	"	45.19	"	47.24	"	45.71	"
Ash (%)	8.75	"	13.74	"	7.93	"	3.81	"	7.57	"
Hydrogen (%)	5.70	34	4.84	14	5.31	33	5.51	7	5.45	2
Carbon (%)	60.44	"	46.84	"	59.29	"	60.55	"	52.65	"
Nitrogen (%)	1.14	"	0.97	"	1.05	"	1.52	"	1.15	"
Oxygen (%)	24.13	"	16.64	"	25.17	"	28.31	"	32.25	"
Sulfur (%)	0.76	"	2.72	"	0.49	"	0.54	"	0.50	"
Ash (%)	7.84	"	27.95	"	8.69	"	3.58	"	8.00	"
Heat Value (Btu/lb)	10,420	158	10,190	198	10,140	198	10,810	24	10,818	16
Sulfur (%)[1]	1.00	193	1.35	50	0.46	200	0:69	27	0.67	23

[1] Includes all available sulfur analyses

Table 6. Continued

	Hanna Formation Hanna District		Hanna Formation Carbon District		Ferris Formation		Medicine Bow Formation		Mesaverde Formation	
	Mean	#Samples	Mean	#Samples	Mean	#Samples	Mean	#Samples	Mean	#Samples
Al_2O_3 (%)	16.9	33	16.5	13	16.4	40			23.0	3
CaO (%)	16.4	"	7.6	"	17.2	"			2.6	"
Fe_2O_3 (%)	8.9	"	14.2	"	6.5	"	No		4.9	"
K_2O (%)	0.8	"	1.9	"	1.0	"			0.3	"
MgO (%)	3.4	"	1.5	"	2.7	"	analyses		0.5	"
Na_2O (%)	1.0	"	0.2	"	0.4	"			0.1	"
P_2O_5 (%)	1.0	"	1.1	"	0.8	"			0.1	"
SiO_2 (%)	32.6	"	47.3	"	36.1	"	available		53.7	"
SO_3 (%)	13.1	"	5.5	"	10.1	"			4.2	"
TiO_2 (%)	0.8	"	0.8	"	0.6	"			0.8	"

Table 7. Concentrations of trace elements in coals of the Hanna Coal Field (in parts per million on a whole-coal basis)

Trace Element	Hanna Formation Hanna District			Hanna Formation Carbon District			Ferris Formation			Mesaverde Formation		
	Mean	Range	#Samples	Mean	Range	#Samples	Mean	Range	#Samples	Mean	Range	#Samples
Arsenic (As)	3.3L[1]	0.88 - 7.7	17	25	7 - 86	17	4.6	0.58 - 35	34	1	1	3
Boron (B)	30	10 - 100	17	30	20 - 70	18	30	10 - 76.3	34	20	10 - 50	3
Barium (Ba)	200	100 - 450	20	200	100 - 500	18	300	148.5 - 1000	36	150	70 - 300	3
Beryllium (Be)	0.3L	ND[2] - 0.5	19	1.0	ND - 1.5	18	0.5L	ND - 2.0	36	1.5	0.7 - 1.5	3
Cadmium (Cd)	0.171L	0.060 - 0.50	17	0.54L	0.15L - 1.4	18	0.176L	.08L - 0.50	35	0.30	0.12 - 0.50	3
Cerium (Ce)	10L	ND - 70	20	30	ND - 100	18	5L	ND - 52L	26	70L	50L - 100	3
Chlorine (Cl)	190L	50 - 1000	22	Not Determined			163L	10L - 800	35	Not Determined		
Cobalt (Co)	2L	0.5 - 3.53	22	3	0.5 - 10	18	1.5	0.3 - 2.72	40	5	3 - 7	3
Chromium Cr)	7	2.92 - 20	20	10	0.7 - 30	18	10	1.5 - 16.1	37	7	3 - 10	3
Copper (Cu)	10.0	2.6 - 20.1	20	29	10 - 55	18	11.6	3.3 - 41.3	37	12.4	9.3 - 16.0	3
Fluorine (F)	78	20 - 155	17	212	75 - 500	18	111L	20L - 460	34	68	60 - 80	3
Gallium (Ga)	1.5L	0.37 - 3.18	21	7	2 - 15	18	2L	0.5L - 5.97	25	3	3 - 5	3
Germanium (Ge)	0.7L	ND - 2	19	Not Determined			0.3L	ND - 2L	36	ND		3
Mercury (Hg)	0.08	0.02 - 0.15	17	0.20	0.10 - 0.36	18	0.08L	0.01L - 0.40	35	0.03	0.02 - 0.04	3
Lanthanum (La)	7	ND - 20	22	30	ND - 70	18	7L	ND - 50	39	15	15 - 20	3
Lithium (Li)	3.9	0.05 - 8.9	17	19.7	0.49 - 60	18	8.1	0.60 - 20.2	35	4.6	4.5 - 4.8	3
Manganese (Mn)	63L	11L - 165	19	192	58 - 410	18	59L	8L - 430	37	11	4.5 - 18	3
Molybdenum (Mo)	2	0.5 - 8.3	17	5	2 - 15	18	2	0.3 - 3.96	35	1.5	1 - 2	3

[1] L = less than [2] ND - not detected

Table 7. Continued

Trace Element	Hanna Formation Hanna District			Hanna Formation Carbon District			Ferris Formation			Mesaverde Formation		
	Mean	Range	#Samples	Mean	Range	#Samples	Mean	Range	#Samples	Mean	Range	#Samples
Niobium (Nb)	1.5L	ND - 4L	23	3	ND - 10	18	1.5L	ND - 6.1	39	3	3 - 5	3
Nickel (Ni)	7	2 - 15	20	15	7 - 70	18	5	1 - 15	36	10	7 - 10	3
Lead (Pb)	3.5L	0.04 - 12	23	11.1L	3.1 - 25	18	5.2L	1.5 - 21.5	40	8.1	5.8 - 9.3	3
Antimony (Sb)	0.6L	0.01L - 1.2	17	1.6	0.8 - 6.0	18	0.7	0.18 - 1.38	34	0.4	0.2 - 0.5	3
Scandium (Sc)	1.5	0.65 - 3	23	7	1.5 - 15	18	1.5L	0.2L - 7	38	1.5	1.5 - 2	3
Selenium (Se)	0.79	0.29 - 2.31	15	3.2	1.5 - 5.1	18	0.67L	0.01L - 1.28	34	2.6	2.4 - 2.9	3
Strontium (Sr)	150	30 - 470	20	150	30 - 500	18	150	30 - 500	36	100	20 - 200	3
Thorium (Th)	3.7	0.86 - 8.9	17	6.9	1.8 - 12.7	18	5.2L	2.0L - 15.3	33	4.1L	3L - 6.3	3
Uranium (U)	1.8	0.6 - 4.2	19	3.9	2.3 - 17	18	2.4	0.1 - 9.6	34	1.7	1.0 - 2.2	3
Vanadium (V)	15	7 - 30	20	70	10 - 150	18	20	3 - 100	37	15	7 - 15	3
Yttrium (Y)	7	2 - 15	23	20	7 - 50	18	5	1 - 20	39	15	7 - 20	3
Ytterbium (Yb)	0.5	0.11 - 1.4	22	2	1 - 5	17	0.7L	0.1 - 1.5	36	1.5	0.7 - 2	3
Zinc (Zn)	11.7	0.21 - 35.5	20	69	24 - 140	18	14.7L	0.3L - 97.2	37	22	17.4 - 30.9	3
Zirconium (Zr)	15	4.55 - 20	19	30	3 - 100	18	50	3 - 901	36	50	30 - 70	3

[1] L = less than [2] ND = not detected

Coal Rank and Composition

The older, Upper Cretaceous coals now differ in quality from the younger coals of the Hanna Coal Field partially because of their different depositional histories and partially because of their higher rank. The higher rank of the Upper Cretaceous coals accounts for their lower moisture contents and higher heat values. Dissimilar depositional histories probably account for some differences in major, minor, and trace element concentrations between the two ages of coals. Unfortunately, there are not enough major, minor, and trace element analyses available for the Upper Cretaceous coals of the Hanna Coal Field to draw any real conclusions.

In this report coals of the Upper Cretaceous Mesaverde Group are regarded as bituminous in rank. The coals of the upper Cretaceous Medicine Bow Formation, however, are only regarded as subbituminous. The sparcity of Medicine Bow Formation coal analyses makes the determination of their rank somewhat open to question. The younger, Paleocene and Eocene age coals of the Ferris and Hanna Formation are considered subbituminous in rank. By American Society for Testing and Materials (ASTM) standards, the rank of many of these younger Tertiary age coals lies on the line between subbituminous A and high-volatile C bituminous (ASTM, 1974). The subbituminous rank, however, must be used because none of these coals are agglomerating - a property that separates these two ranks.

Although chemical analyses are provided on a bed by bed basis in Appendix A, Tables 6, and 7 are provided for easier comparison. In each of these tables, analytical data are separated on the basis of geologic age whenever possible. The analytical data in this report came from Bureau of Land Management (1975), Dobbin, Bowen, and Hoots (1929), Glass (1975, 1978), Lord (1913), Texas Instruments (1978 a, c-h, j-m, o-s, u), and U.S. Bureau of Mines (1931) as well as unpublished company records and government analyses on file at the Geological Survey of Wyoming.

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APPENDIX A: Descriptions of coal beds to include chemical analyses

For easier use the coal beds in Appendix A are arranged in alpha-numerical order, i.e., Bed A, Bed B, ... Bed No. 25, Bed No. 26, ... Hanna No. 1, Hanna No. 2., ... Johnson Rider, and Penn-Wyoming coal beds.

Most of the coals sampled for the analyses provided in this appendix were not collected according to procedures set by the American Society for Testing and Materials (1974). Because of this, only apparent ranks are provided for each coal bed. Although an apparent rank was calculated for each analysis, only a range in apparent rank is provided for coals for which more than one analysis is available. When a range is given, the first apparent rank is the rank determined from the calculated average analysis of the coal bed.

MINING DISTRICT: Seminoe

COAL NAME(s): Bed A

GEOLOGIC FORMATION: Ferris
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 8
GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES *(Table 4, page 48)*	STRIPPABLE RESERVE BASE *(Table 4, page 48)*
0-100 FEET OF COVER: 1.92 mt	0-100 FEET OF COVER: 1.92 mt
100-200 FEET OF COVER: 1.82 mt	100-200 FEET OF COVER: 1.82 mt
0-200 FEET OF COVER: 3.74 mt	0-200 FEET OF COVER: 3.74 mt
TOTAL ACREAGE: 234.6	TOTAL ACREAGE: 234.6

RANGE IN MINABLE THICKNESS (FEET): 9'
WEIGHTED AVERAGE THICKNESS (FEET): 9'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed A

APPARENT RANK: Subbituminous A (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed B

GEOLOGIC FORMATION: Ferris

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 8

GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES	STRIPPABLE RESERVE BASE
(Table 4, page 43 *)*	*(Table* 4, page 43 *)*
0-100 FEET OF COVER: 1.14 mt	0-100 FEET OF COVER: 1.14 mt
100-200 FEET OF COVER: 1.47 mt	100-200 FEET OF COVER: 1.47 mt
0-200 FEET OF COVER: 2.61 mt	0-200 FEET OF COVER: 2.61 mt
TOTAL ACREAGE: 184.6	TOTAL ACREAGE: 184.6

RANGE IN MINABLE THICKNESS (FEET): 8'

WEIGHTED AVERAGE THICKNESS (FEET): 8'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed B

APPARENT RANK: Subbituminous A (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed C

GEOLOGIC FORMATION: Ferris
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 8
GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES (*Table* 4, page 43)	STRIPPABLE RESERVE BASE (*Table* 4, page 43)
0-100 FEET OF COVER: 1.68 mt	0-100 FEET OF COVER: 1.25 mt
100-200 FEET OF COVER: 1.32 mt	100-200 FEET OF COVER: 1.13 mt
0-200 FEET OF COVER: 3.00 mt	0-200 FEET OF COVER: 2.38 mt
TOTAL ACREAGE: 338.9	TOTAL ACREAGE: 269.6

RANGE IN MINABLE THICKNESS (FEET): 5'
WEIGHTED AVERAGE THICKNESS (FEET): 5'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): Medicine Bow
ANNUAL PRODUCTION:	ANNUAL PRODUCTION: Unknown percentage of 3 mt

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed C

APPARENT RANK: Subbituminous A (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed D

GEOLOGIC FORMATION: Ferris
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 8
GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES	STRIPPABLE RESERVE BASE
(Table 4, page 48 *)*	*(Table* 4, page 48 *)*
0-100 FEET OF COVER: 0.84 mt	0-100 FEET OF COVER: 0.84 mt
100-200 FEET OF COVER: 0.89 mt	100-200 FEET OF COVER: 0.89 mt
0-200 FEET OF COVER: 1.73 mt	0-200 FEET OF COVER: 1.73 mt
TOTAL ACREAGE: 195.5	TOTAL ACREAGE: 195.5

RANGE IN MINABLE THICKNESS (FEET): 5'
WEIGHTED AVERAGE THICKNESS (FEET): 5'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed D

APPARENT RANK: Subbituminous A (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)	No routine analyses available		
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)			
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%) (1 sample)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2		61.0	K_2O		2.0
Al_2O_3		29.0	Fe_2O_3		3.3
CaO		1.9	TiO_2		0.72
MgO		1.4	P_2O_5		0.84
Na_2O		0.59	SO_3		1.8

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed E

GEOLOGIC FORMATION: Ferris
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 8
GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES *(Table 4, page 47)*	STRIPPABLE RESERVE BASE *(Table 4, page 47)*
0-100 FEET OF COVER: 0.82 mt	0-100 FEET OF COVER: 0.82 mt
100-200 FEET OF COVER: 1.07 mt	100-200 FEET OF COVER: 1.07 mt
0-200 FEET OF COVER: 1.89 mt	0-200 FEET OF COVER: 1.89 mt
TOTAL ACREAGE: 213.5	TOTAL ACREAGE: 213.5

RANGE IN MINABLE THICKNESS (FEET): 5'
WEIGHTED AVERAGE THICKNESS (FEET): 5'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed E

APPARENT RANK: High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE 1 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)		11.69	
VOLATILE MATTER (%)		34.11	
FIXED CARBON (%)		43.60	
ASH (%)		10.60	
SULFUR (%)			0.45
HYDROGEN (%)			-
CARBON (%)			-
NITROGEN (%)			-
OXYGEN (%)			-
BTU/LB.		10,190 (1 sample)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed F

GEOLOGIC FORMATION: Ferris
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 8
GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES *(Table 4, page 43)*	STRIPPABLE RESERVE BASE *(Table 4, page 43)*
0-100 FEET OF COVER: 1.25 mt	0-100 FEET OF COVER: 1.25 mt
100-200 FEET OF COVER: 0.95 mt	100-200 FEET OF COVER: 0.95 mt
0-200 FEET OF COVER: 2.20 mt	0-200 FEET OF COVER: 2.20 mt
TOTAL ACREAGE: 207.7	TOTAL ACREAGE: 207.7

RANGE IN MINABLE THICKNESS (FEET): 6'
WEIGHTED AVERAGE THICKNESS (FEET): 6'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): Medicine Bow
ANNUAL PRODUCTION:	ANNUAL PRODUCTION: Unknown percentage of 3 mt

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed F

APPARENT RANK: Subbituminous A (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)	No analyses available		
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)			
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed G

GEOLOGIC FORMATION: Ferris
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 8
GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES *(Table 4, page 48)*	STRIPPABLE RESERVE BASE *(Table 4, page 48)*
0-100 FEET OF COVER: 0.53 mt	0-100 FEET OF COVER: 0.20 mt
100-200 FEET OF COVER: 0.78 mt	100-200 FEET OF COVER: 0.15 mt
0-200 FEET OF COVER: 1.31 mt	0-200 FEET OF COVER: 0.35 mt
TOTAL ACREAGE: 74.0	TOTAL ACREAGE: 20.2

RANGE IN MINABLE THICKNESS (FEET): 10'
WEIGHTED AVERAGE THICKNESS (FEET): 10'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed G

APPARENT RANK: Subbituminous A (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)	No analyses available		
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)			
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed H

GEOLOGIC FORMATION: Ferris
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 8
GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES	STRIPPABLE RESERVE BASE
(Table 4, page 48 *)*	*(Table* 4, page 48 *)*
0-100 FEET OF COVER: 0.29 mt	0-100 FEET OF COVER: 0.07 mt
100-200 FEET OF COVER: 0.14 mt	100-200 FEET OF COVER: 0.01 mt
0-200 FEET OF COVER: 0.43 mt	0-200 FEET OF COVER: 0.08 mt
TOTAL ACREAGE: 48.0	TOTAL ACREAGE: 8.5

RANGE IN MINABLE THICKNESS (FEET): 5'
WEIGHTED AVERAGE THICKNESS (FEET): 5'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed H

APPARENT RANK: Subbituminous A (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{O}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Corral Creek

COAL NAME(s): Bed LH 4

GEOLOGIC FORMATION: Almond
AGE: Upper Cretaceous
STRATIGRAPHIC POSITION: *See Figure* 12
GEOGRAPHIC POSITION: *See Plate* 4

STRIPPABLE RESOURCES *(Table 4, page 50)*	STRIPPABLE RESERVE BASE *(Table 4, page 50)*
0-100 FEET OF COVER: 2.38 mt	0-100 FEET OF COVER: 2.38 mt
100-200 FEET OF COVER: 1.19 mt	100-200 FEET OF COVER: 1.19 mt
0-200 FEET OF COVER: 3.57 mt	0-200 FEET OF COVER: 3.57 mt
TOTAL ACREAGE: 355.5	TOTAL ACREAGE: 355.5

RANGE IN MINABLE THICKNESS (FEET): 5' - 7'
WEIGHTED AVERAGE THICKNESS (FEET): 5.74'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed LH 4

APPARENT RANK: High volatile C bituminous (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)	No analyses available		
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)			
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Corral Creek

COAL NAME(s): Bed LH 8

GEOLOGIC FORMATION: Almond
AGE: Upper Cretaceous
STRATIGRAPHIC POSITION: *See Figure* 12
GEOGRAPHIC POSITION: *See Plate* 4

STRIPPABLE RESOURCES
(Table 4, page 50 *)*
0-100 FEET OF COVER: 0.90 mt
100-200 FEET OF COVER: 0.75 mt
0-200 FEET OF COVER: 1.65 mt
TOTAL ACREAGE: 161.9

STRIPPABLE RESERVE BASE
(Table 4, page 50*)*
0-100 FEET OF COVER: 0.90 mt
100-200 FEET OF COVER: 0.75 mt
0-200 FEET OF COVER: 0.65 mt
TOTAL ACREAGE: 161.9

RANGE IN MINABLE THICKNESS (FEET): 5' - 7'
WEIGHTED AVERAGE THICKNESS (FEET): 5.82'

ACTIVE MINES
NAME(s): None

ANNUAL PRODUCTION:

PROPOSED MINES
NAME(s): None

ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed LH 8

APPARENT RANK: High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE 1 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)		9.40	
VOLATILE MATTER (%)		33.53	
FIXED CARBON (%)		48.38	
ASH (%)		8.69	
SULFUR (%)			0.72
HYDROGEN (%)			-
CARBON (%)			-
NITROGEN (%)			-
OXYGEN (%)			-
BTU/LB.		11,120 (1 sample)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{O}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Corral Creek

COAL NAME(s): Bed MB 18

GEOLOGIC FORMATION: Medicine Bow
AGE: Upper Cretaceous
STRATIGRAPHIC POSITION: *See Figure* 9
GEOGRAPHIC POSITION: *See Plate* 4

STRIPPABLE RESOURCES	STRIPPABLE RESERVE BASE
(Table 4, page 49 *)*	*(Table* 4, page 49 *)*
0-100 FEET OF COVER: 0.13 mt	0-100 FEET OF COVER: 0.13 mt
100-200 FEET OF COVER: 0.11 mt	100-200 FEET OF COVER: 0.11 mt
0-200 FEET OF COVER: 0.24 mt	0-200 FEET OF COVER: 0.24 mt
TOTAL ACREAGE: 23.2	TOTAL ACREAGE: 23.2

RANGE IN MINABLE THICKNESS (FEET): 6'
WEIGHTED AVERAGE THICKNESS (FEET): 6'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed MB 18

APPARENT RANK: Subbituminous A - High volatile C bituminous (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{O}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 25
(Called Bed No. 21 in Seminoe No. 1 mine)

GEOLOGIC FORMATION: Ferris

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 8

GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES

(Table 4, page 42 *)*

0-100 FEET OF COVER: 3.82 mt

100-200 FEET OF COVER: 3.79 mt

0-200 FEET OF COVER: 7.61 mt

TOTAL ACREAGE: 510.3

STRIPPABLE RESERVE BASE

(Table 4, page 42 *)*

0-100 FEET OF COVER: 3.72 mt

100-200 FEET OF COVER: 3.70 mt

0-200 FEET OF COVER: 7.42 mt

TOTAL ACREAGE: 498.5

RANGE IN MINABLE THICKNESS (FEET): 5' - 12.5'

WEIGHTED AVERAGE THICKNESS (FEET): 8.85'

ACTIVE MINES

NAME(s): Seminoe No. 1

ANNUAL PRODUCTION:
Unknown percentage of 3 mt

PROPOSED MINES

NAME(s): Medicine Bow

ANNUAL PRODUCTION:
Unknown percentage of 3 mt

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 25

APPARENT RANK: Subbituminous A - High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS (1-17 samples)	AVERAGE PROXIMATE 10 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)	11.05 - 16.77	14.1	
VOLATILE MATTER (%)	31.5 - 34.39	32.8	
FIXED CARBON (%)	43.48 - 45.58	44.6	
ASH (%)	6.07 - 13.09	8.5	8.8
SULFUR (%)	0.21 - 0.74		0.4
HYDROGEN (%)	5.3		5.3
CARBON (%)	57.4		57.4
NITROGEN (%)	0.9		0.9
OXYGEN (%)	27.1		27.1
BTU/LB.	9,095 - 10,290	9,750 (17 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS) (1 sample)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		0.16
SULFATE (%)		0.02
ORGANIC (%)		0.21

ASH FUSION TEMPERATURES (^{O}F) (1 - 2 samples)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION	2125	2125
SOFTENING TEMPERATURE	2265	2265
FLUID TEMPERATURE	2355 - 2400	2380 (2)

ASH COMPOSITION (%) (2 samples)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2	24.0 - 28.0	26.0	K_2O	0.31 - 0.46	0.39
Al_2O_3	14.0 - 17.0	15.5	Fe_2O_3	4.1 - 4.9	4.5
CaO	21.0 - 24.0	22.5	TiO_2	0.76 - 0.77	0.76
MgO	2.25 - 3.4	2.83	P_2O_5	1.0L - 1.7	1.4L
Na_2O	0.31 - 0.88	0.60	SO_3	8.2 - 18.0	13.1

Hardgrove Grindability Index:
L = less than

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 26
(Called Bed No. 23 in Seminoe No. 1 mine)

GEOLOGIC FORMATION: Ferris

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 8

GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES

(Table 4, page 41 *)*

0-100 FEET OF COVER: 3.80 mt

100-200 FEET OF COVER: 3.54 mt

0-200 FEET OF COVER: 7.34 mt

TOTAL ACREAGE: 501.4

STRIPPABLE RESERVE BASE

(Table 4, page 41 *)*

0-100 FEET OF COVER: 3.80 mt

100-200 FEET OF COVER: 3.54 mt

0-200 FEET OF COVER: 7.34 mt

TOTAL ACREAGE: 501.4

RANGE IN MINABLE THICKNESS (FEET): 5' - 12'

WEIGHTED AVERAGE THICKNESS (FEET): 8.83'

ACTIVE MINES

NAME(s): Seminoe No. 1

ANNUAL PRODUCTION:
Unknown percentage of 3 mt

PROPOSED MINES

NAME(s): None

ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 26

APPARENT RANK: Subbituminous A

AS RECEIVED BASIS	RANGE ANALYSIS (1-8 samples)	AVERAGE PROXIMATE 3 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)	11.57 - 17.4	13.48	
VOLATILE MATTER (%)	33.30 - 35.58	34.39	
FIXED CARBON (%)	40.85 - 44.15	42.62	
ASH (%)	7.4 - 10.57	9.51	7.35
SULFUR (%)	0.24 - 0.65		0.50
HYDROGEN (%)	5.64		5.64
CARBON (%)	57.70		57.70
NITROGEN (%)	0.89		0.89
OXYGEN (%)	27.92		27.92
BTU/LB.	10,080 - 11,330	9,570 (8 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS) (1 sample)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		0.17
SULFATE (%)		0.00
ORGANIC (%)		0.43

ASH FUSION TEMPERATURES (^{o}F) (1 sample)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		2210
SOFTENING TEMPERATURE		2265
FLUID TEMPERATURE		2370

ASH COMPOSITION (%) (1 sample)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2		33.0	K_2O		0.4
Al_2O_3		20.4	Fe_2O_3		6.2
CaO		21.1	TiO_2		0.7
MgO		2.9	P_2O_5		1.4
Na_2O		0.8	SO_3		11.3

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 27
(Probably part of Bed No. 24 in the Seminoe No. 1 mine)

GEOLOGIC FORMATION: Ferris

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 8

GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES

(Table 4, page 40 *)*

0-100 FEET OF COVER: 1.80 mt

100-200 FEET OF COVER: 2.11 mt

0-200 FEET OF COVER: 3.91 mt

TOTAL ACREAGE: 272.6

STRIPPABLE RESERVE BASE

(Table 4, page 40 *)*

0-100 FEET OF COVER: 0.99 mt

100-200 FEET OF COVER: 1.76 mt

0-200 FEET OF COVER: 2.75 mt

TOTAL ACREAGE: 182.6

RANGE IN MINABLE THICKNESS (FEET): 5' - 11'

WEIGHTED AVERAGE THICKNESS (FEET): 8.59'

ACTIVE MINES

NAME(s): Seminoe No. 1

ANNUAL PRODUCTION:
Minor percentage of 3 mt

PROPOSED MINES

NAME(s): Medicine Bow

ANNUAL PRODUCTION:
Unknown percentage of 3 mt

MISCELLANEOUS COMMENTS:
Apparently this bed is often merged with Bed No. 28 in the Seminoe No. 1 mine area.

mt=million tons

ANALYTICAL DATA FOR: Bed No. 27

APPARENT RANK: High volatile C bituminous - Subbituminous A

AS RECEIVED BASIS	RANGE ANALYSIS (3 samples)	AVERAGE PROXIMATE 3 *sample(s)*	AVERAGE ULTIMATE 3 *sample(s)*
MOISTURE (%)	10.32 - 14.71	12.24	
VOLATILE MATTER (%)	33.66 - 34.88	34.40	
FIXED CARBON (%)	42.78 - 49.66	46.28	
ASH (%)	6.36 - 7.63	7.09	
SULFUR (%)	0.32 - 0.63		0.44
HYDROGEN (%)			-
CARBON (%)			-
NITROGEN (%)			-
OXYGEN (%)			-
BTU/LB.	10,130 - 11,160	10,670 (3 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (°F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 28
(Called Bed No. 24 in the Seminoe No. 1 mine)

GEOLOGIC FORMATION: Ferris

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 8

GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES

(Table 4, page 40 *)*

0-100 FEET OF COVER: 5.15 mt

100-200 FEET OF COVER: 5.33 mt

0-200 FEET OF COVER: 10.48 mt

TOTAL ACREAGE: 689.5

STRIPPABLE RESERVE BASE

(Table 4, page 40*)*

0-100 FEET OF COVER: 3.45 mt

100-200 FEET OF COVER: 4.24 mt

0-200 FEET OF COVER: 7.69 mt

TOTAL ACREAGE: 514.1

RANGE IN MINABLE THICKNESS (FEET): 4.5' - 18'

WEIGHTED AVERAGE THICKNESS (FEET): 10.40'

ACTIVE MINES

NAME(s): Seminoe No. 1

ANNUAL PRODUCTION:
Major percentage of 3 mt

PROPOSED MINES

NAME(s): None

ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:
Bed Nos. 27 and 29 apparently merge with this coal locally. Bed Nos. 30, 31, and 32 also locally coalesce with Bed No. 28.

mt=million tons

ANALYTICAL DATA FOR: Bed No. 28

APPARENT RANK: Subbituminous B - High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS (5-17 samples)	AVERAGE PROXIMATE 9 *sample(s)*	AVERAGE ULTIMATE 5 *sample(s)*
MOISTURE (%)	9.52 - 16.0	11.53	
VOLATILE MATTER (%)	33.82 - 36.54	34.95	
FIXED CARBON (%)	45.8 - 49.59	47.57	
ASH (%)	3.9 - 17.85	5.95	5.72
SULFUR (%)	0.21 - 0.74		0.31
HYDROGEN (%)	4.94 - 5.8		5.20
CARBON (%)	60.0 - 63.54		61.81
NITROGEN (%)	0.69 - 0.91		0.82
OXYGEN (%)	23.99 - 29.1		26.13
BTU/LB.	8,571 - 11,480	10,080 (16 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS)(5 samples)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)	0.05 - 0.19	0.10
SULFATE (%)	0.00 - 0.01	0.00
ORGANIC (%)	0.16 - 0.23	0.19

ASH FUSION TEMPERATURES (^{O}F)(1-2 samples)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION	2400	2400
SOFTENING TEMPERATURE	2430	2430
FLUID TEMPERATURE	2350-2460	2405 (2)

ASH COMPOSITION (%) (2 samples)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2	16.0 - 19.0	17.5	K_2O	0.12 - 0.25	0.19
Al_2O_3	7.1 - 11.0	9.05	Fe_2O_3	4.9 - 6.9	5.9
CaO	29.0 - 35.0	32.0	TiO_2	0.41 - 0.46	0.44
MgO	2.24 - 3.3	2.8	P_2O_5	0.1L	0.1L
Na_2O	0.11 - 0.32	0.21	SO_3	19.0 - 22.0	20.5

Hardgrove Grindability Index: 47 (1 sample)

L = less than

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 30
(Called lower bench of Bed No. 25 in the Seminoe No. 1 mine)

GEOLOGIC FORMATION: Ferris

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 8

GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES (*Table* 4, page 40)	STRIPPABLE RESERVE BASE (*Table* 4, page 40)
0-100 FEET OF COVER: 0.57 mt	0-100 FEET OF COVER: 0.57 mt
100-200 FEET OF COVER: 0.88 mt	100-200 FEET OF COVER: 0.88 mt
0-200 FEET OF COVER: 1.45 mt	0-200 FEET OF COVER: 1.45 mt
TOTAL ACREAGE: 137.2	TOTAL ACREAGE: 137.2

RANGE IN MINABLE THICKNESS (FEET): 5' - 8'

WEIGHTED AVERAGE THICKNESS (FEET): 6.28'

ACTIVE MINES	PROPOSED MINES
NAME(s): Seminoe No. 1	NAME(s): None
ANNUAL PRODUCTION: Major percentage of 3 mt	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:
This bed is often merged with Bed No. 28 at least in the vicinity of the Seminoe No. 1 mine.

mt=million tons

ANALYTICAL DATA FOR: Bed No. 30

APPARENT RANK: Subbituminous A - High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS (3-7 samples)	AVERAGE PROXIMATE 3 *sample(s)*	AVERAGE ULTIMATE 7 *sample(s)*
MOISTURE (%)	11.96 - 17.62	13.40	
VOLATILE MATTER (%)	33.27 - 35.62	34.14	
FIXED CARBON (%)	44.41 - 48.69	46.24	
ASH (%)	5.62 - 9.67	6.22	
SULFUR (%)	0.24 - 0.58		0.41
HYDROGEN (%)			-
CARBON (%)			-
NITROGEN (%)			-
OXYGEN (%)			-
BTU/LB.		10,150 (7 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 31
(Called middle bench of Bed No. 25 in the Seminoe No. 1 mine)

GEOLOGIC FORMATION: Ferris

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 8

GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES

(Table 4, page 39 *)*

0-100 FEET OF COVER: 8.06 mt

100-200 FEET OF COVER: 6.44 mt

0-200 FEET OF COVER: 14.50 mt

TOTAL ACREAGE: 738.5

STRIPPABLE RESERVE BASE

(Table 4, page 39*)*

0-100 FEET OF COVER: 6.47 mt

100-200 FEET OF COVER: 5.58 mt

0-200 FEET OF COVER: 12.05 mt

TOTAL ACREAGE: 619.5

RANGE IN MINABLE THICKNESS (FEET): 5' - 18'

WEIGHTED AVERAGE THICKNESS (FEET): 11.58'

ACTIVE MINES

NAME(s): Seminoe No. 1

ANNUAL PRODUCTION:
Unknown percentage of 3 mt

PROPOSED MINES

NAME(s): Medicine Bow

ANNUAL PRODUCTION:
Unknown percentage of 3 mt

MISCELLANEOUS COMMENTS:
This bed merges with Bed No. 32 in places. Analyses also include Bed No. 32 in some cases. (Bed No. 32 is the upper bench of Bed No. 25 in the Seminoe No. 1 mine).

mt=million tons

ANALYTICAL DATA FOR: Bed No. 31

APPARENT RANK: Subbituminous A - High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS (2-23 samples)	AVERAGE PROXIMATE 14 *sample(s)*	AVERAGE ULTIMATE 2 *sample(s)*
MOISTURE (%)	10.92 - 18.9	14.03	
VOLATILE MATTER (%)	31.99 - 37.69	34.53	
FIXED CARBON (%)	40.65 - 50.31	45.48	
ASH (%)	3.95 - 15.68	5.96	7.6
SULFUR (%)	0.22 - 0.5		0.45
HYDROGEN (%)	5.2 - 5.4		5.3
CARBON (%)	52.2 - 55.1		55.1
NITROGEN (%)	0.8 - 0.9		0.85
OXYGEN (%)	24.6 - 34.6		30.70
BTU/LB.	8,340 - 10,650	10,180 (23 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS) (2 samples)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		0.13
SULFATE (%)		0.12
ORGANIC (%)		0.18

ASH FUSION TEMPERATURES (^{o}F) (2-3 samples)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION	2090 - 2360	2225 (2)
SOFTENING TEMPERATURE	2120 - 2390	2255 (2)
FLUID TEMPERATURE	2150 - 2420	2320 (3)

ASH COMPOSITION (%) (3 samples)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS,	AVERAGE
SiO_2	22.0 - 52.0	39.7	K_2O	0.43 - 2.10	1.34
Al_2O_3	7.1 - 17.0	13.4	Fe_2O_3	3.6 - 11.0	6.5
CaO	12.0 - 24.0	17.0	TiO_2	0.36 - 0.58	0.49
MgO	2.34 - 4.45	3.31	P_2O_5	0.1L	0.1L
Na_2O	0.22 - 0.45	0.34	SO_3	4.0 - 11.0	7.6

Hardgrove Grindability Index: 50-66 (2 samples)
L = less than

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 33
(Locally called Bed No. 38 in Seminoe No. 1 mine)

GEOLOGIC FORMATION: Ferris

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 8

GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES

(Table 4, page 38 *)*

0-100 FEET OF COVER: 8.01 mt

100-200 FEET OF COVER: 7.29 mt

0-200 FEET OF COVER: 15.30 mt

TOTAL ACREAGE: 665.2

STRIPPABLE RESERVE BASE

(Table 4, page 38 *)*

0-100 FEET OF COVER: 6.51 mt

100-200 FEET OF COVER: 6.20 mt

0-200 FEET OF COVER: 12.71 mt

TOTAL ACREAGE: 573.6

RANGE IN MINABLE THICKNESS (FEET): 5' - 25'

WEIGHTED AVERAGE THICKNESS (FEET): 14.17'

ACTIVE MINES

NAME(s): Seminoe No. 1

ANNUAL PRODUCTION:
Minor percentage of 3 mt

PROPOSED MINES

NAME(s): Medicine Bow

ANNUAL PRODUCTION:
Unknown percentage of 3 mt

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 33

APPARENT RANK: Subbituminous A - High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS (3-9 samples)	AVERAGE PROXIMATE 8 *sample(s)*	AVERAGE ULTIMATE 3 *sample(s)*
MOISTURE (%)	11.2 - 15.06	12.58	
VOLATILE MATTER (%)	29.7 - 36.7	32.92	
FIXED CARBON (%)	44.8 - 49.9	46.45	
ASH (%)	5.36 - 13.1	8.06	9.5
SULFUR (%)	0.3 - 0.75		0.4
HYDROGEN (%)	5.1 - 5.6		5.4
CARBON (%)	57.2 - 62.9		59.5
NITROGEN (%)	1.0 - 1.3		1.1
OXYGEN (%)	22.1 - 26.0		24.1
BTU/LB.	9.215 - 11,005	10,230 (9 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS) (3 samples)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)	0.11 - 0.25	0.17
SULFATE (%)	0.02 - 0.03	0.02
ORGANIC (%)	0.16 - 0.36	0.25

ASH FUSION TEMPERATURES (^{O}F) (1 sample)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		2275
SOFTENING TEMPERATURE		2355
FLUID TEMPERATURE		2460

ASH COMPOSITION (%) (2 samples)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2	36.0 - 44.0		K_2O	1.03 - 1.5	1.27
Al_2O_3	18.0 - 19.5	18.75	Fe_2O_3	3.0 - 6.5	4.75
CaO	12.0 - 15.05	13.53	TiO_2	0.61 - 0.87	0.74
MgO	2.5 - 3.22	2.86	P_2O_5	0.2L - 1.0L	0.6L
Na_2O	0.61 - 0.71	0.66	SO_3	7.2 - 9.0	8.1

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 34

GEOLOGIC FORMATION: Ferris
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 8
GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES
(Table 4, page 38 *)*
0-100 FEET OF COVER: 0.25 mt
100-200 FEET OF COVER: 0.45 mt
0-200 FEET OF COVER: 0.70 mt
TOTAL ACREAGE: 78.5'

STRIPPABLE RESERVE BASE
(Table 4, page 38*)*
0-100 FEET OF COVER: 0.25 mt
100-200 FEET OF COVER: 0.45 mt
0-200 FEET OF COVER: 0.70 mt
TOTAL ACREAGE: 78.5'

RANGE IN MINABLE THICKNESS (FEET): 5'
WEIGHTED AVERAGE THICKNESS (FEET): 5'

ACTIVE MINES
NAME(s): Seminoe No. 1

ANNUAL PRODUCTION:
Minor percentage of 3 mt

PROPOSED MINES
NAME(s): Medicine Bow

ANNUAL PRODUCTION:
Unknown percentage of 3 mt

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 34

APPARENT RANK: Subbituminous A

AS RECEIVED BASIS	RANGE ANALYSIS (2 samples)	AVERAGE PROXIMATE 2 *sample(s)*	AVERAGE ULTIMATE 2 *sample(s)*
MOISTURE (%)	12.87 - 13.66	13.27	
VOLATILE MATTER (%)	32.62 - 32.76	32.69	
FIXED CARBON (%)	41.46 - 42.26	41.86	
ASH (%)	11.32 - 13.05	12.19	
SULFUR (%)	0.51 - 0.66		0.59
HYDROGEN (%)			-
CARBON (%)			-
NITROGEN (%)			-
OXYGEN (%)			-
BTU/LB.	9,700 - 9,720	9,710 (2 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 35

GEOLOGIC FORMATION: Ferris

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 8

GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES

(Table 4, page 38 *)*

0-100 FEET OF COVER: 0.23 mt

100-200 FEET OF COVER: 0.29 mt

0-200 FEET OF COVER: 0.52 mt

TOTAL ACREAGE: 59.5

STRIPPABLE RESERVE BASE

(Table 4, page 38 *)*

0-100 FEET OF COVER: 0.23 mt

100-200 FEET OF COVER: 0.29 mt

0-200 FEET OF COVER: 0.52 mt

TOTAL ACREAGE: 59.5

RANGE IN MINABLE THICKNESS (FEET): 5'

WEIGHTED AVERAGE THICKNESS (FEET): 5'

ACTIVE MINES

NAME(s): None

ANNUAL PRODUCTION:

PROPOSED MINES

NAME(s): Seminoe No. 1

ANNUAL PRODUCTION:
Minor percentage of 3 mt

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 35

APPARENT RANK: Subbituminous A - High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS (1-3 samples)	AVERAGE PROXIMATE 1 *sample(s)*	AVERAGE ULTIMATE 3 *sample(s)*
MOISTURE (%)	12.04 - 16.00	12.04	
VOLATILE MATTER (%)	34.95	34.95	
FIXED CARBON (%)	46.15	46.15	
ASH (%)	6.86 - 13.72	6.86	
SULFUR (%)	0.36 - 0.61		0.48
HYDROGEN (%)			-
CARBON (%)			-
NITROGEN (%)			-
OXYGEN (%)			-
BTU/LB.	9,925 - 10,760	10,200 (3 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{O}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 37
(Called Bed No. 34 in Seminoe No. 1 mine)

GEOLOGIC FORMATION: Ferris

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 8

GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES

(Table 4, page 37 *)*

0-100 FEET OF COVER: 0.45 mt

100-200 FEET OF COVER: 0.71 mt

0-200 FEET OF COVER: 1.16 mt

TOTAL ACREAGE: 105.6

STRIPPABLE RESERVE BASE

(Table 4, page 37*)*

0-100 FEET OF COVER: 0.45 mt

100-200 FEET OF COVER: 0.71 mt

0-200 FEET OF COVER: 1.16 mt

TOTAL ACREAGE: 105.6

RANGE IN MINABLE THICKNESS (FEET): 5' - 9'

WEIGHTED AVERAGE THICKNESS (FEET): 6.6'

ACTIVE MINES

NAME(s): Seminoe No. 1

ANNUAL PRODUCTION:
Minor percentage of 3 mt

PROPOSED MINES

NAME(s): None

ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 37

APPARENT RANK: Subbituminous A (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 38

GEOLOGIC FORMATION: Ferris
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 8
GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES

(Table 4, page 37 *)*

0-100 FEET OF COVER: 0.37 mt
100-200 FEET OF COVER: 0.26 mt
0-200 FEET OF COVER: 0.63 mt
TOTAL ACREAGE: 74.1

STRIPPABLE RESERVE BASE

(Table 4, page 37*)*

0-100 FEET OF COVER: 0.37 mt
100-200 FEET OF COVER: 0.26 mt
0-200 FEET OF COVER: 0.63 mt
TOTAL ACREAGE: 74.1

RANGE IN MINABLE THICKNESS (FEET): 4.5' - 5'
WEIGHTED AVERAGE THICKNESS (FEET): 4.7'

ACTIVE MINES

NAME(s): None

ANNUAL PRODUCTION:

PROPOSED MINES

NAME(s): None

ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 38

APPARENT RANK: Subbituminous A

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE 1 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)		12.3	
VOLATILE MATTER (%)		35.6	
FIXED CARBON (%)		38.7	
ASH (%)		13.4	
SULFUR (%)			0.6
HYDROGEN (%)			5.4
CARBON (%)			56.0
NITROGEN (%)			1.2
OXYGEN (%)			23.5
BTU/LB.		9,540 (1 sample)	

FORMS OF SULFUR (AS RECEIVED BASIS) (1 sample)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		0.12
SULFATE (%)		0.02
ORGANIC (%)		0.43

ASH FUSION TEMPERATURES (^{o}F) (1 sample)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		2350
SOFTENING TEMPERATURE		2400
FLUID TEMPERATURE		2460

ASH COMPOSITION (%) (2 samples)[1]

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2	28.0 - 58.0	48.0	K_2O	0.60 - 1.8	1.4
Al_2O_3	12.0 - 20.0	17.3	Fe_2O_3	3.0 - 4.4	3.5
CaO	5.2 - 22.0	10.8	TiO_2	0.69 - 0.92	0.77
MgO	1.18 - 3.5	1.95	P_2O_5	1.0L - 3.1	1.1L
Na_2O	0.13 - 0.15	0.14	SO_3	5.7 - 12.0	7.8

Hardgrove Grindability Index:
L = less than

[1] Weighted average of upper and lower benches of Bed No. 38

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 44

GEOLOGIC FORMATION: Ferris

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 8

GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES

(Table 4, page 37 *)*

0-100 FEET OF COVER: 1.33 mt

100-200 FEET OF COVER: 1.35 mt

0-200 FEET OF COVER: 2.68 mt

TOTAL ACREAGE: 268.6

STRIPPABLE RESERVE BASE

(Table 4, page 37 *)*

0-100 FEET OF COVER: 1.45 mt

100-200 FEET OF COVER: 1.50 mt

0-200 FEET OF COVER: 2.95 mt

TOTAL ACREAGE: 237.9

RANGE IN MINABLE THICKNESS (FEET): 5' - 7'

WEIGHTED AVERAGE THICKNESS (FEET): 6.4'

ACTIVE MINES

NAME(s): None

ANNUAL PRODUCTION:

PROPOSED MINES

NAME(s): Medicine Bow

ANNUAL PRODUCTION:
Unknown percentage of 3 mt

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 44

APPARENT RANK: Subbituminous A

AS RECEIVED BASIS	RANGE ANALYSIS (1-2 samples)	AVERAGE PROXIMATE 2 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)	13.19 - 13.59	13.39	
VOLATILE MATTER (%)	31.70 - 31.77	31.74	
FIXED CARBON (%)	49.35 - 50.23	49.79	
ASH (%)	4.88 - 5.29	5.09	5.29
SULFUR (%)	0.24 - 0.33		0.33
HYDROGEN (%)	5.22		5.22
CARBON (%)	61.06		61.06
NITROGEN (%)	0.83		0.83
OXYGEN (%)	27.27		27.27
BTU/LB.	10,410	10,410 (1 sample)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 46

GEOLOGIC FORMATION: Ferris
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 8
GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES
(Table 4, page 36 *)*
0-100 FEET OF COVER: 2.19 mt
100-200 FEET OF COVER: 2.19 mt
0-200 FEET OF COVER: 4.38 mt
TOTAL ACREAGE: 334.9

STRIPPABLE RESERVE BASE
(Table 4, page 36 *)*
0-100 FEET OF COVER: 1.76 mt
100-200 FEET OF COVER: 1.73 mt
0-200 FEET OF COVER: 3.49 mt
TOTAL ACREAGE: 266.5

RANGE IN MINABLE THICKNESS (FEET): 5' - 9'
WEIGHTED AVERAGE THICKNESS (FEET): 7.75'

ACTIVE MINES
NAME(s): None

ANNUAL PRODUCTION:

PROPOSED MINES
NAME(s): Medicine Bow

ANNUAL PRODUCTION:
Unknown percentage of 3 mt

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 46

APPARENT RANK: High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS (2-4 samples)	AVERAGE PROXIMATE 4 *sample(s)*	AVERAGE ULTIMATE 4 *sample(s)*
MOISTURE (%)	10.65 - 24.54	14.87	
VOLATILE MATTER (%)	31.66 - 34.28	32.52	
FIXED CARBON (%)	37.38 - 50.23	44.51	
ASH (%)	4.88 - 15.43	8.10	
SULFUR (%)	0.24 - 0.52		0.36
HYDROGEN (%)			-
CARBON (%)			-
NITROGEN (%)			-
OXYGEN (%)			-
BTU/LB.	9,690 - 10,960	10,330 (2 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 50
(Called Bed No. 51 in Seminoe No. 1 mine)

GEOLOGIC FORMATION: Ferris

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 8

GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES

(Table 4, page 35 *)*

0-100 FEET OF COVER: 8.35 mt

100-200 FEET OF COVER: 7.84 mt

0-200 FEET OF COVER: 16.19 mt

TOTAL ACREAGE: 840.9

STRIPPABLE RESERVE BASE

(Table 4, page 35*)*

0-100 FEET OF COVER: 8.35 mt

100-200 FEET OF COVER: 7.84 mt

0-200 FEET OF COVER: 16.19 mt

TOTAL ACREAGE: 840.9

RANGE IN MINABLE THICKNESS (FEET): 5' - 22'

WEIGHTED AVERAGE THICKNESS (FEET): 13.04'

ACTIVE MINES

NAME(s): Vanguard No. 50

ANNUAL PRODUCTION:
0.4 - 0.5 mt

PROPOSED MINES

NAME(s): Seminoe No. 1

ANNUAL PRODUCTION:
Unknown percentage of 3 mt

MISCELLANEOUS COMMENTS:
Resources Exploration may also strip mine this coal although plans are vague at this time.

mt=million tons

ANALYTICAL DATA FOR: Bed No. 50

APPARENT RANK: Subbituminous A - Subbituminous B

AS RECEIVED BASIS	RANGE ANALYSIS (2-11 samples)	AVERAGE PROXIMATE 4 *sample(s)*	AVERAGE ULTIMATE 2 *sample(s)*
MOISTURE (%)	11.3 - 15.73	12.50	
VOLATILE MATTER (%)	31.72 - 35.75	33.93	
FIXED CARBON (%)	41.97 - 48.45	44.29	
ASH (%)	6.74 - 15.2	9.29	12.25
SULFUR (%)	0.3 - 0.63		0.42
HYDROGEN (%)	5.3 - 5.43		5.37
CARBON (%)	55.39 - 58.9		57.14
NITROGEN (%)	1.11 - 1.4		1.26
OXYGEN (%)	23.1 - 24.1		23.60
BTU/LB.	8,460 - 10,540	9,640 (11 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS) (2 samples)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)	0.01 - 0.09	0.05
SULFATE (%)	0.00 - 0.02	0.01
ORGANIC (%)	0.28 - 0.49	0.39

ASH FUSION TEMPERATURES (^{o}F) (2 samples)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION	2100 - 2290	2195
SOFTENING TEMPERATURE	2150 - 2350	2250
FLUID TEMPERATURE	2210 - 2530	2370

ASH COMPOSITION (%) (2 samples)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2	34.0 - 52.0	43.0	K_2O	0.92 - 2.1	1.51
Al_2O_3	15.0 - 22.5	18.8	Fe_2O_3	3.3 - 4.7	4.0
CaO	11.8 - 21.0	16.4	TiO_2	0.45 - 0.6	0.53
MgO	1.5 - 3.19	2.35	P_2O_5	0.51 - 0.7	0.65
Na_2O	0.2 - 0.45	0.33	SO_3	4.5 - 5.7	5.1

Hardgrove Grindability Index: 45 (2 samples)

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 51
(Called Bed No. 53 in Seminoe No. 1 mine)

GEOLOGIC FORMATION: Ferris

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 8

GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES

(Table 4, page 35 *)*

0-100 FEET OF COVER: 4.99 mt

100-200 FEET OF COVER: 8.75 mt

0-200 FEET OF COVER: 13.74 mt

TOTAL ACREAGE: 1159.3

STRIPPABLE RESERVE BASE

(Table 4, page 35*)*

0-100 FEET OF COVER: 4.99 mt

100-200 FEET OF COVER: 8.75 mt

0-200 FEET OF COVER: 13.74 mt

TOTAL ACREAGE: 1159.3

RANGE IN MINABLE THICKNESS (FEET): 5' - 10'

WEIGHTED AVERAGE THICKNESS (FEET): 6.97'

ACTIVE MINES

NAME(s): Seminoe No. 1

ANNUAL PRODUCTION:
Unknown percentage of 3 mt

PROPOSED MINES

NAME(s): Medicine Bow

ANNUAL PRODUCTION:
Unknown percentage of 3 mt

MISCELLANEOUS COMMENTS:

Bed No. 52 occasionally mined as a rider coal above Bed No. 51 in the Seminoe No. 1 mine. (Bed No. 52 called Bed No. 53A or 53 Rider in the Seminoe No. 1 mine)

mt=million tons

ANALYTICAL DATA FOR: Bed No. 51

APPARENT RANK: Subbituminous B - High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS (4-17 samples)	AVERAGE PROXIMATE 13 *sample(s)*	AVERAGE ULTIMATE 4 *sample(s)*
MOISTURE (%)	9.38 - 17.84	12.06	
VOLATILE MATTER (%)	31.9 - 36.67	34.40	
FIXED CARBON (%)	44.83 - 48.14	45.89	
ASH (%)	5.6 - 13.95	7.67	7.19
SULFUR (%)	0.47 - 0.89		0.52
HYDROGEN (%)	4.58 - 5.4		5.03
CARBON (%)	57.5 - 65.85		61.80
NITROGEN (%)	0.83 - 1.3		1.00
OXYGEN (%)	22.45 - 27.1		24.37
BTU/LB.	8,310 - 10,930	10,230 (17 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS) (4 samples)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)	0.07 - 0.16	0.12
SULFATE (%)	0.00 - 0.02	0.01
ORGANIC (%)	0.38 - 0.46	0.42

ASH FUSION TEMPERATURES (^{o}F) (2 samples)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION	2135 - 2220	2180
SOFTENING TEMPERATURE	2250 - 2260	2255
FLUID TEMPERATURE	2300 - 2365	2330

ASH COMPOSITION (%) (4 samples)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2	14.3 - 31.0	24.8	K_2O	0.20 - 0.87	0.56
Al_2O_3	8.53 - 14.4	12.23	Fe_2O_3	4.2 - 6.87	5.61
CaO	20.0 - 38.8	27.45	TiO_2	0.34 - 0.67	0.53
MgO	2.08 - 2.95	2.63	P_2O_5	0.41 - 1.6	0.93L
Na_2O	0.11 - 0.23	0.18	SO_3	9.9 - 12.2	11.5

Hardgrove Grindability Index:
L = less than

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 53
(Called rider over Bed No. 53 in Seminoe No. 1 mine)

GEOLOGIC FORMATION: Ferris

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 8

GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES	STRIPPABLE RESERVE BASE
(Table 4, page 34 *)*	*(Table* 4, page 34 *)*
0-100 FEET OF COVER: 0.54 mt	0-100 FEET OF COVER: 0.54 mt
100-200 FEET OF COVER: 1.13 mt	100-200 FEET OF COVER: 1.13 mt
0-200 FEET OF COVER: 1.67 mt	0-200 FEET OF COVER: 1.67 mt
TOTAL ACREAGE: 189.9	TOTAL ACREAGE: 189.9

RANGE IN MINABLE THICKNESS (FEET): 5'

WEIGHTED AVERAGE THICKNESS (FEET): 5'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): Medicine Bow
ANNUAL PRODUCTION:	ANNUAL PRODUCTION: Unknown percentage of 3 mt

MISCELLANEOUS COMMENTS:
Occasionally mined incidentally as a rider bed in Seminoe No. 1 mine.

mt=million tons

ANALYTICAL DATA FOR: Bed No. 53

APPARENT RANK: Subbituminous A (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 54

GEOLOGIC FORMATION: Ferris

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 8

GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES

(Table 4, page 34 *)*

0-100 FEET OF COVER: 0.45 mt

100-200 FEET OF COVER: 1.59 mt

0-200 FEET OF COVER: 2.04 mt

TOTAL ACREAGE: 210.6

STRIPPABLE RESERVE BASE

(Table 4, page 34*)*

0-100 FEET OF COVER: 0.45 mt

100-200 FEET OF COVER: 1.59 mt

0-200 FEET OF COVER: 2.04 mt

TOTAL ACREAGE: 210.6

RANGE IN MINABLE THICKNESS (FEET): 5' - 9'

WEIGHTED AVERAGE THICKNESS (FEET): 5.65'

ACTIVE MINES

NAME(s): Seminoe No. 1

ANNUAL PRODUCTION:
Minor percentage of 3 mt

PROPOSED MINES

NAME(s): None

ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:
Mined incidentally as a rider coal over Bed No. 53 in the Seminoe No. 1 mine.

mt=million tons

ANALYTICAL DATA FOR: Bed No. 54

APPARENT RANK: Subbituminous A - Subbituminous B

AS RECEIVED BASIS	RANGE ANALYSIS (1-5 samples)	AVERAGE PROXIMATE 3 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)	11.26 - 13.81	12.52	
VOLATILE MATTER (%)	31.1 - 33.51	32.26	
FIXED CARBON (%)	39.2 - 44.9	42.26	
ASH (%)	7.78 - 17.2	12.96	17.2
SULFUR (%)	0.55 - 1.3		1.3
HYDROGEN (%)	5.1		5.1
CARBON (%)	51.2		51.2
NITROGEN (%)	1.2		1.2
OXYGEN (%)	24.0		24.0
BTU/LB.	8,825 - 10,140	9,380 (5 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS) (1 sample)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		0.39
SULFATE (%)		0.04
ORGANIC (%)		0.84

ASH FUSION TEMPERATURES (^{O}F) (1 sample)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		2130
SOFTENING TEMPERATURE		2180
FLUID TEMPERATURE		2300

ASH COMPOSITION (%) (1 sample)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2		51.0	K_2O		1.0
Al_2O_3		16.0	Fe_2O_3		4.4
CaO		7.9	TiO_2		0.88
MgO		1.42	P_2O_5		1.3
Na_2O		0.15	SO_3		8.1

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 56

GEOLOGIC FORMATION: Ferris
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 8
GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES *(Table 4, page 33)*	STRIPPABLE RESERVE BASE *(Table 4, page 33)*
0-100 FEET OF COVER: 2.54 mt	0-100 FEET OF COVER: 2.54 mt
100-200 FEET OF COVER: 2.93 mt	100-200 FEET OF COVER: 2.93 mt
0-200 FEET OF COVER: 5.47 mt	0-200 FEET OF COVER: 5.47 mt
TOTAL ACREAGE: 349.1	TOTAL ACREAGE: 349.1

RANGE IN MINABLE THICKNESS (FEET): 5' - 15'
WEIGHTED AVERAGE THICKNESS (FEET): 10.06'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 56

APPARENT RANK: Subbituminous A

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 58

GEOLOGIC FORMATION: Ferris
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 8
GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES *(Table 4, page 33)*	STRIPPABLE RESERVE BASE *(Table 4, page 33)*
0-100 FEET OF COVER: 0.12 mt	0-100 FEET OF COVER: 0.12 mt
100-200 FEET OF COVER: 0.17 mt	100-200 FEET OF COVER: 0.17 mt
0-200 FEET OF COVER: 0.29 mt	0-200 FEET OF COVER: 0.29 mt
TOTAL ACREAGE: 30.6	TOTAL ACREAGE: 30.6

RANGE IN MINABLE THICKNESS (FEET): 5' - 6.5'
WEIGHTED AVERAGE THICKNESS (FEET): 5.6'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 58

APPARENT RANK: Subbituminous A

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{O}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 60

GEOLOGIC FORMATION: Ferris
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 8
GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES *(Table 4, page 33)*	STRIPPABLE RESERVE BASE *(Table 4, page 33)*
0-100 FEET OF COVER: 3.72 mt	0-100 FEET OF COVER: 3.72 mt
100-200 FEET OF COVER: 3.88 mt	100-200 FEET OF COVER: 3.88 mt
0-200 FEET OF COVER: 7.60 mt	0-200 FEET OF COVER: 7.60 mt
TOTAL ACREAGE: 907.4	TOTAL ACREAGE: 907.4

RANGE IN MINABLE THICKNESS (FEET): 4' - 6.5'
WEIGHTED AVERAGE THICKNESS (FEET): 4.8'

ACTIVE MINES	PROPOSED MINES
NAME(s): Medicine Bow	NAME(s): None
ANNUAL PRODUCTION: Major percentage of 3 mt	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 60

APPARENT RANK: High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE 1 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)		10.8	
VOLATILE MATTER (%)		37.2	
FIXED CARBON (%)		43.2	
ASH (%)		8.8	
SULFUR (%)			0.6
HYDROGEN (%)			5.5
CARBON (%)			60.9
NITROGEN (%)			1.2
OXYGEN (%)			23.0
BTU/LB.		10,400 (1 sample)	

FORMS OF SULFUR (AS RECEIVED BASIS) (1 sample)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		0.22
SULFATE (%)		0.00
ORGANIC (%)		0.35

ASH FUSION TEMPERATURES (^{O}F) (1 sample)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		2100
SOFTENING TEMPERATURE		2140
FLUID TEMPERATURE		2180

ASH COMPOSITION (%) (1 sample)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2		37.0	K_2O		0.77
Al_2O_3		11.0	Fe_2O_3		5.4
CaO		18.0	TiO_2		0.56
MgO		1.98	P_2O_5		1.2
Na_2O		0.32	SO_3		10.0

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 61

GEOLOGIC FORMATION: Ferris

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 8

GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES	STRIPPABLE RESERVE BASE
(Table 4, page 32 *)*	*(Table* 4, page 32*)*
0-100 FEET OF COVER: 4.41 mt	0-100 FEET OF COVER: 4.41 mt
100-200 FEET OF COVER: 5.31 mt	100-200 FEET OF COVER: 5.20 mt
0-200 FEET OF COVER: 9.72 mt	0-200 FEET OF COVER: 9.61 mt
TOTAL ACREAGE: 792.4	TOTAL ACREAGE: 779.5

RANGE IN MINABLE THICKNESS (FEET): 5' - 11'

WEIGHTED AVERAGE THICKNESS (FEET): 7.38'

ACTIVE MINES	PROPOSED MINES
NAME(s): Medicine Bow	NAME(s): None
ANNUAL PRODUCTION: Major percentage of 3 mt	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 61

APPARENT RANK: Subbituminous A - High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS (1-3 samples)	AVERAGE PROXIMATE 3 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)	8.2 - 11.48	9.95	
VOLATILE MATTER (%)	33.5 - 35.24	34.57	
FIXED CARBON (%)	37.5 - 44.01	41.67	
ASH (%)	9.53 - 20.8	13.80	20.8
SULFUR (%)	0.58 - 0.73		0.7
HYDROGEN (%)	5.0		5.0
CARBON (%)	51.0		51.0
NITROGEN (%)	1.3		1.3
OXYGEN (%)	21.2		21.2
BTU/LB.	9,140 - 11,750	9,970 (3 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS) (1 sample)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		0.24
SULFATE (%)		0.03
ORGANIC (%)		0.47

ASH FUSION TEMPERATURES (^{o}F) (1 sample)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		2350
SOFTENING TEMPERATURE		2400
FLUID TEMPERATURE		2460

ASH COMPOSITION (%) (1 sample)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2		61.0	K_2O		2.0
Al_2O_3		17.0	Fe_2O_3		3.6
CaO		5.5	TiO_2		0.75
MgO		1.57	P_2O_5		1.0L
Na_2O		0.14	SO_3		5.0

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 61A

GEOLOGIC FORMATION: Ferris
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 8
GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES	STRIPPABLE RESERVE BASE
(Table 4, page 32 *)*	*(Table* 4, page 32 *)*
0-100 FEET OF COVER: 0.76 mt	0-100 FEET OF COVER: 0.76 mt
100-200 FEET OF COVER: 0.55 mt	100-200 FEET OF COVER: 0.55 mt
0-200 FEET OF COVER: 1.31 mt	0-200 FEET OF COVER: 1.31 mt
TOTAL ACREAGE: 148.5	TOTAL ACREAGE: 148.5

RANGE IN MINABLE THICKNESS (FEET): 5'
WEIGHTED AVERAGE THICKNESS (FEET): 5'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:
Not minable in the Seminoe No. 1 and Medicine Bow mine areas.

mt=million tons

ANALYTICAL DATA FOR: Bed No. 61A

APPARENT RANK: Subbituminous A (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 62
(Called Bed No. 63 in the Medicine Bow mine)

GEOLOGIC FORMATION: Ferris

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 8

GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES

(Table 4, page 32 *)*

0-100 FEET OF COVER: 1.29 mt

100-200 FEET OF COVER: 1.82 mt

0-200 FEET OF COVER: 3.11 mt

TOTAL ACREAGE: 325.3

STRIPPABLE RESERVE BASE

(Table 4, page 32*)*

0-100 FEET OF COVER: 1.29 mt

100-200 FEET OF COVER: 1.82 mt

0-200 FEET OF COVER: 3.11 mt

TOTAL ACREAGE: 325.3

RANGE IN MINABLE THICKNESS (FEET): 5' - 9'

WEIGHTED AVERAGE THICKNESS (FEET): 5.59'

ACTIVE MINES

NAME(s): Medicine Bow

ANNUAL PRODUCTION:
Major percentage of 3 mt

PROPOSED MINES

NAME(s): None

ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 62

APPARENT RANK: High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS (1-3 samples)	AVERAGE PROXIMATE 3 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)	10.2 - 12.34	11.33	
VOLATILE MATTER (%)	33.53 - 36.2	34.58	
FIXED CARBON (%)	46.27 - 46.9	46.62	
ASH (%)	6.7 - 8.26	7.47	6.7
SULFUR (%)	0.42 - 0.60		0.6
HYDROGEN (%)	5.4		5.4
CARBON (%)	62.5		62.5
NITROGEN (%)	1.2		1.2
OXYGEN (%)	23.6		23.6
BTU/LB.	10,571 - 10,860	10,670 (3 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS) (1 sample)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		0.22
SULFATE (%)		0.02
ORGANIC (%)		0.33

ASH FUSION TEMPERATURES (^{o}F) (1 sample)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		2070
SOFTENING TEMPERATURE		2120
FLUID TEMPERATURE		2170

ASH COMPOSITION (%) (1 sample)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2		23.0	K_2O		0.23
Al_2O_3		10.0	Fe_2O_3		6.5
CaO		23.0	TiO_2		0.60
MgO		3.39	P_2O_5		1.0L
Na_2O		0.19	SO_3		13.0

Hardgrove Grindability Index: 53 (1 sample)
L = less than

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 63
(Called Bed No. 64 in the Medicine Bow mine)

GEOLOGIC FORMATION: Ferris

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 8

GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES

(Table 4, page 32 *)*

0-100 FEET OF COVER: 4.38 mt

100-200 FEET OF COVER: 3.25 mt

0-200 FEET OF COVER: 7.63 mt

TOTAL ACREAGE: 932.5

STRIPPABLE RESERVE BASE

(Table 4, page 32*)*

0-100 FEET OF COVER: 4.38 mt

100-200 FEET OF COVER: 3.25 mt

0-200 FEET OF COVER: 7.63 mt

TOTAL ACREAGE: 932.5

RANGE IN MINABLE THICKNESS (FEET): 4' - 5.5'

WEIGHTED AVERAGE THICKNESS (FEET): 4.66'

ACTIVE MINES

NAME(s): Medicine Bow

ANNUAL PRODUCTION:
Major percentage of 3 mt

PROPOSED MINES

NAME(s): None

ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 63

APPARENT RANK: High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS (1-2 samples)	AVERAGE PROXIMATE 2 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)	9.5 - 11.71	10.61	
VOLATILE MATTER (%)	34.35 - 39.9	37.13	
FIXED CARBON (%)	43.5 - 46.35	44.93	
ASH (%)	7.1 - 7.59	7.35	7.1
SULFUR (%)	0.28 - 0.6		0.6
HYDROGEN (%)	5.5		5.5
CARBON (%)	62.7		62.7
NITROGEN (%)	1.2		1.2
OXYGEN (%)	22.9		22.9
BTU/LB.	10,600 - 10,940	10,770 (2 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS) (1 sample)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		0.22
SULFATE (%)		0.02
ORGANIC (%)		0.39

ASH FUSION TEMPERATURES (^{o}F) (1 sample)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		2070
SOFTENING TEMPERATURE		2120
FLUID TEMPERATURE		2170

ASH COMPOSITION (%) (1 sample)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2		31.0	K_2O		0.87
Al_2O_3		9.0	Fe_2O_3		6.8
CaO		20.0	TiO_2		0.54
MgO		2.77	P_2O_5		1.0L
Na_2O		0.18	SO_3		12.0

Hardgrove Grindability Index: 45 (1 sample)
L = less than

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 64
(Called Bed No. 65 in Medicine Bow mine)

GEOLOGIC FORMATION: Ferris

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 8

GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES

(Table 4, page 31 *)*

0-100 FEET OF COVER: 10.29 mt

100-200 FEET OF COVER: 5.39 mt

0-200 FEET OF COVER: 15.68 mt

TOTAL ACREAGE: 1610.9

STRIPPABLE RESERVE BASE

(Table 4, page 31 *)*

0-100 FEET OF COVER: 10.29 mt

100-200 FEET OF COVER: 5.39 mt

0-200 FEET OF COVER: 15.68 mt

TOTAL ACREAGE: 1610.9

RANGE IN MINABLE THICKNESS (FEET): 5' - 8'

WEIGHTED AVERAGE THICKNESS (FEET): 5.71'

ACTIVE MINES

NAME(s): Medicine Bow

ANNUAL PRODUCTION:
Unknown percentage of 3 mt

PROPOSED MINES

NAME(s): Seminoe No. 1

ANNUAL PRODUCTION:
Unknown percentage of 3 mt

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 64

APPARENT RANK: High volatile C bituminous - Subbituminous A

AS RECEIVED BASIS	RANGE ANALYSIS (1-11 samples)	AVERAGE PROXIMATE 7 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)	10.45 - 12.87	11.10	
VOLATILE MATTER (%)	34.65 - 38.5	35.39	
FIXED CARBON (%)	41.68 - 46.48	44.16	
ASH (%)	6.51 - 12.65	9.38	6.6
SULFUR (%)	0.33 - 0.73		0.4
HYDROGEN (%)	5.6		5.6
CARBON (%)	62.8		62.8
NITROGEN (%)	1.1		1.1
OXYGEN (%)	23.5		23.5
BTU/LB.	9,870 - 10,880	10,370 (11 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS) (1 sample)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		0.17
SULFATE (%)		0.02
ORGANIC (%)		0.18

ASH FUSION TEMPERATURES (^{o}F) (1 sample)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		2070
SOFTENING TEMPERATURE		2120
FLUID TEMPERATURE		2170

ASH COMPOSITION (%) (1 sample)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2		31.0	K_2O		0.63
Al_2O_3		14.0	Fe_2O_3		6.3
CaO		19.0	TiO_2		0.69
MgO		2.57	P_2O_5		1.0L
Na_2O		0.26	SO_3		11.0

Hardgrove Grindability Index: 43 (1 sample)
L = less than

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 65
(Called Bed No. 66 in Medicine Bow mine)

GEOLOGIC FORMATION: Ferris

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 8

GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES *(Table 4, page 30)*	STRIPPABLE RESERVE BASE *(Table 4, page 30)*
0-100 FEET OF COVER: 10.94 mt	0-100 FEET OF COVER: 10.94 mt
100-200 FEET OF COVER: 7.48 mt	100-200 FEET OF COVER: 7.48 mt
0-200 FEET OF COVER: 18.42 mt	0-200 FEET OF COVER: 18.42 mt
TOTAL ACREAGE: 1359.6	TOTAL ACREAGE: 1359.6

RANGE IN MINABLE THICKNESS (FEET): 5' - 12'

WEIGHTED AVERAGE THICKNESS (FEET): 8.35'

ACTIVE MINES	PROPOSED MINES
NAME(s): Medicine Bow; Seminoe No. 1	NAME(s): None
ANNUAL PRODUCTION: Major percentage of 6 mt	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 65

APPARENT RANK: Subbituminous A - High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS (2-17 samples)	AVERAGE PROXIMATE 11 *sample(s)*	AVERAGE ULTIMATE 2 *sample(s)*
MOISTURE (%)	8.96 - 15.44	11.98	
VOLATILE MATTER (%)	33.58 - 39.69	35.55	
FIXED CARBON (%)	36.86 - 49.04	46.29	
ASH (%)	4.55 - 10.69	6.18	5.9
SULFUR (%)	0.29 - 0.79		0.55
HYDROGEN (%)	5.5 - 5.6		5.55
CARBON (%)	60.8 - 64.4		62.60
NITROGEN (%)	1.3 - 1.6		1.45
OXYGEN (%)	21.5 - 26.4		23.95
BTU/LB.	9,770 - 11,280	10,670 (17 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS) (2 samples)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)	0.06 - 0.34	0.20
SULFATE (%)	0.01 - 0.06	0.04
ORGANIC (%)	0.25 - 0.42	0.34

ASH FUSION TEMPERATURES (^{o}F) (3 samples)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION	2060 - 2110	2080
SOFTENING TEMPERATURE	2130 - 2170	2150
FLUID TEMPERATURE	2180 - 2260	2210

ASH COMPOSITION (%) (3 samples)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2	20.0 - 30.11	25.4	K_2O	0.45 - 0.70	0.61
Al_2O_3	11.0 - 14.3	12.8	Fe_2O_3	6.5 - 10.07	7.8
CaO	21.0 - 30.0	25.4	TiO_2	0.37 - 0.54	0.47
MgO	2.97 - 3.66	3.22	P_2O_5	0.15 - 1.9	0.87
Na_2O	0.14 - 0.31	0.20	SO_3	13.97 - 18.0	15.32

Hardgrove Grindability Index: 50-52 (2 samples)

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 66
(Called rider over Bed No. 66 in Medicine Bow mine)

GEOLOGIC FORMATION: Ferris

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 8

GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES (*Table* 4, page 30)	STRIPPABLE RESERVE BASE (*Table* 4, page 30)
0-100 FEET OF COVER: 1.21 mt	0-100 FEET OF COVER: 1.21 mt
100-200 FEET OF COVER: 0.92 mt	100-200 FEET OF COVER: 0.92 mt
0-200 FEET OF COVER: 2.13 mt	0-200 FEET OF COVER: 2.13 mt
TOTAL ACREAGE: 211.6	TOTAL ACREAGE: 211.6

RANGE IN MINABLE THICKNESS (FEET): 5' - 6.5'

WEIGHTED AVERAGE THICKNESS (FEET): 5.84'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:
May be mined incidentally as a rider coal in the Medicine Bow mine.

mt=million tons

ANALYTICAL DATA FOR: Bed No. 66

APPARENT RANK: Subbituminous A (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Hanna

COAL NAME(s): Bed No. 71

GEOLOGIC FORMATION: Hanna
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 7
GEOGRAPHIC POSITION: *See Plate* 2

STRIPPABLE RESOURCES *(Table 4, page 29)*	STRIPPABLE RESERVE BASE *(Table 4, page 29)*
0-100 FEET OF COVER: 1.01 mt	0-100 FEET OF COVER: 1.01 mt
100-200 FEET OF COVER: 0.67 mt	100-200 FEET OF COVER: 0.67 mt
0-200 FEET OF COVER: 1.68 mt	0-200 FEET OF COVER: 1.68 mt
TOTAL ACREAGE: 158.10	TOTAL ACREAGE: 158.10

RANGE IN MINABLE THICKNESS (FEET): 5' - 7'
WEIGHTED AVERAGE THICKNESS (FEET): 6.08'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 71

APPARENT RANK: Subbituminous A - High volatile C bituminous (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Hanna

COAL NAME(s): Bed No. 72

GEOLOGIC FORMATION: Hanna
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 7
GEOGRAPHIC POSITION: *See Plate* 2

STRIPPABLE RESOURCES	STRIPPABLE RESERVE BASE
(Table 4, page 28 *)*	*(Table* 4, page 28 *)*
0-100 FEET OF COVER: 1.25 mt	0-100 FEET OF COVER: 1.25 mt
100-200 FEET OF COVER: 0.94 mt	100-200 FEET OF COVER: 0.94 mt
0-200 FEET OF COVER: 2.19 mt	0-200 FEET OF COVER: 2.19 mt
TOTAL ACREAGE: 218.00	TOTAL ACREAGE: 218.00

RANGE IN MINABLE THICKNESS (FEET): 5' - 7'
WEIGHTED AVERAGE THICKNESS (FEET): 5.82'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): Seminoe No. 2 South (?)
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:
May be part of Seminoe No. 2 South mine plan.

mt=million tons

ANALYTICAL DATA FOR: Bed No. 72

APPARENT RANK: Subbituminous A

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE 1 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)		16.22	
VOLATILE MATTER (%)		32.49	
FIXED CARBON (%)		46.13	
ASH (%)		5.16	
SULFUR (%)			0.46
HYDROGEN (%)			-
CARBON (%)			-
NITROGEN (%)			-
OXYGEN (%)			-
BTU/LB.		9,860 (1 sample)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Hanna

COAL NAME(s): Bed No. 73

GEOLOGIC FORMATION: Hanna
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 7
GEOGRAPHIC POSITION: *See Plate* 2

STRIPPABLE RESOURCES *(Table 4, page 26)*	STRIPPABLE RESERVE BASE *(Table 4, page 26)*
0-100 FEET OF COVER: 0.66 mt	0-100 FEET OF COVER: 0.66 mt
100-200 FEET OF COVER: 0.46 mt	100-200 FEET OF COVER: 0.46 mt
0-200 FEET OF COVER: 1.12 mt	0-200 FEET OF COVER: 1.12 mt
TOTAL ACREAGE: 98.8	TOTAL ACREAGE: 98.8

RANGE IN MINABLE THICKNESS (FEET): 5' - 8'
WEIGHTED AVERAGE THICKNESS (FEET): 6.56'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 73

APPARENT RANK: Subbituminous A - High volatile C bituminous (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)	No analyses available		
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)			
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Hanna

COAL NAME(s): Bed No. 74

GEOLOGIC FORMATION: Hanna
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 7
GEOGRAPHIC POSITION: *See Plate* 2

STRIPPABLE RESOURCES
(Table 4, page 26 *)*
0-100 FEET OF COVER: 3.11 mt
100-200 FEET OF COVER: 4.18 mt
0-200 FEET OF COVER: 7.29 mt
TOTAL ACREAGE: 562.60

STRIPPABLE RESERVE BASE
(Table 4, page 26*)*
0-100 FEET OF COVER: 3.09 mt
100-200 FEET OF COVER: 4.13 mt
0-200 FEET OF COVER: 7.22 mt
TOTAL ACREAGE: 554.30

RANGE IN MINABLE THICKNESS (FEET): 5' - 11'
WEIGHTED AVERAGE THICKNESS (FEET): 7.86'

ACTIVE MINES
NAME(s): Seminoe No. 2

ANNUAL PRODUCTION:
Minor percentage of 3 mt

PROPOSED MINES
NAME(s): None

ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 74

APPARENT RANK: High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE 1 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)		8.14	
VOLATILE MATTER (%)		34.29	
FIXED CARBON (%)		26.24	
ASH (%)		21.33	
SULFUR (%)			2.29
HYDROGEN (%)			-
CARBON (%)			-
NITROGEN (%)			-
OXYGEN (%)			-
BTU/LB.		9,680 (1 sample)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Hanna

COAL NAME(s): Bed No. 75

GEOLOGIC FORMATION: Hanna
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 7
GEOGRAPHIC POSITION: *See Plate* 2

STRIPPABLE RESOURCES	STRIPPABLE RESERVE BASE
(Table 4, page 25 *)*	*(Table* 4, page 25 *)*
0-100 FEET OF COVER: 3.54 mt	0-100 FEET OF COVER: 3.54 mt
100-200 FEET OF COVER: 5.63 mt	100-200 FEET OF COVER: 5.63 mg
0-200 FEET OF COVER: 9.17 mt	0-200 FEET OF COVER: 9.17 mt
TOTAL ACREAGE: 684.50	TOTAL ACREAGE: 684.50

RANGE IN MINABLE THICKNESS (FEET): 4' - 11'
WEIGHTED AVERAGE THICKNESS (FEET): 7.88'

ACTIVE MINES	PROPOSED MINES
NAME(s): Seminoe No. 2	NAME(s): None
ANNUAL PRODUCTION: Minor percentage of 3 mt	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 75

APPARENT RANK: Subbituminous A - High volatile C bituminous (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{O}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Hanna

COAL NAME(s): Bed No. 76

GEOLOGIC FORMATION: Hanna
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 7
GEOGRAPHIC POSITION: *See Plate* 2

STRIPPABLE RESOURCES

(Table 4, page 24 *)*

0-100 FEET OF COVER: 11.80 mt
100-200 FEET OF COVER: 9.05 mt
0-200 FEET OF COVER: 20.85 mt
TOTAL ACREAGE: 810.10

STRIPPABLE RESERVE BASE

(Table 4, page 24*)*

0-100 FEET OF COVER: 11.80 mt
100-200 FEET OF COVER: 9.05 mt
0-200 FEET OF COVER: 20.85 mt
TOTAL ACREAGE: 810.10

RANGE IN MINABLE THICKNESS (FEET): 7' - 28'
WEIGHTED AVERAGE THICKNESS (FEET): 16.50'

ACTIVE MINES

NAME(s): Seminoe No. 2

ANNUAL PRODUCTION:
Unknown percentage of 3 mt

PROPOSED MINES

NAME(s): None

ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 76

APPARENT RANK: High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS (1-2 samples)	AVERAGE PROXIMATE 1 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)	10.3 - 10.5	10.3	
VOLATILE MATTER (%)	39.4	39.4	
FIXED CARBON (%)	40.5	40.5	
ASH (%)	9.8 - 16.0	9.8	9.8
SULFUR (%)	0.6 - 0.7		0.7
HYDROGEN (%)	5.7		5.7
CARBON (%)	61.0		61.0
NITROGEN (%)	1.4		1.4
OXYGEN (%)	21.4		21.4
BTU/LB.	9,760 - 10,690	10,225 (2 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS) (1 sample)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		0.16
SULFATE (%)		0.02
ORGANIC (%)		0.48

ASH FUSION TEMPERATURES (^{o}F) (1 sample)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		-
SOFTENING TEMPERATURE		-
FLUID TEMPERATURE		2650

ASH COMPOSITION (%) (1 sample)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2		41.0	K_2O		1.1
Al_2O_3		20.0	Fe_2O_3		5.6
CaO		12.0	TiO_2		0.73
MgO		3.34	P_2O_5		1.4
Na_2O		0.14	SO_3		6.2

Hardgrove Grindability Index:

MINING DISTRICT: Hanna

COAL NAME(s): Bed No. 77
(See miscellaneous comments below)

GEOLOGIC FORMATION: Hanna

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 7

GEOGRAPHIC POSITION: *See Plate* 2

STRIPPABLE RESOURCES

(Table 4, page 23 *)*

0-100 FEET OF COVER: 2.88 mt

100-200 FEET OF COVER: 3.50 mt

0-200 FEET OF COVER: 6.38 mt

TOTAL ACREAGE: 558.5

STRIPPABLE RESERVE BASE

(Table 4, page 23 *)*

0-100 FEET OF COVER: 2.88 mt

100-200 FEET OF COVER: 3.50 mt

0-200 FEET OF COVER: 6.38 mt

TOTAL ACREAGE: 558.5

RANGE IN MINABLE THICKNESS (FEET): 5' - 9'

WEIGHTED AVERAGE THICKNESS (FEET): 6.73'

ACTIVE MINES

NAME(s): None

ANNUAL PRODUCTION:

PROPOSED MINES

NAME(s): Hanna South

ANNUAL PRODUCTION:
Unknown percentage of 0.8 mt

MISCELLANEOUS COMMENTS:
This bed is not equivalent to Bed No. 77 of Dobbin, Bowen and Hoots (1929) that occurs north of the fault between Seminoe No. 2 and the Rosebud pits.

mt=million tons

ANALYTICAL DATA FOR: Bed No. 77

APPARENT RANK: High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE 1 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)		9.56	
VOLATILE MATTER (%)		-	
FIXED CARBON (%)		-	
ASH (%)		19.90	
SULFUR (%)			1.42
HYDROGEN (%)			-
CARBON (%)			-
NITROGEN (%)			-
OXYGEN (%)			-
BTU/LB.		9,880 (1 sample)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{O}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Hanna

COAL NAME(s): Bed No. 78
(See miscellaneous comments below)

GEOLOGIC FORMATION: Hanna

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 7

GEOGRAPHIC POSITION: *See Plate* 2

STRIPPABLE RESOURCES

(Table 4, page 22 *)*

0-100 FEET OF COVER: 9.71 mt

100-200 FEET OF COVER: 9.73 mt

0-200 FEET OF COVER: 19.44 mt

TOTAL ACREAGE: 1,073.9

STRIPPABLE RESERVE BASE

(Table 4, page 22 *)*

0-100 FEET OF COVER: 9.71 mt

100-200 FEET OF COVER: 9.73 mt

0-200 FEET OF COVER: 19.44 mt

TOTAL ACREAGE: 1,073.9

RANGE IN MINABLE THICKNESS (FEET): 5' - 21'

WEIGHTED AVERAGE THICKNESS (FEET): 11.34'

ACTIVE MINES

NAME(s): None

ANNUAL PRODUCTION:

PROPOSED MINES

NAME(s): Hanna South

ANNUAL PRODUCTION:
Unknown percentage of 0.8 mt

MISCELLANEOUS COMMENTS:
This bed is not equivalent to Bed No. 78 of Dobbin, Bowen, and Hoots (1929) that occurs north of the fault between Seminoe No. 2 and the Rosebud pits.

mt=million tons

ANALYTICAL DATA FOR: Bed No. 78

APPARENT RANK: High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE 1 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)		12.18	
VOLATILE MATTER (%)		-	
FIXED CARBON (%)		-	
ASH (%)		15.19	
SULFUR (%)			0.89
HYDROGEN (%)			-
CARBON (%)			-
NITROGEN (%)			-
OXYGEN (%)			-
BTU/LB.		10,085 (1 sample)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Hanna

COAL NAME(s): Bed No. 79
(See miscellaneous comments below; called Bed No. 77 in Seminoe No. 2 North mine)
GEOLOGIC FORMATION: Hanna

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 7

GEOGRAPHIC POSITION: *See Plate* 2

STRIPPABLE RESOURCES

(Table 4, page 21 *)*

0-100 FEET OF COVER: 12.94 mt

100-200 FEET OF COVER: 17.94 mt

0-200 FEET OF COVER: 30.88 mt

TOTAL ACREAGE: 1,531.80

STRIPPABLE RESERVE BASE

(Table 4, page 21 *)*

0-100 FEET OF COVER: 12.59 mt

100-200 FEET OF COVER: 17.36 mt

0-200 FEET OF COVER: 29.95 mt

TOTAL ACREAGE: 1,453.20

RANGE IN MINABLE THICKNESS (FEET): 5' - 23'

WEIGHTED AVERAGE THICKNESS (FEET): 13.37'

ACTIVE MINES

NAME(s): Rosebut Pit 6; Seminoe No. 2 North

ANNUAL PRODUCTION:
Unknown percentage of 5.5 mt

PROPOSED MINES

NAME(s): Hanna South

ANNUAL PRODUCTION:
Unknown percentage of 0.8 mt

MISCELLANEOUS COMMENTS:
Probably part of a coal beneath the Hanna No. 1 in the Hanna South mine area. Mapped as Bed No. 77 by Dobbin, Bowen, and Hoots (1929) north of the fault between Seminoe No. 2 and the Rosebud pits.

mt=million tons

ANALYTICAL DATA FOR: Bed No. 79

APPARENT RANK: High volatile C bituminous - Subbituminous A

AS RECEIVED BASIS	RANGE ANALYSIS (2-5 samples)	AVERAGE PROXIMATE 5 *sample(s)*	AVERAGE ULTIMATE 2 *sample(s)*
MOISTURE (%)	8.94 - 16.51	11.33	
VOLATILE MATTER (%)	34.4 - 39.7	36.70	
FIXED CARBON (%)	41.41 - 47.3	43.16	
ASH (%)	5.73 - 12.26	8.81	7.55
SULFUR (%)	0.94 - 2.05		1.05
HYDROGEN (%)	5.6 - 5.7		5.65
CARBON (%)	61.4 - 62.2		61.80
NITROGEN (%)	1.3 - 1.4		1.35
OXYGEN (%)	20.4 - 24.7		22.55
BTU/LB.	10,390 - 11,105	10,724 (5 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS) (2 samples)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)	0.22 - 0.52	0.37
SULFATE (%)	0.03 - 0.10	0.07
ORGANIC (%)	0.52 - 0.75	0.64

ASH FUSION TEMPERATURES (^{o}F) (3 samples)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION	2080 - 2290	2190
SOFTENING TEMPERATURE	2130 - 2320	2230
FLUID TEMPERATURE	2260 - 2410	2330

ASH COMPOSITION (%) (2 samples)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2	17.0 - 46.0	32.0	K_2O	0.55 - 1.3	0.93
Al_2O_3	12.0 - 19.0	15.5	Fe_2O_3	8.9 - 11.0	10.0
CaO	4.0 - 20.0	12.0	TiO_2	0.58 - 0.85	0.72
MgO	2.33 - 2.39	2.36	P_2O_5	1.0L - 2.8	1.9L
Na_2O	0.13 - 0.15	0.14	SO_3	8.6 - 19.0	13.8

Hardgrove Grindability Index:
L = less than

MINING DISTRICT: Hanna

COAL NAME(s): Bed No. 80
(See miscellaneous comments below; called Bed No. 78 in Seminoe No. 2 North mine)
GEOLOGIC FORMATION: Hanna
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 7
GEOGRAPHIC POSITION: *See Plate* 2

STRIPPABLE RESOURCES

(Table 4, page 20 *)*

0-100 FEET OF COVER: 14.86 mt
100-200 FEET OF COVER: 23.17 mt
0-200 FEET OF COVER: 38.03 mt
TOTAL ACREAGE: 1,549.20

STRIPPABLE RESERVE BASE

(Table 4, page 20 *)*

0-100 FEET OF COVER: 14.72 mt
100-200 FEET OF COVER: 23.04 mt
0-200 FEET OF COVER: 37.76 mt
TOTAL ACREAGE: 1,539.10

RANGE IN MINABLE THICKNESS (FEET): 5' - 26'
WEIGHTED AVERAGE THICKNESS (FEET): 16.93'

ACTIVE MINES

NAME(s): Rosebud Pit Nos. 4, 7 and 8

ANNUAL PRODUCTION:
Major percentage of 2.5 mt

PROPOSED MINES

NAME(s): Carbon County; Seminoe No. 2 North; Hanna South

ANNUAL PRODUCTION:
Major percentage of 0.8 mt of Carbon County mine; unknown percentage of 3.8 mt

MISCELLANEOUS COMMENTS:
Mapped as Bed No. 78 by Dobbin, Bowen, and Hoots (1929) north of the fault between Seminoe No. 2 and the Rosebud pits.

mt=million tons

ANALYTICAL DATA FOR: Bed No. 80

APPARENT RANK: High volatile C bituminous - Subbituminous A

AS RECEIVED BASIS	RANGE ANALYSIS (7-32 samples)	AVERAGE PROXIMATE 17 *sample(s)*	AVERAGE ULTIMATE 7 *sample(s)*
MOISTURE (%)	5.97 - 15.44	10.83	
VOLATILE MATTER (%)	35.03 - 47.34	39.23	
FIXED CARBON (%)	35.65 - 50.92	43.68	
ASH (%)	4.4 - 15.83	6.27	7.09
SULFUR (%)	0.48 - 1.24		0.98
HYDROGEN (%)	5.7 - 6.16		5.90
CARBON (%)	58.66 - 65.6		60.66
NITROGEN (%)	0.45 - 1.5		1.13
OXYGEN (%)	21.9 - 25.59		24.23
BTU/LB.	9,940 - 12,600	11,000 (26 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS) (14 samples)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)	0.08 - 0.44	0.25
SULFATE (%)	0.0 - 0.03	0.01
ORGANIC (%)	0.14 - 0.89	0.54

ASH FUSION TEMPERATURES (^{o}F) (11 samples)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION	2030 - 2410	2210
SOFTENING TEMPERATURE	2080 - 2430	2250
FLUID TEMPERATURE	2130 - 2450	2300

ASH COMPOSITION (%) (16 samples)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2	20.19 - 42.56	30.14	K_2O	0.44 - 1.09	0.76
Al_2O_3	12.01 - 21.53	16.37	Fe_2O_3	5.39 - 12.0	9.30
CaO	8.74 - 26.05	18.10	TiO_2	0.02 - 1.66	0.76
MgO	2.62 - 8.05	4.42	P_2O_5	0.1L - 1.75	0.82L
Na_2O	0.11 - 3.34	1.52	SO_3	6.44 - 28.75	15.1

Hardgrove Grindability Index: 47 - 50 (4 samples)
L = less than

MINING DISTRICT: Hanna

COAL NAME(s): Bed No. 82
(See miscellaneous comments below; called Bed No. 79 in Seminoe No. 2 North mine)
GEOLOGIC FORMATION: Hanna

AGE: Eocene

STRATIGRAPHIC POSITION: *See Figure* 7

GEOGRAPHIC POSITION: *See Plate* 2

STRIPPABLE RESOURCES

(Table 4, page 18 *)*

0-100 FEET OF COVER: 15.67 mt

100-200 FEET OF COVER: 19.33 mt

0-200 FEET OF COVER: 35.00 mt

TOTAL ACREAGE: 2,010.90

STRIPPABLE RESERVE BASE

(Table 4, page 18 *)*

0-100 FEET OF COVER: 15.63 mt

100-200 FEET OF COVER: 19.21 mt

0-200 FEET OF COVER: 34.84 mt

TOTAL ACREAGE: 1,999.30

RANGE IN MINABLE THICKNESS (FEET): 5' - 16.5'

WEIGHTED AVERAGE THICKNESS (FEET): 10.84'

ACTIVE MINES

NAME(s): Rosebud Pit Nos. 5 & 9

ANNUAL PRODUCTION:
Unknown percentage of 2.5 mt

PROPOSED MINES

NAME(s): Carbon County; Seminoe No. 2 North

ANNUAL PRODUCTION:
Unknown percentage of 3.8 mt

MISCELLANEOUS COMMENTS:
Mapped as Bed No. 80 by Dobbin, Bowen, and Hoots (1929) north of the fault between Seminoe No. 2 and the Rosebud pits.

mt=million tons

ANALYTICAL DATA FOR: Bed No. 82

APPARENT RANK: High volatile C bituminous - Subbituminous A

AS RECEIVED BASIS	RANGE ANALYSIS (2-31 samples)	AVERAGE PROXIMATE 15 *sample(s)*	AVERAGE ULTIMATE 2 *sample(s)*
MOISTURE (%)	6.51 - 20.75	11.90	
VOLATILE MATTER (%)	31.28 - 43.78	37.08	
FIXED CARBON (%)	36.56 - 48.08	42.46	
ASH (%)	4.29 - 13.2	8.56	7.25
SULFUR (%)	0.35 - 1.94		1.35
HYDROGEN (%)	5.7 - 5.8		5.75
CARBON (%)	58.0 - 61.3		59.65
NITROGEN (%)	0.9 - 1.6		1.25
OXYGEN (%)	23.0 - 26.6		24.80
BTU/LB.	9,105 - 12,150	10,620 (21 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS) (12 samples)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)	0.12 - 0.99	0.44
SULFATE (%)	0.00 - 0.12	0.04
ORGANIC (%)	0.46 - 1.01	0.71

ASH FUSION TEMPERATURES (^{o}F) (10 samples)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION	2090 - 2330	2240
SOFTENING TEMPERATURE	2140 - 2410	2310
FLUID TEMPERATURE	2190 - 2520	2400

ASH COMPOSITION (%) (5 samples)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2	23.53 - 35.0	32.11	K_2O	0.44 - 0.93	0.63
Al_2O_3	16.19 - 20.97	18.84	Fe_2O_3	9.02 - 15.0	10.73
CaO	6.9 - 19.72	12.68	TiO_2	0.95 - 1.3	1.11
MgO	1.27 - 2.84	1.98	P_2O_5	0.1L - 3.52	1.95L
Na_2O	0.11 - 1.91	0.95	SO_3	12.0 - 18.92	14.71

Hardgrove Grindability Index: 50 (1 sample)
L = less than

MINING DISTRICT: Hanna

COAL NAME(s): Bed No. 83
(See miscellaneous comments below; called Bed No. 81 in Seminoe No. 2 North mine)
GEOLOGIC FORMATION: Hanna

AGE: Eocene

STRATIGRAPHIC POSITION: *See Figure* 7

GEOGRAPHIC POSITION: *See Plate* 2

STRIPPABLE RESOURCES	STRIPPABLE RESERVE BASE
(Table 4, page 18 *)*	*(Table* 4, page 18*)*
0-100 FEET OF COVER: 5.24 mt	0-100 FEET OF COVER: 5.05 mt
100-200 FEET OF COVER: 4.85 mt	100-200 FEET OF COVER: 4.50 mt
0-200 FEET OF COVER: 10.09 mt	0-200 FEET OF COVER: 9.55 mt
TOTAL ACREAGE: 983.70	TOTAL ACREAGE: 916.20

RANGE IN MINABLE THICKNESS (FEET): 4.5' - 9'

WEIGHTED AVERAGE THICKNESS (FEET): 6.04'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): Rosebud Pit No. 10; Seminoe No. 2 North
ANNUAL PRODUCTION:	ANNUAL PRODUCTION: Unknown percentage of 3.3 mt

MISCELLANEOUS COMMENTS:
Mapped as Bed No. 81 by Dobbin, Bowen, and Hoots (1929) north of the fault between Seminoe No. 2 and the Rosebud pits.

mt=million tons

ANALYTICAL DATA FOR: Bed No. 83

APPARENT RANK: High volatile C bituminous - Subbituminous A

AS RECEIVED BASIS	RANGE ANALYSIS (8 samples)	AVERAGE PROXIMATE 8 *sample(s)*	AVERAGE ULTIMATE 8 *sample(s)*
MOISTURE (%)	5.54 - 14.49	10.26	
VOLATILE MATTER (%)	27.63 - 37.75	34.76	
FIXED CARBON (%)	35.50 - 49.05	44.24	
ASH (%)	6.62 - 22.38	10.74	
SULFUR (%)	0.54 - 0.97		0.79
HYDROGEN (%)			-
CARBON (%)			-
NITROGEN (%)			-
OXYGEN (%)			-
BTU/LB.	8,255 - 11,720	10,760 (8 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS) (1 sample)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		0.29
SULFATE (%)		0.00
ORGANIC (%)		0.52

ASH FUSION TEMPERATURES (^{O}F) (4 samples)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION	2100 - 2260	2195
SOFTENING TEMPERATURE	2150 - 2380	2290
FLUID TEMPERATURE	2320 - 2570	2440

ASH COMPOSITION (%) (1 sample)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2		36.8	K_2O		0.93
Al_2O_3		18.5	Fe_2O_3		7.19
CaO		16.5	TiO_2		0.63
MgO		1.82	P_2O_5		0.92
Na_2O		0.94	SO_3		14.8

Hardgrove Grindability Index: 42 (1 sample)

MINING DISTRICT: Hanna

COAL NAME(s): Bed No. 84
(See miscellaneous comments below)

GEOLOGIC FORMATION: Hanna

AGE: Eocene

STRATIGRAPHIC POSITION: *See Figure* 7

GEOGRAPHIC POSITION: *See Plate* 2

STRIPPABLE RESOURCES	STRIPPABLE RESERVE BASE
(Table 4, page 17 *)*	*(Table* 4, page 17 *)*
0-100 FEET OF COVER: 0.63 mt	0-100 FEET OF COVER: 0.63 mt
100-200 FEET OF COVER: 0.77 mt	100-200 FEET OF COVER: 0.77 mg
0-200 FEET OF COVER: 1.40 mt	0-200 FEET OF COVER: 1.40 mt
TOTAL ACREAGE: 161.9	TOTAL ACREAGE: 161.9

RANGE IN MINABLE THICKNESS (FEET): 4.5' - 6'

WEIGHTED AVERAGE THICKNESS (FEET): 4.92'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:
Mapped as Bed No. 82 by Dobbin, Bowen, and Hoots (1929) north of the fault between Seminoe No. 2 and the Rosebud pits.

mt=million tons

ANALYTICAL DATA FOR: Bed No. 84

APPARENT RANK: High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE 1 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)		13.92	
VOLATILE MATTER (%)		35.32	
FIXED CARBON (%)		42.88	
ASH (%)		7.88	
SULFUR (%)			0.75
HYDROGEN (%)			-
CARBON (%)			-
NITROGEN (%)			-
OXYGEN (%)			-
BTU/LB.		10,520 (1 sample)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F) (1 sample)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		2250
SOFTENING TEMPERATURE		2350
FLUID TEMPERATURE		2440

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Hanna

COAL NAME(s): Bed No. 86
(See miscellaneous comments below)

GEOLOGIC FORMATION: Hanna

AGE: Eocene

STRATIGRAPHIC POSITION: *See Figure* 7

GEOGRAPHIC POSITION: *See Plate* 2

STRIPPABLE RESOURCES	STRIPPABLE RESERVE BASE
(Table 4, page 17 *)*	*(Table* 4, page 17 *)*
0-100 FEET OF COVER: 2.37 mt	0-100 FEET OF COVER: 2.37 mt
100-200 FEET OF COVER: 3.22 mt	100-200 FEET OF COVER: 3.22 mt
0-200 FEET OF COVER: 5.59 mt	0-200 FEET OF COVER: 5.59 mt
TOTAL ACREAGE: 411.5	TOTAL ACREAGE: 411.5

RANGE IN MINABLE THICKNESS (FEET): 5' - 11'

WEIGHTED AVERAGE THICKNESS (FEET): 8.23'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:
Mapped as Bed No. 84 by Dobbin, Bowen, and Hoots (1929) north of the fault between Seminoe No. 2 and the Rosebud pits.

mt=million tons

ANALYTICAL DATA FOR: Bed No. 86

APPARENT RANK: High volatile C bituminous - Subbituminous A (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{O}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Hanna

COAL NAME(s): Bed No. 87
(See miscellaneous comments below)

GEOLOGIC FORMATION: Hanna

AGE: Eocene

STRATIGRAPHIC POSITION: *See Figure* 7

GEOGRAPHIC POSITION: *See Plate* 2

STRIPPABLE RESOURCES	STRIPPABLE RESERVE BASE
(Table 4, page 17 *)*	*(Table* 4 page 17 *)*
0-100 FEET OF COVER: 0.42 mt	0-100 FEET OF COVER: 0.42 mt
100-200 FEET OF COVER: 0.37 mt	100-200 FEET OF COVER: 0.37 mt
0-200 FEET OF COVER: 0.79 mt	0-200 FEET OF COVER: 0.79 mt
TOTAL ACREAGE: 85.4	TOTAL ACREAGE: 85.4

RANGE IN MINABLE THICKNESS (FEET): 5' - 6.5'

WEIGHTED AVERAGE THICKNESS (FEET): 5.3'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:
Mapped as Bed No. 85 by Dobbin, Bowen, and Hoots (1929) north of the fault between Seminoe No. 2 and the Rosebud pits.

mt=million tons

ANALYTICAL DATA FOR: Bed No. 87

APPARENT RANK: High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE 1 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)		8.42	
VOLATILE MATTER (%)		34.57	
FIXED CARBON (%)		37.43	
ASH (%)		19.58	
SULFUR (%)			1.66
HYDROGEN (%)			-
CARBON (%)			-
NITROGEN (%)			-
OXYGEN (%)			-
BTU/LB.		9,590 (1 sample)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Hanna

COAL NAME(s): Bed No. 88
(See miscellaneous comments below)

GEOLOGIC FORMATION: Hanna

AGE: Eocene

STRATIGRAPHIC POSITION: *See Figure* 7

GEOGRAPHIC POSITION: *See Plate* 2

STRIPPABLE RESOURCES	STRIPPABLE RESERVE BASE
(Table 4, page 16 *)*	*(Table* 4, page 16 *)*
0-100 FEET OF COVER: 0.20 mt	0-100 FEET OF COVER: 0.20 mt
100-200 FEET OF COVER: 0.17 mt	100-200 FEET OF COVER: 0.17 mt
0-200 FEET OF COVER: 0.37 mt	0-200 FEET OF COVER: 0.37 mt
TOTAL ACREAGE: 31.5	TOTAL ACREAGE: 31.5

RANGE IN MINABLE THICKNESS (FEET): 5' - 9'

WEIGHTED AVERAGE THICKNESS (FEET): 7.11'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:
Mapped as Bed No. 86 by Dobbin, Bowen, and Hoots (1929) north of the fault between Seminoe No. 2 and the Rosebud pits.

mt=million tons

ANALYTICAL DATA FOR: Bed No. 88

APPARENT RANK: High volatile C bituminous - Subbituminous A (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Hanna

COAL NAME(s): Bed No. 88
(See miscellaneous comments below)

GEOLOGIC FORMATION: Hanna

AGE: Eocene

STRATIGRAPHIC POSITION: *See Figure* 7

GEOGRAPHIC POSITION: *See Plate* 2

STRIPPABLE RESOURCES	STRIPPABLE RESERVE BASE
(Table 4, page 16 *)*	*(Table* 4, page 16 *)*
0-100 FEET OF COVER: 0.20 mt	0-100 FEET OF COVER: 0.20 mt
100-200 FEET OF COVER: 0.17 mt	100-200 FEET OF COVER: 0.17 mt
0-200 FEET OF COVER: 0.37 mt	0-200 FEET OF COVER: 0.37 mt
TOTAL ACREAGE: 31.5	TOTAL ACREAGE: 31.5

RANGE IN MINABLE THICKNESS (FEET): 5' - 9'

WEIGHTED AVERAGE THICKNESS (FEET): 7.11'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:
Mapped as Bed No. 86 by Dobbin, Bowen, and Hoots (1929) north of the fault between Seminoe No. 2 and the Rosebud pits.

mt=million tons

ANALYTICAL DATA FOR: Bed No. 88

APPARENT RANK: High volatile C bituminous - Subbituminous A (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Hanna

COAL NAME(s): Bed No. 89

GEOLOGIC FORMATION: Hanna

AGE: Eocene

STRATIGRAPHIC POSITION: *See Figure* 7

GEOGRAPHIC POSITION: *See Plate* 2

STRIPPABLE RESOURCES	STRIPPABLE RESERVE BASE
(Table 4, page 14 *)*	*(Table* 4, page 14 *)*
0-100 FEET OF COVER: 2.12 mt	0-100 FEET OF COVER: 2.12 mt
100-200 FEET OF COVER: 3.31 mt	100-200 FEET OF COVER: 3.31 mt
0-200 FEET OF COVER: 5.43 mt	0-200 FEET OF COVER: 5.43 mt
TOTAL ACREAGE: 408.5	TOTAL ACREAGE: 408.5

RANGE IN MINABLE THICKNESS (FEET): 5' - 7'

WEIGHTED AVERAGE THICKNESS (FEET): 9.03'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 89

APPARENT RANK: Subbituminous A - Subbituminous B

AS RECEIVED BASIS	RANGE ANALYSIS (1-3 samples)	AVERAGE PROXIMATE 3 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)	15.06 - 15.52	15.30	
VOLATILE MATTER (%)	33.63 - 36.42	35.48	
FIXED CARBON (%)	33.15 - 45.34	37.92	
ASH (%)	5.70 - 14.91	11.30	5.70
SULFUR (%)	0.99 - 2.27		2.27
HYDROGEN (%)	6.04		6.04
CARBON (%)	57.02		57.02
NITROGEN (%)	1.63		1.63
OXYGEN (%)	27.34		27.34
BTU/LB.	8,750 - 10,245	9,370 (3 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{O}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Carbon

COAL NAME(s): Bed No. 105
(See miscellaneous comments below)

GEOLOGIC FORMATION: Hanna

AGE: Eocene - Paleocene

STRATIGRAPHIC POSITION: *See Figure* 6

GEOGRAPHIC POSITION: *See Plate* 1

STRIPPABLE RESOURCES	STRIPPABLE RESERVE BASE
(Table 4, page 9 *)*	*(Table* 4, page 9 *)*
0-100 FEET OF COVER: .60 mt	0-100 FEET OF COVER: .60 mt
100-200 FEET OF COVER: 1.41 mt	100-200 FEET OF COVER: 1.41 mt
0-200 FEET OF COVER: 2.01 mt	0-200 FEET OF COVER: 2.01 mt
TOTAL ACREAGE: 227.70	TOTAL ACREAGE: 227.70

RANGE IN MINABLE THICKNESS (FEET): 5'

WEIGHTED AVERAGE THICKNESS (FEET): 5.0'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:
Mapped as Bed No. 107 by Dobbin, Bowen, and Hoots (1929)

mt=million tons

ANALYTICAL DATA FOR: Bed No. 105

APPARENT RANK: High volatile C bituminous - Subbituminous A (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Carbon

COAL NAME(s): Bed No. 109

GEOLOGIC FORMATION: Hanna
AGE: Eocene - Paleocene
STRATIGRAPHIC POSITION: *See Figure* 6
GEOGRAPHIC POSITION: *See Plate* 1

STRIPPABLE RESOURCES
(Table 4, page 9 *)*
0-100 FEET OF COVER: 6.36 mt
100-200 FEET OF COVER: 6.50 mt
0-200 FEET OF COVER: 12.86 mt
TOTAL ACREAGE: 1,287.0

STRIPPABLE RESERVE BASE
(Table 4, page 9 *)*
0-100 FEET OF COVER: 6.36 mt
100-200 FEET OF COVER: 6.50 mt
0-200 FEET OF COVER: 12.86 mt
TOTAL ACREAGE: 1,287.0

RANGE IN MINABLE THICKNESS (FEET): 5' - 8'
WEIGHTED AVERAGE THICKNESS (FEET): 5.89'

ACTIVE MINES
NAME(s): None

PROPOSED MINES
NAME(s): None

ANNUAL PRODUCTION:

ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 109

APPARENT RANK: High volatile C bituminous - Subbituminous A

AS RECEIVED BASIS	RANGE ANALYSIS (3 samples)	AVERAGE PROXIMATE 3 *sample(s)*	AVERAGE ULTIMATE 3 *sample(s)*
MOISTURE (%)	7.7 - 9.8	8.7	
VOLATILE MATTER (%)	21.4 - 36.1	30.3	
FIXED CARBON (%)	17.9 - 31.5	26.5	
ASH (%)	26.0 - 50.9	34.5	34.5
SULFUR (%)	0.9 - 4.0		2.5
HYDROGEN (%)	3.7 - 5.0		4.5
CARBON (%)	28.9 - 49.2		42.2
NITROGEN (%)	0.6 - 1.1		0.9
OXYGEN (%)	14.7 - 16.5		15.4
BTU/LB.	5,070 - 8,990	7,580 (3 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS) (3 samples)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)	0.61 - 1.40	0.94
SULFATE (%)	0.01 - 0.02	0.02
ORGANIC (%)	0.28 - 1.08	0.78

ASH FUSION TEMPERATURES (^{o}F) (3 samples)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION	2100 - 2610	2290
SOFTENING TEMPERATURE	2210 - 2720	2390
FLUID TEMPERATURE	2310 - 2800	2490

ASH COMPOSITION (%) (3 samples)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2	45.0 - 61.0	50.7	K_2O	1.5 - 2.4	1.93
Al_2O_3	17.0 - 20.0	18.3	Fe_2O_3	5.2 - 17.0	11.1
CaO	3.3 - 11.0	7.3	TiO_2	0.73 - 0.85	0.81
MgO	1.49 - 1.81	1.65	P_2O_5	1.0L	1.0L
Na_2O	0.16 - 0.26	0.20	SO_3	2.1 - 6.2	4.6

Hardgrove Grindability Index:
L = less than

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 121

GEOLOGIC FORMATION: Ferris

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 8

GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES *(Table 4, page 47)*	STRIPPABLE RESERVE BASE *(Table 4, page 47)*
0-100 FEET OF COVER: 0.31 mt	0-100 FEET OF COVER: 0.31 mt
100-200 FEET OF COVER: 0.26 mt	100-200 FEET OF COVER: 0.26 mt
0-200 FEET OF COVER: 0.57 mt	0-200 FEET OF COVER: 0.57 mt
TOTAL ACREAGE: 40.8	TOTAL ACREAGE: 40.8

RANGE IN MINABLE THICKNESS (FEET): 8'

WEIGHTED AVERAGE THICKNESS (FEET): 8'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 121

APPARENT RANK: Subbituminous A (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 122

GEOLOGIC FORMATION: Ferris
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 8
GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES
(Table 4, page 47 *)*
0-100 FEET OF COVER: 2.54 mt
100-200 FEET OF COVER: 2.16 mt
0-200 FEET OF COVER: 4.70 mt
TOTAL ACREAGE: 283.2

STRIPPABLE RESERVE BASE
(Table 4, page 47*)*
0-100 FEET OF COVER: 1.26 mt
100-200 FEET OF COVER: 0.84 mt
0-200 FEET OF COVER: 2.10 mt
TOTAL ACREAGE: 196.5

RANGE IN MINABLE THICKNESS (FEET): 5' - 17'
WEIGHTED AVERAGE THICKNESS (FEET): 10'

ACTIVE MINES
NAME(s): None

PROPOSED MINES
NAME(s): Medicine Bow

ANNUAL PRODUCTION:

ANNUAL PRODUCTION:
Unknown percentage of 3 mt

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 122

APPARENT RANK: Subbituminous A (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No routine analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{O}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%) (1 sample)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2		26.0	K_2O		0.74
Al_2O_3		13.0	Fe_2O_3		40.0
CaO		3.2	TiO_2		0.47
MgO		1.7	P_2O_5		0.76
Na_2O		0.09	SO_3		8.0

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 123

GEOLOGIC FORMATION: Ferris

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 8

GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES

(Table 4, page 46 *)*

0-100 FEET OF COVER: 3.11 mt

100-200 FEET OF COVER: 12.32 mt

0-200 FEET OF COVER: 15.43 mt

TOTAL ACREAGE: 380.5

STRIPPABLE RESERVE BASE

(Table 4, page 46 *)*

0-100 FEET OF COVER: 2.69 mt

100-200 FEET OF COVER: 11.34 mt

0-200 FEET OF COVER: 14.03 mt

TOTAL ACREAGE: 354.4

RANGE IN MINABLE THICKNESS (FEET): 5' - 40'

WEIGHTED AVERAGE THICKNESS (FEET): 28.07'

ACTIVE MINES

NAME(s): None

ANNUAL PRODUCTION:

PROPOSED MINES

NAME(s): Medicine Bow

ANNUAL PRODUCTION:
Unknown percentage of 3 mt

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 123

APPARENT RANK: Subbituminous A (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)	No analyses available		
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)			
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 124

GEOLOGIC FORMATION: Ferris

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 8

GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES *(Table 4, page 45)*	STRIPPABLE RESERVE BASE *(Table 4, page 45)*
0-100 FEET OF COVER: 4.35 mt	0-100 FEET OF COVER: 4.04 mt
100-200 FEET OF COVER: 5.30 mt	100-200 FEET OF COVER: 4.96 mt
0-200 FEET OF COVER: 9.65 mt	0-200 FEET OF COVER: 9.00 mt
TOTAL ACREAGE: 660.6	TOTAL ACREAGE: 619.9

RANGE IN MINABLE THICKNESS (FEET): 5' - 11'

WEIGHTED AVERAGE THICKNESS (FEET): 8.73'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): Medicine Bow
ANNUAL PRODUCTION:	ANNUAL PRODUCTION: Unknown percentage of 3 mt

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 124

APPARENT RANK: Subbituminous A (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{O}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 127

GEOLOGIC FORMATION: Ferris
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 8
GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES
(Table 4, page 45 *)*
0-100 FEET OF COVER: 5.46 mt
100-200 FEET OF COVER: 4.43 mt
0-200 FEET OF COVER: 9.89 mt
TOTAL ACREAGE: 674.2

STRIPPABLE RESERVE BASE
(Table 4, page 45 *)*
0-100 FEET OF COVER: 5.28 mt
100-200 FEET OF COVER: 4.09 mt
0-200 FEET OF COVER: 9.37 mt
TOTAL ACREAGE: 648.9

RANGE IN MINABLE THICKNESS (FEET): 5' - 15'
WEIGHTED AVERAGE THICKNESS (FEET): 9.08'

ACTIVE MINES
NAME(s): None

ANNUAL PRODUCTION:

PROPOSED MINES
NAME(s): Medicine Bow

ANNUAL PRODUCTION:
Unknown percentage of 3 mt

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 127

APPARENT RANK: Subbituminous A (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 128

GEOLOGIC FORMATION: Ferris
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 8
GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES
(Table 4, page 44 *)*
0-100 FEET OF COVER: 0.87 mt
100-200 FEET OF COVER: 0.99 mt
0-200 FEET OF COVER: 1.86 mt
TOTAL ACREAGE: 210.5

STRIPPABLE RESERVE BASE
(Table 4, page 44 *)*
0-100 FEET OF COVER: 0.79 mt
100-200 FEET OF COVER: 0.99 mt
0-200 FEET OF COVER: 1.78 mt
TOTAL ACREAGE: 201.1

RANGE IN MINABLE THICKNESS (FEET): 5'
WEIGHTED AVERAGE THICKNESS (FEET): 5'

ACTIVE MINES
NAME(s): None

ANNUAL PRODUCTION:

PROPOSED MINES
NAME(s): None

ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 128

APPARENT RANK: Subbituminous A

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)		13.44	
VOLATILE MATTER (%)		34.98	
FIXED CARBON (%)		46.88	
ASH (%)		4.70	
SULFUR (%)			0.44
HYDROGEN (%)			-
CARBON (%)			-
NITROGEN (%)			-
OXYGEN (%)			-
BTU/LB.		10,910 (1 sample)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 129

GEOLOGIC FORMATION: Ferris
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 8
GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES
(Table 4, page 44 *)*
0-100 FEET OF COVER: 4.78 mt
100-200 FEET OF COVER: 6.24 mt
0-200 FEET OF COVER: 11.02 mt
TOTAL ACREAGE: 845.0

STRIPPABLE RESERVE BASE
(Table 4, page 44 *)*
0-100 FEET OF COVER: 4.22 mt
100-200 FEET OF COVER: 5.90 mt
0-200 FEET OF COVER: 10.12 mt
TOTAL ACREAGE: 743.7

RANGE IN MINABLE THICKNESS (FEET): 5' - 12'
WEIGHTED AVERAGE THICKNESS (FEET): 7.97'

ACTIVE MINES
NAME(s): None

ANNUAL PRODUCTION:

PROPOSED MINES
NAME(s): Medicine Bow

ANNUAL PRODUCTION:
Unknown percentage of 3 mt

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 129

APPARENT RANK: Subbituminous A

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE 1 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)		12.78	
VOLATILE MATTER (%)		35.21	
FIXED CARBON (%)		45.90	
ASH (%)		6.11	
SULFUR (%)			0.34
HYDROGEN (%)			-
CARBON (%)			-
NITROGEN (%)			-
OXYGEN (%)			-
BTU/LB.		10,720 (1 sample)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%) (1 sample)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2		44.0	K_2O		1.0
Al_2O_3		18.0	Fe_2O_3		8.5
CaO		10.0	TiO_2		0.75
MgO		6.6	P_2O_5		0.82
Na_2O		0.35	SO_3		9.2

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Bed No. 130

GEOLOGIC FORMATION: Ferris
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 8
GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES (*Table* 4, page 43)	STRIPPABLE RESERVE BASE (*Table* 4, page 43)
0-100 FEET OF COVER: 1.41 mt	0-100 FEET OF COVER: 1.41 mt
100-200 FEET OF COVER: 2.05 mt	100-200 FEET OF COVER: 2.05 mt
0-200 FEET OF COVER: 3.46 mt	0-200 FEET OF COVER: 3.46 mt
TOTAL ACREAGE: 354.9	TOTAL ACREAGE: 354.9

RANGE IN MINABLE THICKNESS (FEET): 5' - 6'
WEIGHTED AVERAGE THICKNESS (FEET): 5.55'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed No. 130

APPARENT RANK: High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE 1 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)		12.12	
VOLATILE MATTER (%)		34.69	
FIXED CARBON (%)		45.98	
ASH (%)		7.12	
SULFUR (%)			0.79
HYDROGEN (%)			-
CARBON (%)			-
NITROGEN (%)			-
OXYGEN (%)			-
BTU/LB.		10,710 (1 sample)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{O}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Hanna

COAL NAME(s): Bed No. RME 92
(See miscellaneous comments below)

GEOLOGIC FORMATION: Hanna

AGE: Eocene

STRATIGRAPHIC POSITION: *See Figure* 7

GEOGRAPHIC POSITION: *See Plate* 2

STRIPPABLE RESOURCES *(Table 4, page 16)*	STRIPPABLE RESERVE BASE *(Table 4, page 16)*
0-100 FEET OF COVER: 2.80 mt	0-100 FEET OF COVER: 2.60 mt
100-200 FEET OF COVER: 2.55 mt	100-200 FEET OF COVER: 2.47 mt
0-200 FEET OF COVER: 5.35 mt	0-200 FEET OF COVER: 5.07 mt
TOTAL ACREAGE: 247.5	TOTAL ACREAGE: 235.3

RANGE IN MINABLE THICKNESS (FEET): 5' - 18'

WEIGHTED AVERAGE THICKNESS (FEET): 13.46'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:
Mapped as Bed No. 87 by Dobbin, Bowen, and Hoots (1929) north of the fault between Seminoe No. 2 and the Rosebud pits.

mt=million tons

ANALYTICAL DATA FOR: Bed No. RME 92

APPARENT RANK: High volatile C bituminous - Subbituminous A (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Hanna

COAL NAME(s): Bed No. RME #93
(See miscellaneous comments below)

GEOLOGIC FORMATION: Hanna

AGE: Eocene

STRATIGRAPHIC POSITION: *See Figure* 7

GEOGRAPHIC POSITION: *See Plate* 2

STRIPPABLE RESOURCES
(Table 4, page 14 *)*

0-100 FEET OF COVER: 13.69 mt

100-200 FEET OF COVER: 16.63 mt

0-200 FEET OF COVER: 30.32 mt

TOTAL ACREAGE: 1,088.2

STRIPPABLE RESERVE BASE
(Table 4, page 14 *)*

0-100 FEET OF COVER: 12.19 mt

100-200 FEET OF COVER: 15.58 mt

0-200 FEET OF COVER: 27.77 mt

TOTAL ACREAGE: 980.0

RANGE IN MINABLE THICKNESS (FEET): 5' - 31'

WEIGHTED AVERAGE THICKNESS (FEET): 20.15'

ACTIVE MINES

NAME(s): None

ANNUAL PRODUCTION:

PROPOSED MINES

NAME(s): None

ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:
Mapped as Bed No. 88 by Dobbin, Bowen, and Hoots (1929) north of the fault between Seminoe No. 2 and the Rosebud pits.

mt=million tons

ANALYTICAL DATA FOR: Bed No. RME 93

APPARENT RANK: High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS (4 samples)	AVERAGE PROXIMATE 4 *sample(s)*	AVERAGE ULTIMATE 4 *sample(s)*
MOISTURE (%)	12.25 - 12.89	12.45	
VOLATILE MATTER (%)	34.34 - 37.18	35.60	
FIXED CARBON (%)	39.80 - 46.21	42.76	
ASH (%)	6.41 - 10.95	9.19	
SULFUR (%)	1.77 - 2.97		2.39
HYDROGEN (%)			-
CARBON (%)			-
NITROGEN (%)			-
OXYGEN (%)			-
BTU/LB.	10,270 - 10,380	10,325 (2 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{O}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Corral Creek

COAL NAME(s): Bed WH 1

GEOLOGIC FORMATION: Almond
AGE: Upper Cretaceous
STRATIGRAPHIC POSITION: *See Figure* 11
GEOGRAPHIC POSITION: *See Plate* 4

STRIPPABLE RESOURCES *(Table 4, page 52)*	STRIPPABLE RESERVE BASE *(Table 4, page 52)*
0-100 FEET OF COVER: 2.30 mt	0-100 FEET OF COVER: 2.30 mt
100-200 FEET OF COVER: 1.64 mt	100-200 FEET OF COVER: 1.64 mt
0-200 FEET OF COVER: 3.94 mt	0-200 FEET OF COVER: 3.94 mt
TOTAL ACREAGE: 364.5	TOTAL ACREAGE: 364.5

RANGE IN MINABLE THICKNESS (FEET): 5' - 8.5'
WEIGHTED AVERAGE THICKNESS (FEET): 6.28'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): Corral Canyon (?)
ANNUAL PRODUCTION:	ANNUAL PRODUCTION: ?

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed WH 1

APPARENT RANK: High volatile C bituminous (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)	No analyses available		
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)			
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Corral Creek

COAL NAME(s): Bed WH 2

GEOLOGIC FORMATION: Almond
AGE: Upper Cretaceous
STRATIGRAPHIC POSITION: *See Figure* 11
GEOGRAPHIC POSITION: *See Plate* 4

STRIPPABLE RESOURCES	STRIPPABLE RESERVE BASE
(Table 4, page 51 *)*	*(Table* 4, page 51 *)*
0-100 FEET OF COVER: 1.83 mt	0-100 FEET OF COVER: 1.83 mt
100-200 FEET OF COVER: 1.39 mt	100-200 FEET OF COVER: 1.39 mt
0-200 FEET OF COVER: 3.22 mt	0-200 FEET OF COVER: 3.22 mt
TOTAL ACREAGE: 341.3	TOTAL ACREAGE: 341.3

RANGE IN MINABLE THICKNESS (FEET): 5' - 7'
WEIGHTED AVERAGE THICKNESS (FEET): 5.32'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): Corral Canyon
ANNUAL PRODUCTION:	ANNUAL PRODUCTION: ?

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed WH 2

APPARENT RANK: High volatile C bituminous (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{O}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Corral Creek

COAL NAME(s): Bed WH 3

GEOLOGIC FORMATION: Almond
AGE: Upper Cretaceous
STRATIGRAPHIC POSITION: *See Figure* 11
GEOGRAPHIC POSITION: *See Plate* 4

STRIPPABLE RESOURCES (*Table* 4, page 51)	STRIPPABLE RESERVE BASE (*Table* 4, page 51)
0-100 FEET OF COVER: 0.82 mt	0-100 FEET OF COVER: 0.82 mt
100-200 FEET OF COVER: 0.79 mt	100-200 FEET OF COVER: 0.79 mt
0-200 FEET OF COVER: 1.61 mt	0-200 FEET OF COVER: 1.61 mt
TOTAL ACREAGE: 156.1	TOTAL ACREAGE: 156.1

RANGE IN MINABLE THICKNESS (FEET): 5' - 6.5'
WEIGHTED AVERAGE THICKNESS (FEET): 5.78'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): Corral Canyon
ANNUAL PRODUCTION:	ANNUAL PRODUCTION: ?

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed WH 3

APPARENT RANK: High volatile C bituminous (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Corral Creek

COAL NAME(s): Bed WH 4

GEOLOGIC FORMATION: Almond
AGE: Upper Cretaceous
STRATIGRAPHIC POSITION: *See Figure* 11
GEOGRAPHIC POSITION: *See Plate* 4

STRIPPABLE RESOURCES *(Table 4, page 51)*	STRIPPABLE RESERVE BASE *(Table 4, page 51)*
0-100 FEET OF COVER: 0.25 mt	0-100 FEET OF COVER: 0.25 mt
100-200 FEET OF COVER: 0.28 mt	100-200 FEET OF COVER: 0.28 mt
0-200 FEET OF COVER: 0.53 mt	0-200 FEET OF COVER: 0.53 mt
TOTAL ACREAGE: 59.7	TOTAL ACREAGE: 59.7

RANGE IN MINABLE THICKNESS (FEET): 5'
WEIGHTED AVERAGE THICKNESS (FEET): 5'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): Corral Canyon
ANNUAL PRODUCTION:	ANNUAL PRODUCTION: ?

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed WH 4

APPARENT RANK: High volatile C bituminous (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Corral Creek

COAL NAME(s): Bed WH 6

GEOLOGIC FORMATION: Almond
AGE: Upper Cretaceous
STRATIGRAPHIC POSITION: *See Figure* 11
GEOGRAPHIC POSITION: *See Plate* 4

STRIPPABLE RESOURCES
(Table 4, page 50 *)*
0-100 FEET OF COVER: 0.96 mt
100-200 FEET OF COVER: 0.52 mt
0-200 FEET OF COVER: 1.48 mt
TOTAL ACREAGE: 137.2

STRIPPABLE RESERVE BASE
(Table 4, page 50 *)*
0-100 FEET OF COVER: 0.96 mt
100-200 FEET OF COVER: 0.52 mt
0-200 FEET OF COVER: 1.48 mt
TOTAL ACREAGE: 137.2

RANGE IN MINABLE THICKNESS (FEET): 5' - 10'
WEIGHTED AVERAGE THICKNESS (FEET): 6.37'

ACTIVE MINES
NAME(s): None

ANNUAL PRODUCTION:

PROPOSED MINES
NAME(s): Corral Canyon

ANNUAL PRODUCTION:
?

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed WH 6

APPARENT RANK: High volatile C bituminous (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE 1 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)		19.19	
VOLATILE MATTER (%)		28.39	
FIXED CARBON (%)		43.59	
ASH (%)		8.83	
SULFUR (%)			0.48
HYDROGEN (%)			-
CARBON (%)			-
NITROGEN (%)			-
OXYGEN (%)			-
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Corral Creek

COAL NAME(s): Bed WH 10

GEOLOGIC FORMATION: Medicine Bow
AGE: Upper Cretaceous
STRATIGRAPHIC POSITION: *See Figure* 10
GEOGRAPHIC POSITION: *See Plate* 4

STRIPPABLE RESOURCES *(Table 4, page 49)*	STRIPPABLE RESERVE BASE *(Table 4, page 49)*
0-100 FEET OF COVER: 0.17 mt	0-100 FEET OF COVER: 0.17 mt
100-200 FEET OF COVER: -	100-200 FEET OF COVER: -
0-200 FEET OF COVER: 0.17 mt	0-200 FEET OF COVER: 0.17 mt
TOTAL ACREAGE: 19.3	TOTAL ACREAGE: 19.3

RANGE IN MINABLE THICKNESS (FEET): 5'
WEIGHTED AVERAGE THICKNESS (FEET): 5'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Bed WH 10

APPARENT RANK: Subbituminous A - High volatile C bituminous (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{O}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Seminoe

COAL NAME(s): Brooks

GEOLOGIC FORMATION: Hanna
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 8
GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES

(Table 4, page 30 *)*

0-100 FEET OF COVER: 1.86 mt
100-200 FEET OF COVER: 3.45 mt
0-200 FEET OF COVER: 5.31 mt
TOTAL ACREAGE: 504.8

STRIPPABLE RESERVE BASE

(Table 4, page 30*)*

0-100 FEET OF COVER: 1.86 mt
100-200 FEET OF COVER: 3.45 mt
0-200 FEET OF COVER: 5.31 mt
TOTAL ACREAGE: 504.8

RANGE IN MINABLE THICKNESS (FEET): 5' - 8'
WEIGHTED AVERAGE THICKNESS (FEET): 6.17'

ACTIVE MINES

NAME(s): None

ANNUAL PRODUCTION:

PROPOSED MINES

NAME(s): None

ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:
This bed has been extensively strip mined.

mt=million tons

ANALYTICAL DATA FOR: Brooks Coal Bed

APPARENT RANK: High volatile C bituminous - Subbituminous A

AS RECEIVED BASIS	RANGE ANALYSIS (2-8 samples)	AVERAGE PROXIMATE 7 *sample(s)*	AVERAGE ULTIMATE 2 *sample(s)*
MOISTURE (%)	8.89 - 13.67	12.34	
VOLATILE MATTER (%)	32.45 - 36.74	34.02	
FIXED CARBON (%)	46.46 - 49.92	48.10	
ASH (%)	4.29 - 7.0	5.54	6.92
SULFUR (%)	0.25 - 0.70		0.60
HYDROGEN (%)	5.60		5.60
CARBON (%)	62.5 - 64.68		63.59
NITROGEN (%)	0.71 - 1.1		0.91
OXYGEN (%)	21.45 - 23.3		22.38
BTU/LB.	10,395 - 11,180	10,860 (8 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS) (1 sample)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		0.27
SULFATE (%)		0.03
ORGANIC (%)		0.21

ASH FUSION TEMPERATURES (^{O}F) (2 samples)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION	2060 - 2080	2070
SOFTENING TEMPERATURE	2110 - 2160	2135
FLUID TEMPERATURE	2140 - 2270	2205

ASH COMPOSITION (%) (2 samples)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2	33.80 - 36.0	34.9	K_2O	0.61 - 0.68	0.65
Al_2O_3	10.0 - 11.70	10.85	Fe_2O_3	9.0 - 9.60	9.3
CaO	20.0 - 27.00	23.5	TiO_2	0.53 - 0.56	0.55
MgO	1.84 - 2.37	2.11	P_2O_5	0.1L - 0.19	0.15L
Na_2O	0.15 - 0.86	0.51	SO_3	8.4 - 12.35	10.4

Hardgrove Grindability Index: 48 - 50.9 (2 samples)
L = less than

MINING DISTRICT: Carbon

COAL NAME(s): Carbon No. 4

GEOLOGIC FORMATION: Hanna
AGE: Eocene - Paleocene
STRATIGRAPHIC POSITION: *See Figure* 6
GEOGRAPHIC POSITION: *See Plate* 1

STRIPPABLE RESOURCES	STRIPPABLE RESERVE BASE
(Table 4, page 13 *)*	*(Table* 4, page 13 *)*
0-100 FEET OF COVER: 0.22 mt	0-100 FEET OF COVER: 0.22 mt
100-200 FEET OF COVER: 0.22 mt	100-200 FEET OF COVER: 0.22 mt
0-200 FEET OF COVER: 0.44 mt	0-200 FEET OF COVER: 0.44 mt
TOTAL ACREAGE: 27.3	TOTAL ACREAGE: 27.3

RANGE IN MINABLE THICKNESS (FEET): 5' - 12.5'
WEIGHTED AVERAGE THICKNESS (FEET): 10.10'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:
May be equivalent to the Finch coal bed.

mt=million tons

ANALYTICAL DATA FOR: Carbon No. 4

APPARENT RANK: High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE 1 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)		10.53	
VOLATILE MATTER (%)		34.95	
FIXED CARBON (%)		44.12	
ASH (%)		10.40	
SULFUR (%)			0.54
HYDROGEN (%)			-
CARBON (%)			-
NITROGEN (%)			-
OXYGEN (%)			-
BTU/LB.		10,560 (1 sample)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Carbon

COAL NAME(s): Carbon No. 5

GEOLOGIC FORMATION: Hanna
AGE: Eocene - Paleocene
STRATIGRAPHIC POSITION: *See Figure* 6
GEOGRAPHIC POSITION: *See Plate* 1

STRIPPABLE RESOURCES	STRIPPABLE RESERVE BASE
(Table 4, page 13 *)*	*(Table* 4, page 13 *)*
0-100 FEET OF COVER: 0.47 mt	0-100 FEET OF COVER: 0.47 mt
100-200 FEET OF COVER: 0.41 mt	100-200 FEET OF COVER: 0.41 mt
0-200 FEET OF COVER: 0.88 mt	0-200 FEET OF COVER: 0.88 mt
TOTAL ACREAGE: 67.7	TOTAL ACREAGE: 67.7

RANGE IN MINABLE THICKNESS (FEET): 5' - 12.5'
WEIGHTED AVERAGE THICKNESS (FEET): 8.36'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:
May be equivalent to the Johnson coal bed.

mt=million tons

ANALYTICAL DATA FOR: Carbon No. 5

APPARENT RANK: High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE 1 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)		10.02	
VOLATILE MATTER (%)		36.05	
FIXED CARBON (%)		42.66	
ASH (%)		11.27	
SULFUR (%)			0.33
HYDROGEN (%)			-
CARBON (%)			-
NITROGEN (%)			-
OXYGEN (%)			-
BTU/LB.		10,540 (1 sample)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{O}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Carbon

COAL NAME(s): Carbon No. 6

GEOLOGIC FORMATION: Hanna
AGE: Eocene - Paleocene
STRATIGRAPHIC POSITION: *See Figure* 6
GEOGRAPHIC POSITION: *See Plate* 1

STRIPPABLE RESOURCES *(Table 4, page 9)*	STRIPPABLE RESERVE BASE *(Table 4, page 9)*
0-100 FEET OF COVER: 1.06 mt	0-100 FEET OF COVER: 1.06 mt
100-200 FEET OF COVER: -	100-200 FEET OF COVER: -
0-200 FEET OF COVER: 1.06 mt	0-200 FEET OF COVER: 1.06 mt
TOTAL ACREAGE: 105.1	TOTAL ACREAGE: 105.1

RANGE IN MINABLE THICKNESS (FEET): 5' - 8'
WEIGHTED AVERAGE THICKNESS (FEET): 5.94'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Carbon No. 6

APPARENT RANK: High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS (3-11 samples)	AVERAGE PROXIMATE 11 *sample(s)*	AVERAGE ULTIMATE 3 *sample(s)*
MOISTURE (%)	7.5 - 13.4	10.25	
VOLATILE MATTER (%)	22.8 - 41.1	35.66	
FIXED CARBON (%)	18.1 - 46.18	39.83	
ASH (%)	5.5 - 51.6	14.27	30.2
SULFUR (%)	0.9 - 2.4		2.3
HYDROGEN (%)	3.4 - 5.5		4.7
CARBON (%)	28.7 - 53.8		44.6
NITROGEN (%)	0.7 - 1.1		0.9
OXYGEN (%)	17.8 - 20.9		17.2
BTU/LB.	5,140 - 10,850	8,705 (4 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS) (3 samples)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)	0.82 - 2.37	1.61
SULFATE (%)	0.01 - 0.02	0.01
ORGANIC (%)	0.35 - 1.08	0.68

ASH FUSION TEMPERATURES (^{O}F) (3 samples)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION	2050 - 2400	2180
SOFTENING TEMPERATURE	2180 - 2510	2300
FLUID TEMPERATURE	2280 - 2580	2390

ASH COMPOSITION (%) (3 samples)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2	43.0 - 59.0	51.7	K_2O	1.8 - 2.8	2.3
Al_2O_3	13.0 - 19.0	16.7	Fe_2O_3	9.0 - 13.0	10.7
CaO	2.8 - 14.0	7.8	TiO_2	0.71 - 0.81	0.75
MgO	1.42 - 1.52	1.48	P_2O_5	0.1L	0.1L
Na_2O	0.14 - 0.16	0.15	SO_3	2.3 - 7.6	4.8

Hardgrove Grindability Index:
L = less than

MINING DISTRICT: Seminoe

COAL NAME(s): Dana

GEOLOGIC FORMATION: Ferris

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 8

GEOGRAPHIC POSITION: *See Plate* 3

STRIPPABLE RESOURCES

(Table 4, page 42 *)*

0-100 FEET OF COVER: 1.16 mt

100-200 FEET OF COVER: 1.11 mt

0-200 FEET OF COVER: 2.27 mt

TOTAL ACREAGE: 190.2

STRIPPABLE RESERVE BASE

(Table 4, page 42*)*

0-100 FEET OF COVER: 1.16 mt

100-200 FEET OF COVER: 1.11 mt

0-200 FEET OF COVER: 2.27 mt

TOTAL ACREAGE: 190.2

RANGE IN MINABLE THICKNESS (FEET): 5' - 12'

WEIGHTED AVERAGE THICKNESS (FEET): 7.80'

ACTIVE MINES

NAME(s): None

ANNUAL PRODUCTION:

PROPOSED MINES

NAME(s): Seminoe No. 1

ANNUAL PRODUCTION:
Unknown percentage of 3 mt

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Dana Coal Bed

APPARENT RANK: Subbituminous A - Subbituminous B

AS RECEIVED BASIS	RANGE ANALYSIS (1-3 samples)	AVERAGE PROXIMATE 3 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)	14.38 - 16.4	15.34	
VOLATILE MATTER (%)	-	-	
FIXED CARBON (%)	-	-	
ASH (%)	7.21 - 13.50	10.39	10.45
SULFUR (%)	0.48 - 0.70		0.48
HYDROGEN (%)	5.79		5.79
CARBON (%)	55.37		55.37
NITROGEN (%)	1.11		1.11
OXYGEN (%)	26.80		26.80
BTU/LB.	9,380 - 9,610	9,475 (3 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS) (1 sample)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		0.09
SULFATE (%)		0.00
ORGANIC (%)		0.48

ASH FUSION TEMPERATURES (^{O}F) (1 sample)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		2245
SOFTENING TEMPERATURE		2320
FLUID TEMPERATURE		2505

ASH COMPOSITION (%) (1 sample)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2		50.1	K_2O		1.1
Al_2O_3		23.6	Fe_2O_3		4.44
CaO		7.5	TiO_2		0.8
MgO		2.9	P_2O_5		0.9
Na_2O		0.5	SO_3		6.3

Hardgrove Grindability Index: 43 (1 sample)

MINING DISTRICT: Carbon

COAL NAME(s): Finch

GEOLOGIC FORMATION: Hanna

AGE: Eocene - Paleocene

STRATIGRAPHIC POSITION: *See Figure* 6

GEOGRAPHIC POSITION: *See Plate* 1

STRIPPABLE RESOURCES

(Table 4, page 10 *)*

0-100 FEET OF COVER: 8.05 mt

100-200 FEET OF COVER: 10.28 mt

0-200 FEET OF COVER: 18.33 mt

TOTAL ACREAGE: 1,370.48

STRIPPABLE RESERVE BASE

(Table 4, page 10 *)*

0-100 FEET OF COVER: 7.70 mt

100-200 FEET OF COVER: 7.94 mt

0-200 FEET OF COVER: 15.64 mt

TOTAL ACREAGE: 1,153,88

RANGE IN MINABLE THICKNESS (FEET): 5' - 12.5'

WEIGHTED AVERAGE THICKNESS (FEET): 8.04'

ACTIVE MINES

NAME(s): None

ANNUAL PRODUCTION:

PROPOSED MINES

NAME(s): Carbon Basin

ANNUAL PRODUCTION:
Major percentage of 2 mt

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Finch Coal Bed

APPARENT RANK: High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS (1-10 samples)	AVERAGE PROXIMATE 10 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)	8.8 - 12.7	9.88	
VOLATILE MATTER (%)	36.8 - 41.26	39.31	
FIXED CARBON (%)	38.37 - 45.0	42.07	
ASH (%)	7.09 - 12.58	8.74	8.4
SULFUR (%)	0.5 - 0.8		0.5
HYDROGEN (%)	6.0		6.0
CARBON (%)	62.8		62.8
NITROGEN (%)	1.1		1.1
OXYGEN (%)	21.2		21.2
BTU/LB.	10,795 - 11,450	11,110 (10 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F) (4 samples)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION	-	-
SOFTENING TEMPERATURE	2280 - 2380	2320
FLUID TEMPERATURE	-	-

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Hanna

COAL NAME(s): Hanna No. 1
(See miscellaneous comments below)

GEOLOGIC FORMATION: Hanna

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 7

GEOGRAPHIC POSITION: *See Plate* 2

STRIPPABLE RESOURCES

(Table 4, page 19 *)*

0-100 FEET OF COVER: 13.41 mt

100-200 FEET OF COVER: 7.00 mt

0-200 FEET OF COVER: 20.41 mt

TOTAL ACREAGE: 683.9

STRIPPABLE RESERVE BASE

(Table 4, page 19 *)*

0-100 FEET OF COVER: 13.41 mt

100-200 FEET OF COVER: 7.00 mt

0-200 FEET OF COVER: 20.41 mt

TOTAL ACREAGE: 683.9

RANGE IN MINABLE THICKNESS (FEET): 4' - 27'

WEIGHTED AVERAGE THICKNESS (FEET): 18.52'

ACTIVE MINES

NAME(s): Department of Energy's Hanna In Situ Coal Gasification Project

ANNUAL PRODUCTION:

PROPOSED MINES

NAME(s): Hanna South

ANNUAL PRODUCTION:
Major percentage of 0.8 mt

MISCELLANEOUS COMMENTS:
Mapped as Bed No. 81 by Dobbin, Bowen, and Hoots (1929) north of the fault between Seminoe No. 2 and the Rosebud pits.

mt=million tons

ANALYTICAL DATA FOR: Hanna No. 1 Coal Bed

APPARENT RANK: High volatile C bituminous - Subbituminous A

AS RECEIVED BASIS	RANGE ANALYSIS (4-22 samples)	AVERAGE PROXIMATE 20 *sample(s)*	AVERAGE ULTIMATE 4 *sample(s)*
MOISTURE (%)	6.3 - 15.65	12.05	
VOLATILE MATTER (%)	32.64 - 43.39	39.33	
FIXED CARBON (%)	34.09 - 45.26	41.71	
ASH (%)	4.17 - 23.76	6.90	11.09
SULFUR (%)	0.29 - 1.02		0.50
HYDROGEN (%)	5.09 - 5.79		5.48
CARBON (%)	49.6 - 62.82		59.38
NITROGEN (%)	0.99 - 1.31		1.21
OXYGEN (%)	19.58 - 24.04		22.34
BTU/LB.	8,660 - 11,480	10,740 (17 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F) (9 samples)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION	-	-
SOFTENING TEMPERATURE	2100 - 2310	2190
FLUID TEMPERATURE	-	-

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Hanna

COAL NAME(s): Hanna No. 2

GEOLOGIC FORMATION: Hanna

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure 7*

GEOGRAPHIC POSITION: *See Plate 2*

STRIPPABLE RESOURCES

(Table 4, page 23)

0-100 FEET OF COVER: 6.25 mt

100-200 FEET OF COVER: 5.20 mt

0-200 FEET OF COVER: 11.45 mt

TOTAL ACREAGE: 324.70

STRIPPABLE RESERVE BASE

(Table 4, page 23)

0-100 FEET OF COVER: 6.25 mt

100-200 FEET OF COVER: 5.20 mt

0-200 FEET OF COVER: 11.45 mt

TOTAL ACREAGE: 324.70

RANGE IN MINABLE THICKNESS (FEET): 5' - 38'

WEIGHTED AVERAGE THICKNESS (FEET): 26.37'

ACTIVE MINES

NAME(s): Seminoe No. 2

ANNUAL PRODUCTION:
Major percentage of 3 mt

PROPOSED MINES

NAME(s): Carbon County

ANNUAL PRODUCTION:
Unknown percentage of 2 mt

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Hanna No. 2 Coal Bed

APPARENT RANK: High volatile C bituminous - Subbituminous A

AS RECEIVED BASIS	RANGE ANALYSIS (10-21 samples)	AVERAGE PROXIMATE 20 *sample(s)*	AVERAGE ULTIMATE 10 *sample(s)*
MOISTURE (%)	9.1 - 17.2	11.58	
VOLATILE MATTER (%)	33.2 - 42.58	39.16	
FIXED CARBON (%)	39.33 - 44.9	42.61	
ASH (%)	3.8 - 16.33	6.65	7.62
SULFUR (%)	0.21 - 0.8		0.48
HYDROGEN (%)	5.11 - 6.37		5.77
CARBON (%)	57.46 - 64.74		61.23
NITROGEN (%)	0.85 - 1.4		1.05
OXYGEN (%)	19.54 - 28.4		23.86
BTU/LB.	9,990 - 11,390	10,910 (17 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS) (4 samples)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)	0.12 - 0.26	0.20
SULFATE (%)	0.00 - 0.01	0.01
ORGANIC (%)	0.24 - 0.46	0.39

ASH FUSION TEMPERATURES (^{O}F) (1-4 samples)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION	2090	2090 (1)
SOFTENING TEMPERATURE	2120 - 2350	2260 (4)
FLUID TEMPERATURE	2150 - 2250	2200 (2)

ASH COMPOSITION (%) (2 samples)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2	30.0 - 45.0	37.5	K_2O	0.58 - 1.6	1.09
Al_2O_3	14.0 - 25.0	19.5	Fe_2O_3	3.7 - 5.6	4.7
CaO	4.7 - 22.0	13.4	TiO_2	0.67 - 0.71	0.69
MgO	1.8 - 4.45	3.12	P_2O_5	0.54 - 0.1L	0.32L
Na_2O	0.18	0.18	SO_3	0.62 - 11.0	5.81

Hardgrove Grindability Index: 48 (1 sample)

L = less than

MINING DISTRICT: Hanna

COAL NAME(s): Hanna No. 5

GEOLOGIC FORMATION: Hanna

AGE: Paleocene

STRATIGRAPHIC POSITION: *See Figure* 7

GEOGRAPHIC POSITION: *See Plate* 2

STRIPPABLE RESOURCES

(Table 4, page 26 *)*

0-100 FEET OF COVER: 6.69 mt

100-200 FEET OF COVER: 6.37 mt

0-200 FEET OF COVER: 13.06 mt

TOTAL ACREAGE: 620.30

STRIPPABLE RESERVE BASE

(Table 4, page 26*)*

0-100 FEET OF COVER: 6.69 mt

100-200 FEET OF COVER: 6.37 mt

0-200 FEET OF COVER: 13.06 mt

TOTAL ACREAGE: 620.30

RANGE IN MINABLE THICKNESS (FEET): 5' - 31'

WEIGHTED AVERAGE THICKNESS (FEET): 15.84'

ACTIVE MINES

NAME(s): Section 24 Pit; Seminoe No. 2 South

ANNUAL PRODUCTION:

0.7 mt from Section 24 Pit;
Unknown percentage of 3 mt from Seminoe No. 2

PROPOSED MINES

NAME(s): None

ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

Analyses may include the lower bench of this coal.

mt=million tons

ANALYTICAL DATA FOR: Hanna No. 5 Coal Bed

APPARENT RANK: High volatile C bituminous - Subbituminous C (weathered)

AS RECEIVED BASIS	RANGE ANALYSIS (2-4 samples)	AVERAGE PROXIMATE 4 *sample(s)*	AVERAGE ULTIMATE 2 *sample(s)*
MOISTURE (%)	10.3 - 20.56[1]	13.82	
VOLATILE MATTER (%)	36.3 - 38.9	37.45	
FIXED CARBON (%)	37.2 - 47.3	42.70	
ASH (%)	5.6 - 6.7	6.04	5.92
SULFUR (%)	0.34 - 0.6		0.47
HYDROGEN (%)	4.78 - 5.7		5.24
CARBON (%)	56.34 - 64.4		60.37
NITROGEN (%)	0.85 - 1.3		1.08
OXYGEN (%)	22.0 - 31.95		26.98
BTU/LB.	8,880 - 11,190	10,540 (4 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS) (2 samples)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)	0.05 - 0.16	0.11
SULFATE (%)	0.00 - 0.04	0.02
ORGANIC (%)	0.29 - 0.38	0.34

ASH FUSION TEMPERATURES (^{o}F) (1-3 samples)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION	2080	2080 (1)
SOFTENING TEMPERATURE	2130 - 2510	2280 (3)
FLUID TEMPERATURE	2250	2250 (1)

ASH COMPOSITION (%) (2 samples)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2	29.1 - 31.0	30.1	K_2O	0.49 - 0.84	0.67
Al_2O_3	14.7 - 16.0	15.4	Fe_2O_3	4.8 - 11.3	8.1
CaO	16.0 - 27.0	21.5	TiO_2	0.57 - 0.61	0.59
MgO	2.92 - 4.34	3.63	P_2O_5	0.22 - 2.4	1.31
Na_2O	0.24 - 0.30	0.27	SO_3	9.9 - 12.1	11.0

Hardgrove Grindability Index: 50 - 110' (2 samples)

[1] Probably a result of weathering

MINING DISTRICT: Hanna

COAL NAME(s): Hanna No. 5 (lower bench)

GEOLOGIC FORMATION: Hanna
AGE: Paleocene
STRATIGRAPHIC POSITION: *See Figure* 7
GEOGRAPHIC POSITION: *See Plate* 2

STRIPPABLE RESOURCES	STRIPPABLE RESERVE BASE
(Table 4, page 28 *)*	*(Table* 4, page 28 *)*
0-100 FEET OF COVER: 1.24 mt	0-100 FEET OF COVER: 1.24 mt
100-200 FEET OF COVER: 1.15 mt	100-200 FEET OF COVER: 1.15 mt
0-200 FEET OF COVER: 2.39 mt	0-200 FEET OF COVER: 2.39 mt
TOTAL ACREAGE: 174.50	TOTAL ACREAGE: 174.50

RANGE IN MINABLE THICKNESS (FEET): 5' - 8'
WEIGHTED AVERAGE THICKNESS (FEET): 7.80'

ACTIVE MINES	PROPOSED MINES
NAME(s): Seminoe No. 2 South	NAME(s): None
ANNUAL PRODUCTION: Unknown percentage of 3 mt	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:
This bench splits off the main Hanna No. 5 coal bed in places.

mt=million tons

ANALYTICAL DATA FOR: Hanna No. 5 (lower bench) Coal Bed

APPARENT RANK: High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE 1 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)		9.27	
VOLATILE MATTER (%)		35.91	
FIXED CARBON (%)		44.02	
ASH (%)		10.08	
SULFUR (%)			1.26
HYDROGEN (%)			-
CARBON (%)			-
NITROGEN (%)			-
OXYGEN (%)			-
BTU/LB.		11,080 (1 sample)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Carbon

COAL NAME(s): Johnson

GEOLOGIC FORMATION: Hanna
AGE: Eocene - Paleocene
STRATIGRAPHIC POSITION: *See Figure* 6
GEOGRAPHIC POSITION: *See Plate* 1

STRIPPABLE RESOURCES

(Table 4, page 11 *)*

0-100 FEET OF COVER: 20.08 mt
100-200 FEET OF COVER: 48.52 mt
0-200 FEET OF COVER: 68.60 mt
TOTAL ACREAGE: 3,191.9

STRIPPABLE RESERVE BASE

(Table 4, page 11 *)*

0-100 FEET OF COVER: 20.08 mt
100-200 FEET OF COVER: 48.52 mt
0-200 FEET OF COVER: 68.60 mt
TOTAL ACREAGE: 3,191.9

RANGE IN MINABLE THICKNESS (FEET): 5' - 23'
WEIGHTED AVERAGE THICKNESS (FEET): 13.66'

ACTIVE MINES

NAME(s): None

ANNUAL PRODUCTION:

PROPOSED MINES

NAME(s): Carbon Basin

ANNUAL PRODUCTION:
Major percentage of 2 mt

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Johnson Coal Bed

APPARENT RANK: High volatile C bituminous

AS RECEIVED BASIS	RANGE ANALYSIS (9-12 samples)	AVERAGE PROXIMATE 12 *sample(s)*	AVERAGE ULTIMATE 12 *sample(s)*
MOISTURE (%)	7.06 - 22.78	11.00	
VOLATILE MATTER (%)	33.44 - 41.7	38.50	
FIXED CARBON (%)	39.74 - 47.7	43.25	
ASH (%)	3.5 - 10.36	7.25	
SULFUR (%)	0.35 - 0.91		0.60
HYDROGEN (%)			-
CARBON (%)			-
NITROGEN (%)			-
OXYGEN (%)			-
BTU/LB.	10,810 - 11,700	11,280 (10 samples)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F) (3 samples)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION	-	-
SOFTENING TEMPERATURE	2150 - 2300	2230
FLUID TEMPERATURE	-	-

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Carbon

COAL NAME(s): Johnson Rider
(See miscellaneous comments below)

GEOLOGIC FORMATION: Hanna

AGE: Eocene - Paleocene

STRATIGRAPHIC POSITION: *See Figure* 6

GEOGRAPHIC POSITION: *See Plate* 1

STRIPPABLE RESOURCES	STRIPPABLE RESERVE BASE
(Table 4, page 10 *)*	*(Table* 4, page 10*)*
0-100 FEET OF COVER: 6.16 mt	0-100 FEET OF COVER: 6.16 mt
100-200 FEET OF COVER: 11.21 mt	100-200 FEET OF COVER: 11.21 mt
0-200 FEET OF COVER: 17.37 mt	0-200 FEET OF COVER: 17.37 mt
TOTAL ACREAGE: 1,056.1	TOTAL ACREAGE: 1,056.1

RANGE IN MINABLE THICKNESS (FEET): 5' - 12.5'

WEIGHTED AVERAGE THICKNESS (FEET): 9.55'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): Carbon Basin
ANNUAL PRODUCTION:	ANNUAL PRODUCTION: Unknown percentage of 2 mt

MISCELLANEOUS COMMENTS:
Called Blue Group in the Carbon Basin mine area.

mt=million tons

ANALYTICAL DATA FOR: Johnson Rider Coal Bed

APPARENT RANK: High volatile C bituminous - Subbituminous A (?)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE *sample(s)*	AVERAGE ULTIMATE *sample(s)*
MOISTURE (%)			
VOLATILE MATTER (%)			
FIXED CARBON (%)			
ASH (%)			
SULFUR (%)	No analyses available		
HYDROGEN (%)			
CARBON (%)			
NITROGEN (%)			
OXYGEN (%)			
BTU/LB.			

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{o}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

MINING DISTRICT: Corral Creek

COAL NAME(s): Penn-Wyoming

GEOLOGIC FORMATION: Medicine Bow
AGE: Upper Cretaceous
STRATIGRAPHIC POSITION: *See Figure* 10
GEOGRAPHIC POSITION: *See Plate* 4

STRIPPABLE RESOURCES	STRIPPABLE RESERVE BASE
(Table 4, page 49 *)*	*(Table* 4, page 49*)*
0-100 FEET OF COVER: 0.28 mt	0-100 FEET OF COVER: 0.28 mt
100-200 FEET OF COVER: 0.39 mt	100-200 FEET OF COVER: 0.39 mt
0-200 FEET OF COVER: 0.67 mt	0-200 FEET OF COVER: 0.67 mt
TOTAL ACREAGE: 52.6	TOTAL ACREAGE: 52.6

RANGE IN MINABLE THICKNESS (FEET): 5' - 9'
WEIGHTED AVERAGE THICKNESS (FEET): 7.57'

ACTIVE MINES	PROPOSED MINES
NAME(s): None	NAME(s): None
ANNUAL PRODUCTION:	ANNUAL PRODUCTION:

MISCELLANEOUS COMMENTS:

mt=million tons

ANALYTICAL DATA FOR: Penn-Wyoming Coal Bed

APPARENT RANK: Subbituminous C (weathered sample)

AS RECEIVED BASIS	RANGE ANALYSIS	AVERAGE PROXIMATE 1 *sample(s)*	AVERAGE ULTIMATE 1 *sample(s)*
MOISTURE (%)		18.4	
VOLATILE MATTER (%)		34.5	
FIXED CARBON (%)		43.4	
ASH (%)		3.7	3.7
SULFUR (%)			0.3
HYDROGEN (%)			5.5
CARBON (%)			53.9
NITROGEN (%)			1.3
OXYGEN (%)			35.3
BTU/LB.		9,130 (1 sample)	

FORMS OF SULFUR (AS RECEIVED BASIS)

	RANGE ANALYSIS	AVERAGE
PYRITIC (%)		
SULFATE (%)		
ORGANIC (%)		

ASH FUSION TEMPERATURES (^{O}F)

	RANGE ANALYSIS	AVERAGE
INITIAL DEFORMATION		
SOFTENING TEMPERATURE		
FLUID TEMPERATURE		

ASH COMPOSITION (%)

	RANGE ANALYSIS	AVERAGE		RANGE ANALYSIS	AVERAGE
SiO_2			K_2O		
Al_2O_3			Fe_2O_3		
CaO			TiO_2		
MgO			P_2O_5		
Na_2O			SO_3		

Hardgrove Grindability Index:

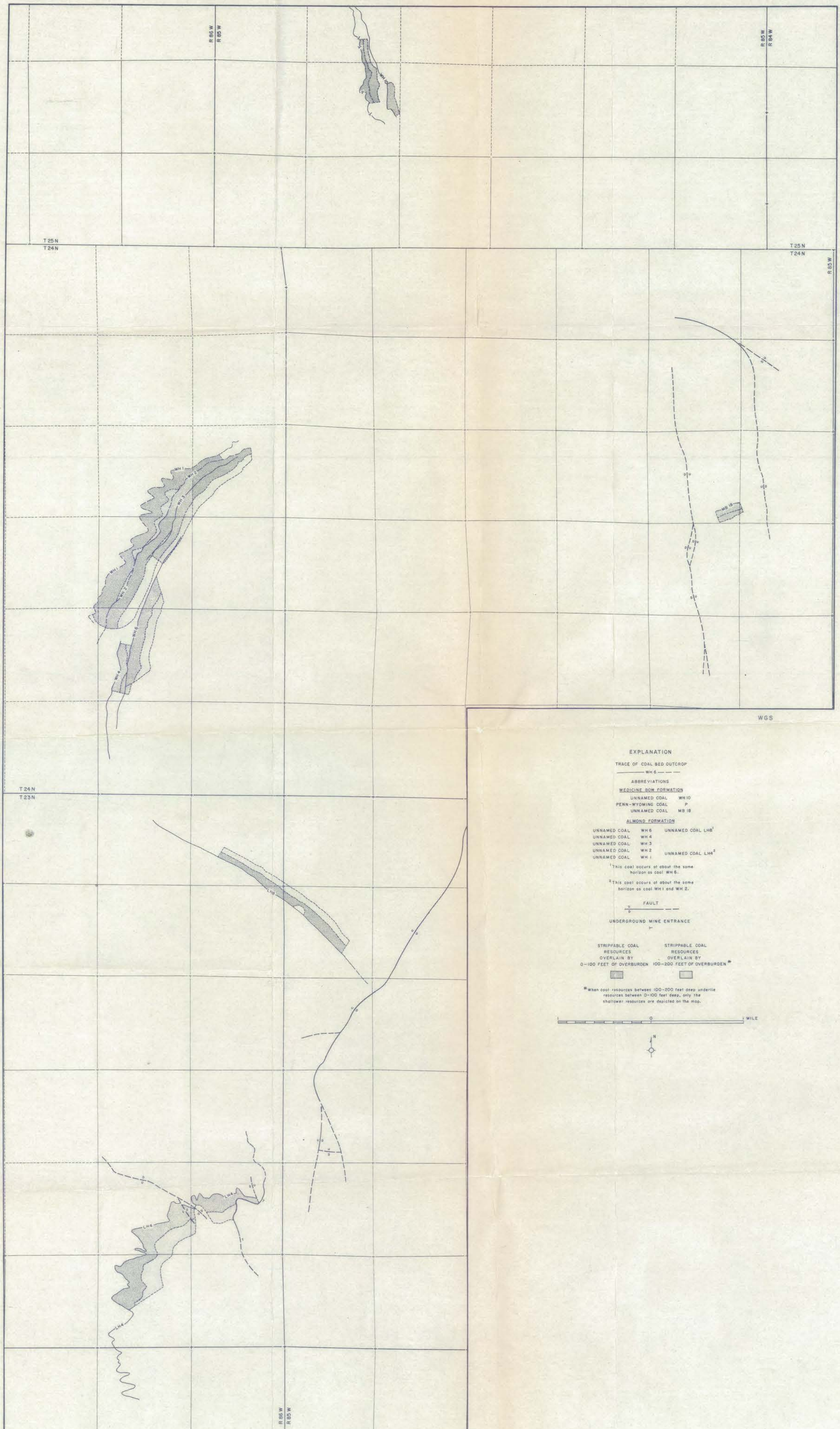

Plate 4. Strippable coal resources in the Corral Creek Mining District of the Hanna Coal Field

OFR79-1

EXPLANATION

TRACE OF COAL BED OUTCROP

C5

ABBREVIATIONS

CARBON NO. 6 COAL	C6		
BED NO. 109	109		
BED NO. 105	105		
FINCH COAL	F	CARBON NO. 4 COAL	C4[2]
JOHNSON RIDER COAL	JR		
JOHNSON COAL	J	CARBON NO. 5 COAL	C5[1]

[1] This coal may be equivalent to the Finch coal

[2] This coal may be equivalent to the Johnson coal

FAULT

U = upthrown side, D = downthrown side

UNDERGROUND MINE ENTRANCE

MINED-OUT AREAS (strip and deep)

BURNED COAL BED

STRIPPABLE COAL RESOURCES OVERLAIN BY 0-100 FEET OF OVERBURDEN

STRIPPABLE COAL RESOURCES OVERLAIN BY 100-200 FEET OF OVERBURDEN[3]

[3] When coal resources between 100-200 feet deep underlie resources between 0-100 feet deep, only the shallower resources are depicted on the map.

0 1 MILE

N

WGS

Includes Some areas depleted by underground mine fires

C6

C5

C4

109

105

F

JR

J

T 22 N
T 21 N

T 21 N
T 20 N

R 80 W
R 79 W

pr

Plate I. Strippable coal resources in the Carbon Mining District of the Hanna Coal Field

OFR 79-1

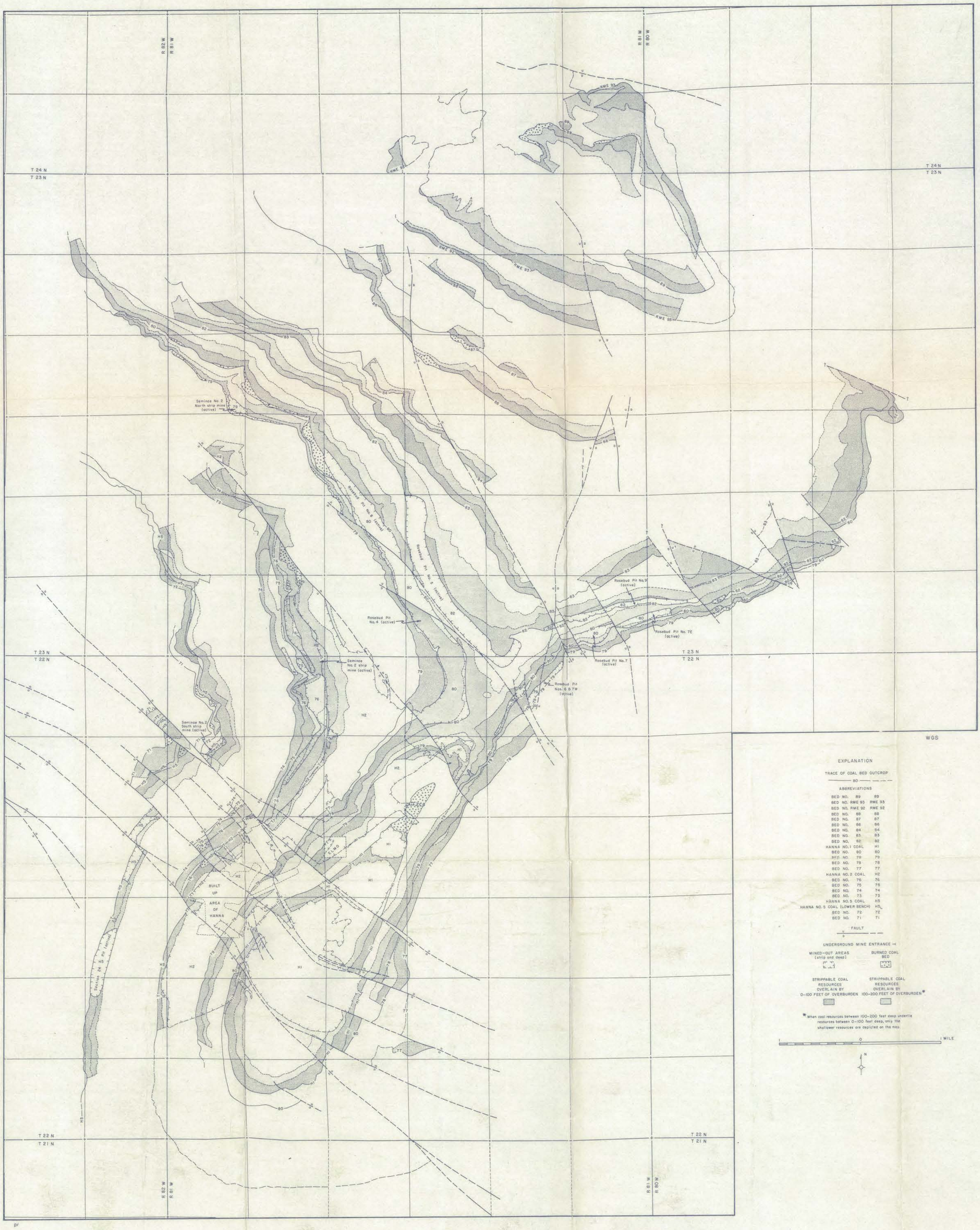

Plate 2. Strippable coal resources in the Hanna Mining District of the Hanna Coal Field

OFR 79-1

OFR79-1

EXPLANATION

ABBREVIATIONS

BROOKS COAL	B
BED NO. 66	66
BED NO. 65	65
BED NO. 64	64
BED NO. 63	63
BED NO. 62	62
BED NO. 61A	61A
BED NO. 61	61
BED NO. 60	60
BED NO. 58	58
BED NO. 56	56
BED NO. 54	54
BED NO. 53	53
BED NO. 51	51
BED NO. 50	50
BED NO. 46	46
BED NO. 44	44
BED NO 38	38
BED NO. 37	37
BED NO. 35?	35?
BED NO. 34?	34?
BED NO. 33	33
BED NO. 31	31
BED NO. 30	30
BED NO. 28	28
BED NO. 27	27
BED NO. 26	26
BED NO. 25	25
DANA COAL	DA

BED C	C
BED F	F
BED B	B
BED NO. 130	130
BED NO. 129	129
BED NO. 128	128
BED NO. 127	127
BED NO. 126	126
BED NO. 125	125
BED NO. 124	124
BED NO. 123	123
BED NO. 122	122
BED NO. 121	121

These coals occur at approximately the same interval as Bed No. 28 through No. 58, but their exact equivalencies have not been determined.

These coals occur at approximately the same interval as Bed No. 128 through 130, but their exact equivalencies have not been determined.

BED E	E
BED D	D
BED A	A

BED H	H
BED G	G

These coals occur at approximately the same interval as Bed No. 121 and No. 122, but their exact equivalencies have not been determined.

TRACE OF COAL BED OUTCROP — 26 — — —

FAULT — U / D — — —

UNDERGROUND MINE ENTRANCE

MINED-OUT AREAS (strip and deep)

BURNED COAL BED

STRIPPABLE COAL RESOURCES OVERLAIN BY 0-100 FEET OF OVERBURDEN

STRIPPABLE COAL RESOURCES OVERLAIN BY 100-200 FEET OF OVERBURDEN*

* When coal resources between 100-200 feet deep underlie resources between 0-100 feet deep, only the shallower resources are depicted on the map.

0 1 MILE

N

WGS

SEMINOE RESERVOIR

Medicine Bow strip mine (active)

Seminoe No.1 strip mine (active)

Vanguard No. 2 deep mine (active)

T24N
T23N
T23N
T22N
T22N
T21N

R84W
R83W
R83W
R82W

Plate 3. Strippable coal resources in the Seminoe Mining District of the Hanna Coal Field