Notice

Weir International, Inc. (WEIR) was retained by Ramaco Resources, LLC (Ramaco) to prepare this Technical Report Summary (TRS) related to Ramaco's Elk Creek Complex. This report provides a statement of Ramaco's coal reserves and resources at its Elk Creek Complex and has been prepared in accordance with the United States Securities and Exchange Commission (SEC), Regulation S-K 1300 for Mining Property Disclosure (S-K 1300) and 17 Code of Federal Regulations (CFR) § 229.601(b)(96)(iii)(B) reporting requirements. This report was prepared for the sole use of Ramaco and its affiliates and is effective as of December 31, 2021.

This report was prepared by full-time WEIR personnel who meet the SEC's definition of Qualified Persons (QPs) with sufficient experience in the relevant type of mineralization and deposit under consideration in this report.

In preparing this report, WEIR relied upon data, written reports and statements provided by Ramaco. WEIR has taken all appropriate steps, in its professional opinion, to ensure information provided by Ramaco is reasonable and reliable for use in this report.

The accuracy of reserve and resource estimates are, in part, a function of the quality and quantity of available data at the time this report was prepared. Estimates presented herein are considered reasonable. However, they should be accepted with the understanding that with additional data and analysis available subsequent to the date of this report, the estimates may necessitate revision which may be material. Certain information set forth in this report contains "forward-looking information", including production, productivity, operating costs, capital costs, sales prices, and other assumptions. These statements are not guarantees of future performance and undue reliance should not be placed on them. The assumptions used to develop the forward-looking information and the risks that could cause the actual results to differ materially are detailed in the body of this report.

WEIR and its personnel are not affiliates of Ramaco or any other entity with ownership, royalty or other interest in the subject property of this report.

Weir International, Inc. hereby consents to the use of Ramaco's Elk Creek Complex coal reserve and resource estimates as of December 31, 2021.

Qualified Person: /s/ Weir International, Inc

Date: November 22, 2022

Address: Weir International, Inc.
1431 Opus Place, Suite 210
Downers Grove, IL 60515

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1.0 EXECUTIVE SUMMARY

WEIR was retained by Ramaco Resources, Inc. (Ramaco) to prepare a Technical Report Summary (TRS) related to Ramaco's Elk Creek Complex coal holdings This report has been prepared in accordance with the United States Securities and Exchange Commission (SEC), *Regulation S-K 1300 for Mining Property Disclosure* (S-K 1300) and 17 Code of Federal Regulations (CFR) § 229.601(b)(96)(iii)(B) reporting requirements.

1.1 PROPERTY DESCRIPTION

The Elk Creek Complex is located approximately 45 miles south of Charleston, West Virginia, in Logan, Wyoming, and Mingo Counties at 37.698718 degrees North Latitude and 81.778297 degrees West Longitude on the World Geodetic System (WGS 84) reference coordinate system. The nearest town is Man, West Virginia, which is approximately five miles to the northwest of the Elk Creek Complex. The Elk Creek Complex is within the Southern West Virginia coal field of the Central Appalachia Coal Producing (CAPP) Region of the United States (see Figure 1.1-1).

The Elk Creek Complex consists of approximately 20,200 acres of leased coal holdings. Within the Elk Creek Complex controlled coal holdings, 16,000 acres lie in Logan County, 2,800 acres in Wyoming County and 1,400 acres in Mingo County. Currently, there are four active mines within the complex:

- Ram No. 1 Surface and Highwall Mine
- Stonecoal No. 2 Alma Deep Mine
- Rockhouse Eagle Deep Mine
- No. 2 Gas Deep Mine

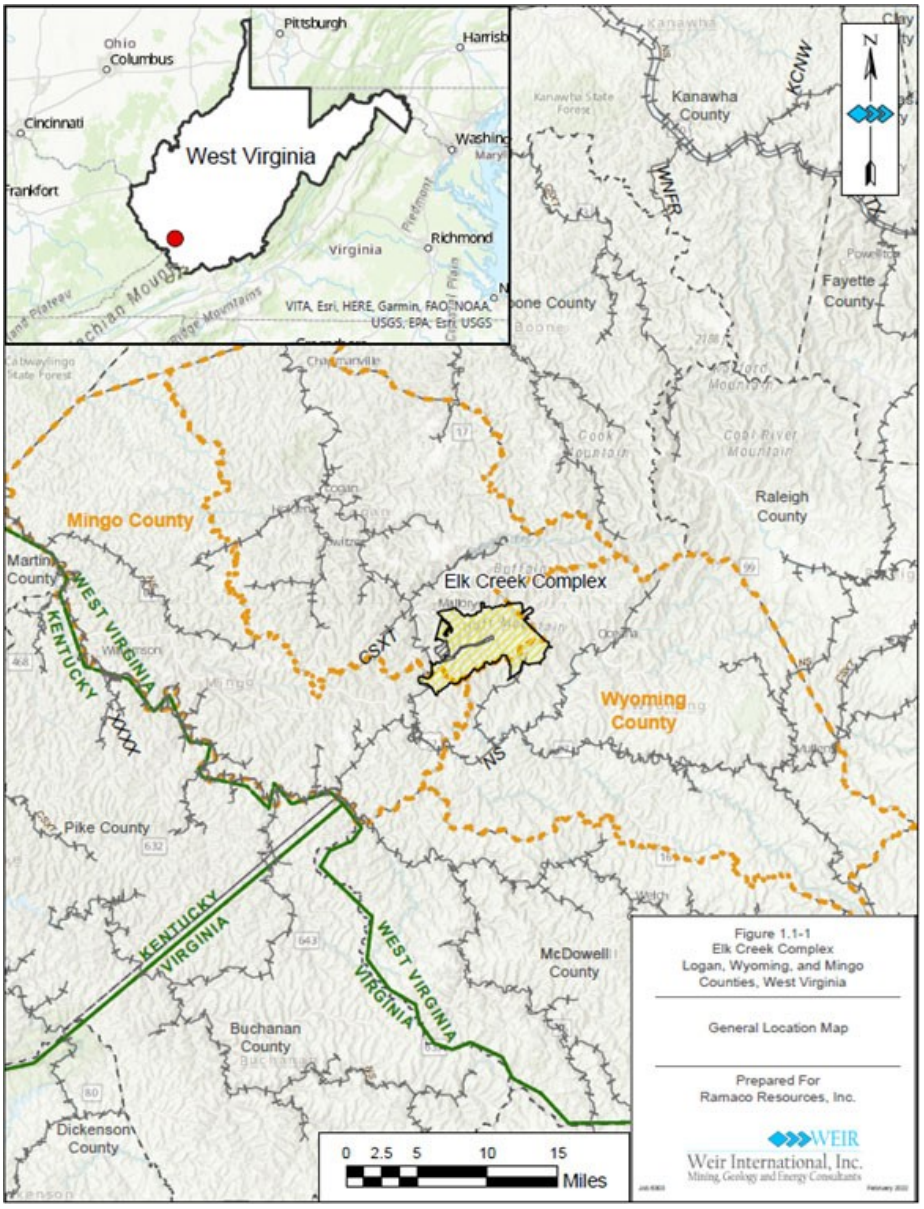
There are four planned and permitted mines within the complex:

- Michael Powellton Deep Mine, scheduled for late 2022 startup
- Crucible Lower Cedar Grove B and C seams, scheduled for early 2022 startup
- Glenalum Tunnel #1 Deep Mine, scheduled for 2027 startup
- Ram No. 3 Surface and Highwall Mine, scheduled for 2023 startup

There is one permitted inactive mine, the Eight-Kay Deep Mine that is projected to re-start in 2027.

The Bens Creek Deep Mine is planned, but is not yet permitted. The projected startup date for this mine is 2026. There are several other resource areas on the property which Ramaco may plan to mine and permit at a future date.

Figure 1.1-1 General Location Map



1.2 GEOLOGICAL SETTING AND MINERALIZATION

The coal seams on the Elk Creek Complex are Carboniferous in age and form part of the Kanawha Formation of the Pennsylvanian System. Typical strata consist largely of sandstone, sandy shale and shale, with beds of coal. The property is located in the CAPP region of the United States. Coal deposits in this region have long supported production for the domestic and international metallurgical and thermal coal markets. The coal seams within the Elk Creek Complex are known for very high calorific value (Btu/lb) and high volatile metallurgical coal characteristics, with high fluidity, low ash content, and medium sulfur content.

The 26 primary coal seams of interest on the Elk Creek Complex, in descending stratigraphic order, are the Buffalo Creek 5, Winifrede, Chilton A, Upper Dorothy Rider, Upper Dorothy 1, Upper Dorothy 2, Upper Dorothy 3 and 4, Middle Dorothy, Lower Dorothy, Williamson, Upper Cedar Grove, Lower Cedar Grove A, Lower Cedar Grove B, Lower Cedar Grove C, Upper and Lower Alma, Powellton, Eagle, No. 2 Gas, Bens Creek 1, 2 and 3, Cedar, Lower War Eagle, Glenalum Tunnel, and Gilbert. The seams are relatively thin (usually less than four feet in thickness individually), conformable, and continuous.

Several of the coal seams of interest occur in multiple benches. In some places, the interburden between benches is thin enough to allow the mining of multiple benches. This usually involves mining some parting, which is removed during processing at the preparation plant.

1.3 EXPLORATION

Prior to Ramaco's control of the property in 2012, previous exploration, some dating back before 1977, included 582 holes drilled within or in proximity to the Elk Creek Complex. Historical exploration at the Elk Creek Complex has relied exclusively upon continuous core drilling.

It is WEIR's opinion that the adequacy of sample preparation, security, and analytical procedures for holes that were drilled by Ramaco after acquiring the property is acceptable and that Ramaco's methods and procedures meet typical industry standards.

The adequacy of sample preparation, security, and analytical procedures are generally unknown for holes that were drilled prior to Ramaco acquiring the property in 2012. However, the geologist's logs for these holes contain sampling descriptions and lithologic descriptions that are sufficiently detailed to ascertain that an experienced geologist supervised the drilling and sampling. It is unknown if coal quality analyses were performed to ASTM standards by qualified laboratories, as detailed in Section 8.0, however, this legacy drillhole information was included as the samples matched the coal seam intervals and reported similar quality data. Model verifications further support WEIR's high level of confidence that a representative, valid, and accurate drillhole database and geological model has been generated for the Elk Creek Complex that can be relied upon to accurately estimate coal resources and reserves.

1.4 DEVELOPMENT AND OPERATIONS

The Elk Creek Complex currently has four active mines, four planned and permitted mines, one permitted inactive mine, and one planned but not permitted mine. The four active permitted mines include one surface mine with a highwall miner, and three underground room and pillar mines, which use continuous miners for mine development. Ramaco began production of metallurgical coal at the complex in 2016. A majority of the underground mines implement retreat mining, which results in mining recovery of greater than 80 percent. Contour mining has an average mining recovery of approximately 90 percent, and the highwall mines have and average mining recovery of approximately 40 percent.

The Elk Creek Complex is mining several seams and seam splits, including the Chilton A, Upper Dorothy, Upper Dorothy 2, 3, and 4, Middle Dorothy, Lower Dorothy, Upper Cedar Grove, Lower Cedar Grove A, Lower Cedar Grove B, Lower Cedar Grove C, No. 2 Gas, Upper Alma, Lower Alma, Powellton, and Eagle.

Historical coal production from the Elk Creek Complex, in accordance with the Mine Safety and Health Administration (MSHA) statistics, is summarized as follows:

- 1.669 million tons in 2018
- 1.669 million tons in 2019
- 1.548 million tons in 2020
- 1.981 million tons in 2021

The current Elk Creek Complex Life-of-Mine (LOM) Plan projects mining through 2040; an expected mine life for the complex of 19 years. Ramaco projects total annual mine production to range from 2.0 to 2.6 million clean tons when the surface and continuous miner units are operating (2022 through 2028) and 0.5 to 1.6 million clean tons per year from 2029 through 2040 after surface mining ceases in 2028. It is likely future mines will be planned and scheduled, as necessary, from resource areas within the complex, to meet internal Ramaco production goals aligned with market conditions.

All Run-of-Mine (ROM) coal is washed at the Elk Creek Preparation Plant. The Elk Creek Preparation Plant, built by Raw Resources Group located in Princeton, West Virginia, is a well designed and constructed preparation plant, with ROM processing capacity of 700 tons per hour.

The Elk Creek Complex produces a high quality, high volatile metallurgical coal. Historically, the market for metallurgical coal from the Elk Creek Complex has been domestic metallurgical coal consumers and the global seaborne metallurgical coal market. Coal produced from the complex is primarily high volatile A and high volatile B metallurgical coal. The Elk Creek Complex also produces thermal coal and specialty coal products, which represent approximately five percent of sales.

1.5 MINERAL RESERVE AND RESOURCE ESTIMATE

The Elk Creek Complex coal resources, as of December 31, 2021, are reported as in-place resources and are exclusive of reported coal reserve tons. Resources are reported in categories of Measured, Indicated and Inferred tonnage, in accordance with Regulation S-K Item 1302(d), summarized in Table 1.5-1 as follows:

Table 1.5-1 In-Place Coal Resource Tonnage and Quality Estimate, as of December 31, 2021

						Coal Quality (Dry Basis) Raw	
	Average Coal Thickness	In-Place Resources (000 Tons)				Ash	Relative Density
Mine / Seam	(Feet)	Measured	Indicated	Total	Inferred	(%)	(Lbs/CF)
Ram Surface Mine							
Buffalo Creek 5	2.78	2,255	520	2,775	—	23.56	93.87
Winifrede	2.90	775	365	1,140	—	30.06	97.98
Chilton A	4.27	8,220	250	8,470	—	32.56	98.69
Upper Dorothy Rider	1.45	300	10	310	—	15.80	85.49
Upper Dorothy 1	2.80	1,135	110	1,245	—	28.09	94.89
Upper Dorothy 2	2.56	2,095	340	2,435	—	6.69	94.30
Upper Dorothy 3 and 4	3.24	1,370	—	1,370	—	29.42	98.00
Middle Dorothy	2.63	8,140	810	8,950	—	9.33	92.25
Lower Dorothy	3.76	510	—	510	—	20.48	90.48

Mine / Seam	Average Coal Thickness (Feet)	In-Place Resources (000 Tons) Measured	Indicated	Total	Inferred	Coal Quality (Dry Basis) Raw Ash (%)	Relative Density (Lbs/CF)
Ram Surface Mine							
Powellton	2.64	1,700	270	1,970	—	21.88	91.07
Eagle	1.64	3,210	850	4,060	—	17.90	88.51
No. 2 Gas	3.35	3,390	475	3,865	—	21.66	90.67
Bens Creek 1	2.27	1,270	1,575	2,845	—	8.19	82.73
Total	2.92	95,250	14,055	109,305		15.74	88.65
Crucible Deep Mine							
Lower Cedar Grove A	2.74	1,095	380	1,475	—	14.28	86.57
Lower Cedar Grove C	2.41	1,190	350	1,540	—	3.43	81.61
Total	2.57	2,285	730	3,015		8.74	84.04
Stonecoal No. 2 Alma Deep Mine							
Lower Cedar Grove A	2.38	3,150	5	3,155	—	16.09	87.98
Lower Cedar Grove B	2.76	1,225	25	1,250	—	12.53	85.49
Lower Cedar Grove C	2.73	4,470	280	4,750	—	4.36	80.50
No. 2 Gas	3.01	10,760	1,395	12,155	—	11.41	84.53
Lower Alma	3.44	4,400	3,430	7,830	—	27.92	96.27
	3.00	24,005	5,135	29,140		15.25	87.44
Michael Powellton Mine							
Powellton	3.37	2,460	—	2,460	—	32.24	97.85
Rockhouse Eagle Deep Mine							
Eagle	3.09	4,065	35	4,100	—	19.62	89.07
Moorefork Mine							
No. 2 Gas	2.82	2,390	360	2,750	—	15.49	82.24
Bens Creek Deep Mine							
Bens Creek 1 and 2	2.68	15,510	24,425	39,935	—	25.83	93.81
Lower War Eagle Mine							
Lower War Eagle	2.66	4,965	2,870	7,835	70	21.76	90.64
Glenalum Tunnel #1 Deep Mine							
Glenalum Tunnel	2.06	9,295	10,855	20,150	815	4.80	81.13
Gilbert Deep Mine							
Gilbert	2.84	2,085	2,565	4,650	85	23.56	92.66
Grand Total	2.80	162,310	61,030	223,340	970	16.98	88.83

Notes:

- Mineral Resources reported above are not Mineral Reserves and do not meet the threshold for reserve modifying factors, such as estimated economic viability, that would allow for conversion to mineral reserves. There is no certainty that any part of the Mineral Resources estimated will be converted into Mineral Reserves. Mineral Resources reported here are exclusive of Mineral Reserves
- Resource probable economic mineability based on underground minable resources with 2.0 feet minimum seam thickness, surface and highwall mines with 1.0 feet minimum seam thickness, surface and contour mining with a cutoff stripping ratio of 20:1, and predominately high volatile A and high volatile B metallurgical coal products realizing an average sales price of $131 per ton at a cash cost of $77 per clean ton (FOB Mine)
- Numbers in the table have been rounded to reflect the accuracy of the estimate and may not sum due to rounding

The conversion of resources to reserves at the Elk creek Complex considers the design of a mine plan accommodating the planned mining equipment and executed in accordance with the MSHA rules and regulations, projected dilution and loss of product coal quality, projected coal sales prices, operating costs, and mineral control to determine if the saleable coal product will be economically mineable.

The coal reserves representing the economically viable tonnage controlled by Ramaco, and estimated in accordance with Regulation S-K Item 1302(e), is summarized in Table 1.5-2 as follows:

Table 1.5-2 Recoverable Coal Reserve Tonnage and Quality Estimate, as of December 31, 2021

							Coal Quality (Dry Basis)	
							Raw	
Mine / Seam	Area (Acres)	Average Coal Thickness (Feet)	In-Place Tons (000)	Clean Recoverable Tons (000) Reserves			Ash (%)	Relative Density (Lbs/CF)
				Proven	Probable	Total		
Ram Surface No. 1 Surface and Highwall Mine								
Chilton A	135	5.01	765	235	—	235	35.1	100.5
Upper Dorothy Rider	50	2.29	250	100	—	100	9.8	83.6
Upper Dorothy 3 and 4	200	3.05	1,150	565	—	565	16.7	88.8
Middle Dorothy	180	2.31	530	295	5	300	9.1	83.4
Upper Cedar Grove	50	3.46	295	135	—	135	7.6	81.8
Lower Cedar Grove A	95	2.90	505	240	—	240	10.6	82.7
Lower Cedar Grove B	40	2.81	225	120	—	120	15.7	87.0
Lower Cedar Grove C	90	2.56	385	190	10	200	4.6	80.2
Alma	25	3.53	175	45	20	65	23.1	93.1
Powellton	30	2.00	110	40	—	40	23.0	92.1
Total	895	3.08	4,390	1,965	35	2,000	15.1	87.1
Ram Surface No. 3 Surface and Highwall Mine								
Upper Dorothy Rider	17	1.80	55	20	—	20	9.8	84.2
Upper Dorothy 1 and 2	150	2.31	550	210	30	240	15.8	87.5
Upper Dorothy 3 and 4	196	3.54	1,480	480	—	480	31.2	98.0
Middle Dorothy	58	6.06	640	70	220	290	10.2	83.7
Lower Dorothy	43	3.55	300	115	—	115	20.3	90.4
Upper Cedar Grove	252	2.36	1,140	485	—	485	15.6	87.9
Lower Cedar Grove A	263	2.78	1,335	555	65	620	8.1	83.6
Lower Cedar Grove B	189	3.05	1,125	460	50	510	19.0	89.5
Lower Cedar Grove C	143	2.74	700	285	55	340	6.0	81.1
No. 2 Gas	7	3.07	45	10	20	30	22.3	91.3
Powellton	10	4.86	100	70	—	70	18.7	89.2
Total	1,328	2.97	7,470	2,760	440	3,200	15.8	87.8

Mine / Seam	Area (Acres)	Average Coal Thickness (Feet)	In-Place Tons (000)	Clean Recoverable Tons (000) Reserves			Coal Quality (Dry Basis) Raw	
				Proven	Probable	Total	Ash (%)	Relative Density (Lbs/CF)
Crucible Deep Mine								
Lower Cedar Grove B	880	3.90	6,545	2,300	310	2,610	15.7	87.0
Lower Cedar Grove C	990	2.91	5,155	2,005	335	2,340	4.5	80.9
Total	1,870	3.38	11,700	4,305	645	4,950	10.4	84.1
Stonecoal No. 2 Alma Deep Mine								
Lower Cedar Grove B	440	3.70	3,200	1,210	60	1,270	20.6	90.4
Lower Cedar Grove C	130	2.53	1,175	460	—	460	15.4	1.5
Upper Alma	920	1.86	2,580	1,010	90	1,100	27.0	94.9
Lower Alma	755	3.20	6,100	2,330	140	2,470	25.9	94.6
Total	2,245	2.71	13,055	5,010	290	5,300	23.9	85.6
Michael Powellton Mine								
Powellton	30	4.14	250	60	—	60	42.8	104.6
Rockhouse Eagle Deep Mine								
Eagle	690	3.83	5,420	1,915	495	2,410	14.6	86.7
No. 2 Gas	80	3.21	640	130	—	130	37.4	101.5
Total	770	3.77	6,060	2,045	495	2,540	15.8	87.4
No. 2 Gas Deep Mine								
No. 2 Gas	778	3.07	7,345	2,085	455	2,540	27.9	94.4
Eight-Kay								
No. 2 Gas	650	2.91	3,585	1,390	240	1,630	12.3	85.7
Bens Creek Deep Mine								
Bens Creek	601	4.14	5,850	1,670	170	1,840	28.6	95.8
Glenalum Tunnel #1 Deep Mine								
Glenalum Tunnel	2,520	2.16	10,700	2,380	2,190	4,570	5.9	81.8
Grand Total	10,359	3.31	70,405	23,670	4,960	28,630	16.5	86.7

Notes:

- Clean recoverable reserve tonnage based on underground mining recovery of 50 to 80 percent (contingent upon retreat mining capability), 90 percent for surface mining, 40 percent for highwall mining, theoretical preparation plant yield, and a 95 percent preparation plant efficiency
- Mineral Reserves estimated based on predominately high volatile A and high volatile B metallurgical coal products realizing an average sales price of $131 per ton and cash cost of $77 per clean ton (FOB Mine)
- Numbers in the table have been rounded to reflect the accuracy of the estimate and may not sum due to rounding
- Mineral Reserves are reported exclusive of Mineral Resources

1.6 ECONOMIC EVALUATION

WEIR prepared a Preliminary Feasibility Study financial model in order to assess the economic viability of the Elk Creek Complex LOM Plan. Specifically, plans were evaluated using discounted cash flow analysis, incorporating annual revenue projections for the Elk Creek LOM Plan. Cash outflows such as capital, including preproduction costs, sustaining capital, operating costs, transportation costs, royalties, and taxes are subtracted from cash inflows, resulting in annual cash flow projections. No adjustments are made for inflation and all cash flows are in 2021 United States dollars. WEIR's study was conducted on an un-levered basis, excluding costs associated with any debt servicing requirements. In its assessment of the Discounted Cash Flow Net Present Value (DCF-NPV), WEIR utilized a discount rate of 10 percent.

The Preliminary Feasibility Study financial model developed for use in this TRS was meant to evaluate the prospects of economic extraction of coal within the Elk Creek Complex resource area. This economic evaluation is not meant to represent a project valuation. Furthermore, optimization of the LOM Plan was outside of the scope of this engagement.

The results of WEIR's Preliminary Feasibility Study demonstrated an after-tax DCF-NPV of $536.6 million for the Elk Creek Complex LOM Plan. Key operational statistics for the LOM Plan, on an after-tax basis, are summarized in Table 1.6-1 as follows:

Table 1.6-1 Key Operating Statistics

	LOM Plan
ROM Tons Produced (000s)	76,990
Clean Tons Produced (000s)	28,499
Preparation Plant Yield (%)	37.0
Marketable Tons Sold (000s)	28,499
	($ Per Ton)
Coal Sales Realization	130.50
Cost of Sales	76.15
SG & A	0.86
Non-cash Costs	7.12
Total Operating Cost	84.13
Profit / (Loss) ($/Ton)	46.41
EBITDA ($/Ton)	53.53
CAPEX ($/Ton)	10.95

A sensitivity analysis was undertaken to examine the influence of changes to coal sales prices, production, operating cost, capital expenditures, and the discount rate on the base case after-tax NPV. The sensitivity analysis range (+/- 25 percent) was designed to capture the bounds of reasonable variability for each element analyzed.

The Elk Creek Complex NPV is most sensitive to changes in coal sales prices and operating cost. It is less sensitive to changes in production and least sensitive to changes in discount rate and capital expenditures.

1.7 ENVIRONMENTAL STUDIES AND PERMITTING REQUIREMENTS

As part of the permitting process required by the West Virginia Department of Environmental Protection (WVDEP), numerous baseline studies or impact assessments were undertaken by Ramaco. These baseline studies or impact assessments included in the permit are summarized as follows, with pertinent text from the permit replicated below:

- Groundwater Inventory and Baseline Quality
- Surface Water Baseline Quality and Quantity
- Surface Water Runoff Analysis
- Probable Hydrologic Consequences

Based on water samples from adjacent mining and the baseline surface water sampling, acid or toxic mine drainage is not expected or anticipated. All of the Ramaco existing and proposed mines are well above any significantly producing aquifers. Probable Hydrologic Consequence (PHC) studies showed no significant ground or surface water resource is likely to be contaminated, diminished, or interrupted, providing that the approved drainage control and revegetation plans are adhered to throughout existing and planned mining activities.

Coal mines in West Virginia are required to file applications for and receive approval of mining permits issued by the WVDEP to conduct surface disturbance and mining activities. The Elk Creek Complex has been issued mining permits and associated NPDES permits by the WVDEP as shown in Table 1.7.-1 as follows:

Table 1.7-1 Elk Creek Complex Mining and NPDES Permits

Facility Name	Permit Number	Permitted Surface Area (Acres)	Issue Date	Current Status	NPDES Permit No.
Ram No. 1 Surface and Hiwall Mine	S500713	502	1/5/2015	Renewed	WV1028090
Ram No. 2 Surface and Hiwall Mine	S500217	309	12/14/2017	Active	WV1028421
Ram No. 3 Surface and Hiwall Mine	S500219	474	3/2/2020	New	WV1028545
No. 2 Gas Deep Mine	U500115	31	12/1/2015	Renewed	WV1028227
Eight-Kay Deep Mine	U500316	9	9/27/2017	New	WV1028413
Michael Powellton Deep Mine	U500320	8	9/1/2020	New	WV1031015
Rockhouse Eagle Seam Deep Mine	U500413	32	2/14/2014	Renewed	WV1004751
Glenalum Tunnel #1 Deep Mine	U500518	5	5/20/2019	New	WV1028511
Crucible Lower Cedar Grove Deep Min	U501115	13	9/6/2017	Not Started Extended	WV1028341
Stonecoal No. 2 Alma Deep Mine	U502596	51	2/11/1997	Renewed	WV1004671

Facility Name	Permit Number	Permitted Surface Area (Acres)	Issue Date	Current Status	NPDES Permit No.
Island Creek Eagle Mine No. 1 Portal	U505687	8	12/8/1987	Active	WV1004751
Oldhouse Branch C Seam Portal	U506186	10	10/1/1986	Phase 1 Released	WV0064840
Elk Creek Preparation Plant	P059000	242	1/18/1981	Renewed	WV0064840
Elk Creek Haulroad	H045600	152	1/4/1993	Renewed	WV0064840
Phase 5E Prospect (09/04/2020)	P500520	1	9/28/2020	New	NA
No. 2 Gas Outcrop Prospect	P500820	1	12/4/2020	New	NA
Phase 8 Prospect	P502519	9	11/12/2019	New	NA
Coal Mountain Loadout	O500321	29	NA	Pending Application	WV1028545
Elk Creek Refuse Facility	O500620	388	NA	Pending Application	WV1031058
Total		2,273			

As of June 28, 2001, Ramaco estimated a reclamation liability of $5.2 million for its disturbed permit acreage, which is covered with a total bond amount of $6.4 million.

Ramaco currently employs approximately 314 personnel at the Elk Creek Complex and is projected to have maximum employment of 436 personnel through its Elk Creek Complex LOM Plan. The Elk Creek Complex also creates substantial economic value with its third-party service and supply providers, utilities, and through payment of taxes and fees to local, state and federal governments.

Ramaco's environmental citations issued by the WVDEP are typical of similar citations issued to other operators in southern West Virginia. In WEIR's opinion, most of these violations or citations were quickly abated and none were significant in nature.

Based on WEIR's review of Ramaco's plans for environmental compliance, permit compliance and conditions, and dealings with local individuals and groups, Ramaco's efforts are adequate and reasonable in order to obtain necessary approvals relative to its mine plans.

1.8 CONCLUSIONS AND RECOMMENDATIONS

Ramaco has a long operating history of resource exploration, mine development, and mining operations at the Elk Creek Complex, with extensive exploration data including drillholes, in-mine seam thickness and elevation measurements, and in-mine channel samples supporting the determination of mineral resource and reserve estimates, and economic viability. The data has been reviewed and analyzed by WEIR, and determined to be adequate in quantity and reliability to support the coal resource and coal reserve estimates in this TRS.

Ramaco has full mineral control through current leases for all existing and planned mines in the complex. There are no uncontrolled areas.

The coal resource and coal reserve estimates and supporting Preliminary Feasibility Study were prepared in accordance with Regulation S-K 1300 requirements. There are 220 million in-place tons of measured and indicated coal resources, exclusive of reserves, and 29 million clean recoverable tons of underground mineable reserves within the Elk Creek Complex, as of December 31, 2021. Reasonable prospects for economic extraction were established through the development of a Preliminary Feasibility Study relative to the Elk Creek Complex LOM Plan, considering historical mining performance, historical and projected metallurgical coal sales prices, historical and projected mine operating costs, and recognizing reasonable and sufficient capital expenditures.

The ability of Ramaco, or any coal company, to achieve production and financial projections is dependent on numerous factors. These factors primarily include site-specific geological conditions, the capabilities of management and mine personnel, level of success in acquiring reserves and surface properties, coal sales prices and market conditions, environmental issues, securing permits and bonds, and developing and operating mines in a safe and efficient manner. Unforeseen changes in legislation and new industry developments could substantially alter the performance of any mining company.

Coal mining is carried out in an environment where not all events are predictable. While an effective management team can identify known risks and take measures to manage and/or mitigate these risks, there is still the possibility of unexpected and unpredictable events occurring. It is not possible therefore to totally remove all risks or state with certainty that an event that may have a material impact on the operation of a coal mine will not occur.

WEIR assessed that the risks associated with the economic mineability of the Elk Creek Complex were low to moderate and adds that the majority of the risks can be kept low and/or mitigated with efficient and effective mine planning and mine engineering, and monitoring of the mining operations.

WEIR recommends that any future exploration work and mineral property acquisition should include what has been historically implemented related to the following:

- Have an experienced geologist log core holes, measure core recovery, and complete sampling. Geophysically log core holes to verify seam and coal thickness and core recovery.
- Geophysically log rotary holes to verify strata and coal thickness.
- Continue to prepare laboratory sample analysis at 1.40 and 1.50 specific gravities to better match the preparation plant specific gravity.
- Continue collecting in mine channel samples

2.0 INTRODUCTION

2.1 REGISTRANT

WEIR was retained by Ramaco (Nasdaq: METC) to prepare a TRS related to Ramaco's Elk Creek Complex coal holdings.

The Elk Creek Complex is located is located approximately five miles southeast of the city of Man, West Virginia, in Logan, Wyoming, and Mingo Counties West Virginia (see Figure 1.1-1).

2.2 TERMS OF REFERENCE AND PURPOSE

This TRS was prepared specifically for Ramaco's Elk Creek Complex. The reserves and resources at the Elk Creek Complex have been classified in accordance with SEC mining property disclosure rules under Subpart 1300 and Item 601 (96)(B)(iii) of Regulation S-K. Unless otherwise stated, all volumes, grades, distances, and currencies are expressed in United States customary units.

The accuracy of reserve and resource estimates are, in part, a function of the quality and quantity of available data at the time this report was prepared. Estimates presented herein are considered reasonable, however, estimates should be accepted with the understanding that with additional data and analysis subsequent to the date of this report, the estimates may necessitate revision which may be material. Certain information set forth in this report contains "forward-looking information", including production, productivity, operating costs, capital expenditures, coal sales prices, and other assumptions. These statements are not guarantees of future performance and undue reliance should not be placed on these statements. The assumptions used to develop the forward-looking information and the risks that could cause the actual results to differ materially are detailed in the body of this report.

The Elk Creek Complex consists of several active and planned surface and underground mines. Production of metallurgical coal at the Elk Creek Complex commenced in the fourth quarter 2016.

For the Elk Creek Complex, this TRS reports both mineral reserves and resources (exclusive of reserves). Supporting the assessment of the economic mineability of reported reserves and prospects of economically feasible extraction of reported resources, this report includes summary detail of a Preliminary Feasibility Study conducted relative to the Elk Creek Complex.

WEIR's evaluation of coal reserves and resources was conducted in accordance with Regulation S-K 1300 definitions for Mineral Resource, Mineral Reserve and Preliminary Feasibility Study as follows:

- *Mineral Resource* is a concentration or occurrence of material of economic interest in or on the earth's crust in such form, grade or quality, and quantity that there are reasonable prospects for economic extraction. A mineral resource is a reasonable estimate of mineralization, taking into account relevant factors such as cut-off grade, likely mining dimensions, location or continuity, that, with the assumed and justifiable technical and economic conditions, is likely to, in whole or in part, become economically extractable. It is not merely an inventory of all mineralization drilled or sampled.
- *Mineral Reserve* is an estimate of tonnage and grade or quality of indicated and measured mineral resources that, in the opinion of the Qualified Person, can be the basis of an economically viable project. More specifically, it is the economically mineable part of a measured or indicated mineral resource, which includes diluting materials and allowances for losses that may occur when the material is mined or extracted.
- *Preliminary Feasibility Study* is a comprehensive study of a range of options for the technical and economic viability of a mineral project that has advanced to a stage where a Qualified Person has determined (in the case of underground mining) a preferred mining method, or (in the case of surface mining) a pit configuration, and in all cases has determined an effective method of mineral processing and an effective plan to sell the product.

2.3 SOURCES OF INFORMATION AND DATA

The primary information used in this study was obtained from the following sources:

- Geological data that was exclusively provided by Ramaco geology and engineering personnel. The geological data includes drillhole information such as driller's logs, geologist's logs, both full and partial scans of geophysical logs, survey data, coal quality laboratory certificates, and MS Excel™ (Excel) versions of drillhole survey, lithology and quality data. Additionally, WEIR was provided with in-mine seam measurement thicknesses, mine channel samples, and other base geological data.

- Mineral and surface ownership maps, and supplemental files were provided exclusively by Ramaco.
- Site visits by WEIR Qualified Persons (QPs) on November 29, 2021.
- Interviews between WEIR personnel and Ramaco personnel including
  - Senior V.P., General Counsel and Secretary
  - Director of Financial Reporting and Accounting
  - Chief Operating Officer
  - Contract Geologist
  - V.P. of Safety
  - V.P. of Surface Mining Operations
  - V.P. of Underground Mining Operations
  - Mine Managers
- Historical production, productivity, staffing levels, operating costs, capital expenditures, and coal sales revenue provided by Ramaco.
- LOM projections and cost models provided by Ramaco.
- Coal processing and handling facilities plot plans and flow sheets provided by Ramaco.
- Health, safety, and environmental issues discussed during interviews between WEIR personnel and Ramaco personnel.
- Current mine permit information, in addition to recent permit revisions and renewals, from documents provided by Ramaco and data that is publicly available from the WVDEP.
- Current and projected mine plans, including production, productivity, operating costs, and capital expenditures required to sustain projected levels of production for the Elk Creek Complex provided by Ramaco, and all data was reviewed for reasonableness by WEIR.
- Market outlook and coal sales price projections provided by Ramaco.
- Projected reclamation costs for mine closure activities provided by Ramaco.

A detailed list of all data received and reviewed for this study is provided in Sections 24.0 and 25.0 of this TRS.

2.4 DETAILS OF THE PERSONAL INSPECTION OF THE PROPERTY

WEIR personnel visited the Elk Creek Complex on November 29, 2021. While on-site, WEIR personnel conducted interviews with company and mine management relative to the following key topics:

- Geology
- Property
- Infrastructure
- Mine Plan, Production and Productivity
- Preparation Plant and Coal Handling Facilities
- Operating Costs and Capital Expenditures
- Marketing
- Environmental and Compliance
- Risks and Uncertainties

Key areas inspected by WEIR personnel at the Elk Creek Complex included the following:

- Mine surface operations including office, maintenance, and warehouse facilities
- Coal Preparation Plant, stockpiles, and rail loadout facilities
- Mine operations
  - No. 2 Gas Deep Mine
  - Rockhouse Eagle Deep Mine
  - Stonecoal No. 2 Alma Deep Mine
  - Ram No. 1 and No. 2 Surface and Highwall Mine
  - Michael Powellton Mine (faceup)
  - Eight-Kay Deep Mine (faceup)
  - Crucible Deep Mine (faceup)
- Refuse Disposal Facilities

Based on WEIR's inspection of the Elk Creek Complex, the mines, the preparation plant, and associated facilities and equipment are well maintained and operated with regard for all state and federal rules and regulations related to mine safety and health standards.

2.5 PREVIOUS TRS

This TRS is the initial TRS to be filed related to the Elk Creek Complex.

3.0 PROPERTY DESCRIPTION

3.1 PROPERTY LOCATION

The Elk Creek Complex is located approximately 45 miles south of Charleston, West Virginia, in Logan, Wyoming, and Mingo Counties at 37.698718 degrees North Latitude and 81.778297 degrees West Longitude on the WGS 84 reference coordinate system. The nearest town is Man, West Virginia, which is approximately five miles to the northwest of the complex. The Elk Creek Complex is within the Southern West Virginia Coal Field of the CAPP Region of the United States (see Figure 1.1-1). The United States Geological (USGS) Survey 7.5-minute quadrangle map sheets are Mallory and Oceana.

3.2 PROPERTY AREA

The Elk Creek Complex includes approximately 20,200 acres of controlled mineral property. Elk Creek flows southwest through the property to its confluence with the Guyandotte River. The Elk Creek Complex is also drained by Huff Creek to the north and Big Cub Creek to the south. The Guyandotte River flows north, forming the western boundary of the property. A United States government land tract lies between Big Cub Creek and the Logan-Wyoming county line, forming the southern boundary of the Elk Creek Complex.

Ramaco's Elk Creek Preparation Plant, rail load-out, and storage facilities are located adjacent to Elk Creek in the northwest portion of the property (see Figure 1.1-1). Ramaco has leased surface rights for approximately 920 acres in this area.

Currently, there are four active mines on the property:

- Ram No. 1 Surface and Highwall Mine
- Stonecoal No. 2 Alma Deep Mine
- Rockhouse Eagle Deep Mine
- No. 2 Gas Deep Mine

There are four planned and permitted mines on the property:

- Michael Powellton Deep Mine, scheduled for late 2022 startup
- Crucible Lower Cedar Grove B and C seams, scheduled for early 2022 startup
- Glenalum Tunnel #1 Deep Mine, scheduled for 2027 startup
- Ram No. 3 Surface and Highwall Mine, scheduled for 2023 startup

There is one permitted inactive mine, the Eight-Kay Deep Mine, that is scheduled to re-start in 2027.

The Bens Creek Deep Mine is planned, but is not yet permitted. A startup date for this mine is scheduled for 2026. There are several other resource areas on the property, which Ramaco may plan to mine and permit at a future date.

3.3 PROPERTY CONTROL

There are 14 property control contracts that make up the Elk Creek Complex. Various property control contracts are shown in Table 3.3-1. Note that each individual contract may include more than one type of property control.

Table 3.3-1 Property Control

Document Type	Quantity
Coal Leases	12
Coal Deeds	0
Surface Leases	1
Surface Deeds	0
Mutual Cooperation Agreement	1

3.4 MINERAL CONTROL

The Elk Creek Complex consists of approximately 20,200 acres of leased coal holdings. Within the Elk Creek Complex controlled coal holdings, 16,000 acres lie in Logan County, 2,800 acres in Wyoming County and 1,400 acres in Mingo County. The original Elk Creek Complex coal holdings are controlled by Ramaco through leases with Ramaco Central Appalachia, LLC (RCA). When RCA purchased two tracts in 2012, it also established two leases with Natural Resource Partners, L.P. (NRP), and a mineral lease on the Cook Property, located on the northeast boundary of the property. The Baisden lease was subsequently acquired by RCA in September 2014. RCA then either leased directly or subleased the mineral rights in these areas to Ramaco. Two additional mineral leases (McDonald) were directly acquired by Ramaco in January 2020 and as such, are not subleased through RCA. Ramaco has a minimum royalty obligation of approximately $1.7 million per year, production royalty rates range from 2.5 percent to 9 percent of the GSP, and wheelage rates range from 0.25 percent to 0.50 percent per ton. Ramaco's minimum royalty payments are recoupable. Mineral control within the Elk Creek Complex is shown in Table 3.4-1.

Table 3.4-1 Mineral Control

File Number	Document Type	Seams	Expiration Date (1)
1	Coal Lease	All seams	8/20/2037
2	Surface Lease	All seams	8/20/2037
3	Coal Lease	All seams above drainage	3/25/2022 Extensions of 1 year until all coal exhausted
4	Coal Lease	All seams above drainage	3/25/2022 Extensions of 1 year until all coal exhausted
5	Coal Lease	All Seams	11/11/2022 Extensions of 1 year until all coal exhausted
6	Coal Lease	All seams	1/1/2026 renewed in 5 year terms
7	Coal Lease	All seams	12/31/2024 renewed in 5 year terms
8	Coal Lease	All seams	3/31/2022 renewed in 5 year terms
9	Coal Sublease	All seams	8/20/2025 renewed in 5 year terms
10	Mutual Cooperation Agreement		N/A
11	Coal Lease	All seams	1/3/2030 renewed with 5 year terms up to 5 times
12	Coal Lease	Bens Creek and Above	1/18/2024 renewed on 5 year terms, up to 3 times
13	Coal Lease	All seams	8/7/2022 renewed on 5 year terms, up to 5 times
14	Lease Agreement	All seams	1/1/2025 renewed on 5 year terms, up to 3 times

(1) Expiration dates on leases can be extended

3.5 SIGNIFICANT PROPERTY ENCUMBRANCES AND PERMIT STATUS

WEIR has not discovered any significant encumbrances for any of the tracts within the Elk Creek Complex.

A list of Ramaco's permits for the Elk Creek Complex and permit status is shown in Table 3.5-1, with a more detailed description of the permits discussed in Section 17.3.

Table 3.5-1 Permit List

Facility Name	Permit Number	Permitted Surface Area (Acres)	Issue Date	Current Status	NPDES Permit No.
Ram No. 1 Surface and Hiwall Mine	S500713	502	1/5/2015	Renewed	WV1028090
Ram No. 2 Surface and Hiwall Mine	S500217	309	12/14/2017	Active	WV1028421
Ram No. 3 Surface and Hiwall Mine	S500219	474	3/2/2020	New	WV1028545
No. 2 Gas Deep Mine	U500115	31	12/1/2015	Renewed	WV1028227
Eight-Kay Deep Mine	U500316	9	9/27/2017	New	WV1028413
Michael Powellton Deep Mine	U500320	8	9/1/2020	New	WV1031015
Rockhouse Eagle Seam Deep Mine	U500413	32	2/14/2014	Renewed	WV1004751
Glenalum Tunnel #1 Deep Mine	U500518	5	5/20/2019	New	WV1028511
Crucible Lower Cedar Grove Deep Mine	U501115	13	9/6/2017	Not Started Extended	WV1028341
Stonecoal No. 2 Alma Deep Mine	U502596	51	2/11/1997	Renewed	WV1004671
Island Creek Eagle Mine No. 1 Portal	U505687	8	12/8/1987	Active	WV1004751
Oldhouse Branch C Seam Portal	U506186	10	10/1/1986	Phase 1 Released	WV0064840
Elk Creek Preparation Plant	P059000	242	1/18/1981	Renewed	WV0064840
Elk Creek Haulroad	H045600	152	1/4/1993	Renewed	WV0064840
Elk Creek Fills Prospect	P500120	2	2/27/2020	New	NA
Phase 5E Prospect (09/04/2020)	P500520	1	9/28/2020	New	NA
No. 2 Gas Outcrop Prospect	P500820	1	12/4/2020	New	NA
Phase 6B Prospect (08/06/2019)	P501819	5	9/27/2019	New	NA
Phase 8 Prospect	P502519	9	11/12/2019	New	NA
Phase 5D Prospct	P503119	3	11/5/2019	New	NA
Phase 6C Prospect	P503419	9	12/16/2019	New	NA
Coal Mountain Loadout	O500321	29	NA	Pending Application	WV1028545
Elk Creek Refuse Facility	O500620	388	NA	Pending Application	WV1031058
Total		2,292			

3.6 SIGNIFICANT PROPERTY FACTORS AND RISKS

Given Ramaco's controlled interests at the Elk Creek Complex, which relate to property that is held, by and large, by RCA and leased to Ramaco, WEIR assesses there are no significant issues affecting access to the coal interests or Ramaco's ability to execute its mine plans. There are no uncontrolled mineral tracts within the Elk Creek Complex. Surface rights have been secured to ensure coal haulage and coal processing requirements.

WEIR did not conduct an independent verification of property control, nor has it independently surveyed the mining locations. Rather, WEIR has relied on information compiled from maps and summaries of the leased properties prepared by Ramaco. WEIR did not conduct a legal title investigation relative to Ramaco's mineral and surface rights.

3.7 ROYALTY INTEREST

Ramaco, within the Elk Creek Complex, holds no royalty or similar interest in property which is owned or operated by another party.

4.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE, AND PHYSIOGRAPHY

4.1 TOPOGRAPHY, ELEVATION, AND VEGETATION

The Elk Creek Complex is located in the Cumberland Mountain region of West Virginia. The terrain is mountainous, steep, and rugged with elevations ranging from approximately 760 feet above Mean Sea Level (MSL) along the Guyandotte River to over 2,890 feet above MSL along ridges on the property. Topography and other features of the area are shown on Figure 7.5-1. Elk Creek flows southwest through the property to its confluence with the Guyandotte River. The Elk Creek Complex is also drained by Huff Creek to the north and Big Cub Creek to the south. The Guyandotte River flows north, forming the western boundary of the property. The surrounding waterways are not navigable for commercial traffic.

The Elk Creek Complex consists mostly of unmanaged forestland and scattered pastureland. The forestland consists of typical West Virginia Forest, with Oak/Hickory as the dominant forest-type group and a lesser percentage of the Maple/Beech/Birch forest-type group, (USDA Resource update FS-123). The largely abandoned town of Emmett, along Elk Creek, and the northern portion of Coal Mountain, on Big Cub Creek, are the only inhabited areas within the complex.

The wildlife indigenous to the area is typical of the species and diversities associated with the geographical and climatic areas within which the proposed surface mine site is located. Reconnaissance of the area affected by the proposed mining determined that the following species are or have been present: Whitetail Deer, Fox Squirrels, Gray Squirrels, Ground Squirrels, Eastern Opossums, Raccoon, Rabbits, Eastern Black Bear, Wild Turkey, and numerous species of birds. On the basis of numerous reconnaissance surveys, no endangered or threatened species of plants or animals, or habitats of such species were found to exist within or adjacent to the permit areas.

4.2 PROPERTY ACCESS

The Elk Creek Complex can be accessed by state roads SR 10 and SR 80, and US Route 52. Multiple state, county and local roadways traverse the area, providing broad access to the central portion of the property, however, roads to the higher elevation ridges are limited.

The CSX Railroad runs north/south along SR 80 and the Guyandotte River, with a spur line to the Elk Creek Complex rail load-out facility. The Norfolk Southern (NS) Railroad has a rail spur that accesses the east side of the property.

The nearest regional airport is the Appalachian Regional Airport (EBD), which is located approximately 20 miles west of the Elk Creek Complex just off of US Route 52 near Ragland, West Virginia. The closest commercial airport is Yeager Airport (CRW) in Charleston, West Virginia, 45 miles to the north of the Elk Creek Complex.

4.3 CLIMATE AND OPERATING SEASON

The climate associated with the Elk Creek Complex is classified as a humid continental, characterized by hot, humid summers and moderately cold winters. Climate conditions vary greatly in the state of West Virginia due to influence of the rugged topography. Average high temperatures range from 82 to 87 degrees Fahrenheit in the summer, with average low temperatures ranging from 20 to 25 degrees Fahrenheit in winter. Average yearly rainfall measured in nearby Logan, West Virginia is approximately 47 inches per year, with approximately 1.6 inches occurring as snowfall. The mines on the Elk Creek Complex currently operate year-round, regardless of weather conditions.

4.4 INFRASTRUCTURE

Power
Electrical power for mines on the Elk Creek Complex is provided by Appalachian Power Company (also known as AEP). AEP's average industrial price is 6.4 cents per KWH.

Water
Water for mining operations is provided by a combination of extraction from abandoned underground mine pools, Elk Creek, and settling ponds located on the surface. Clarified water from the settling ponds is used for dust sprays on the mining equipment. A water line from the Logan County Public Service District supplies potable water to the Elk Creek Preparation Plant and mine office. Individual mine sites have purchased potable water.

Personnel
The southern West Virginia area surrounding the Elk Creek Complex has a long history of coal mining and attracting mining personnel with qualified skills has not been an issue. The Elk Creek Complex is projected to employ a maximum of 436 personnel over the LOM Plan. The Elk Creek Complex operations employed approximately 314 personnel at the end of September 2021. The hourly labor force remains non-union and no change in this labor arrangement is anticipated in the near term.

Supplies

Supplies for the mining operations are available from multiple nearby vendors that service the coal industry in the CAPP Region. There are 10 Caterpillar dealerships located within 50 miles of the Elk Creek Complex. There are four Komatsu/Joy Manufacturing dealerships within 50 miles of the site.

5.0 HISTORY

5.1 PREVIOUS OPERATIONS

The Elk Creek Complex and surrounding area has an extensive history of previous mining, primarily by underground methods. Detailed underground mine maps showing previous mine workings were provided by Ramaco. Other sources of maps showing previous mine workings that WEIR referenced were from the West Virginia Geological and Economic Survey, the USGS, and the MSHA.

Companies that previously mined on the Elk Creek Complex include Island Creek Coal Company (Island Creek) which started mining in the area in December 1904. Consolidation Coal Company, now known as Consol Energy, Inc. (Consol), bought Island Creek in July 1993 and continued operations in and around the area until the late 1990s when Consol idled its Elk Creek Mine. Ramaco bought the property from Consol in 2012 and started production on the Elk Creek Complex in the fourth quarter of 2016. The 2012 purchase included acquisition of rail access, permitted impoundment and coal refuse disposal facilities, as well as numerous reclaimed, but permitted deep mines. Pittston Coal Company operated mines on the northern Huff Creek portion (McDonald and Baisden properties) of the Elk Creek Complex in the 1970s and 1980s before the company exited the coal mining business in 2001.

There are 26 coal seams on the Elk Creek Complex with resource potential. As such, numerous small mines previously operated within and around the Elk Creek Complex, dating back to the late 1800s.

5.2 PREVIOUS EXPLORATION AND DEVELOPMENT

Prior to Ramaco's control of the property in 2012, previous exploration included 582 holes drilled within or in proximity to the Elk Creek Complex. Previous exploration activity dates back prior to 1977. A list of prior companies conducting exploration, number of holes drilled, total footage drilled, and approximate dates are shown in Table 5.2-1. Since property ownership has changed several times over the years, prior records are not fully available in their original form.

As can be seen in Table 5.2-1, Island Creek was the primary exploration driller. Other companies including Pittston, Consol, Western Pocahontas Properties LP (Western Pocahontas), and AT Massey Coal Company, Inc. (Massey) also explored the property. Lack of drilling records prevented reporting Western Pocahontas and Massey drilling separately, therefore exploration drilling by these companies are included with the unknown companies in the table.

Table 5.2-1 Previous Exploration

Company	Drill Holes	Drilled Footage	Quality Laboratory	Year Drilled
Unknown - Core drilling	74	39,619	Unknown	1940-1975 (Est.)
Unknown - Outcrop drilling	328	4,348	Unknown	1940-1975 (Est.)
Pittston Coal Company	21	21,818	In-House Laboratory	1975-1985 (Approx.)
Island Creek Coal Company	148	77,799	Commercial Testing Laboratories and Standard Laboratories, Inc.,	1975-1990 (Approx.)
Consol Energy, Inc.	11	991	Charleston, WV and Dickenson Laboratories, El Paso, TX No Quality Drilling Performed	1997
Total	582	144,575		

Island Creek drilled over the larger extent of the Elk Creek Complex. Pittston was exploring the Huff Creek area, which mostly involved the McDonald properties to the north. Massey drilled mainly along the eastern side of the complex.

6.0 GEOLOGICAL SETTING, MINERALIZATION, AND DEPOSIT

6.1 REGIONAL, LOCAL, AND PROPERTY GEOLOGY

6.1.1 Regional Geology

The coal seams on the Elk Creek Complex are Carboniferous in age and form part of the Kanawha Formation of the Pennsylvanian System. Typical strata consist largely of sandstone, sandy shale and shale, with beds of coal. The property is located in the CAPP region of the United States. Coal deposits in this region have long supported production for the domestic and international metallurgical and thermal coal markets. The coal seams within the Elk Creek Complex are known for very high calorific value (Btu/lb) and high volatile metallurgical coal characteristics, with high fluidity, low ash content, and medium sulfur content.

The coalbeds of the Kanawha Series Formation are interbedded with sandstones, shales, siltstones, and underclays. The sandstones are light gray, very fine coarse grained, thin bedded to massive, and crossbedded. They consist of 50 to 65 percent quartz, with large proportions of white-weathering feldspar, mica flakes and dark mineral grains. The shales are medium to dark, thinly laminated, and carbonaceous. Horizontally laminated or crossbedded medium light gray siltstones and medium gray clayey to silty underclays occur in thin beds throughout the formation.

6.1.2 Local Geology

The coal seams underlying the property are gently folded, with no major faults or structural anomalies identified in the general area. The strata dip gently to the northwest at approximately two degrees. Depth to the coal seams varies by topography and specific coal seam, ranging from approximately 470 feet to 1,050 feet. Generally, the strata consist primarily of sandstone and shale layers over the area.

6.1.3 Property Geology

The 26 primary coal seams of interest on the Elk Creek Complex, in descending stratigraphic order, are the Buffalo Creek 5, Winifrede, Chilton A, Upper Dorothy Rider, Upper Dorothy 1, 2, 3, and 4, Middle Dorothy, Lower Dorothy, Williamson, Upper Cedar Grove A, Upper Cedar Grove, Lower Cedar Grove A, Lower Cedar Grove B, Lower Cedar Grove C, Upper and Lower Alma, Powellton, Eagle, No. 2 Gas Rider, No. 2 Gas, Bens Creek 1, 2 and 3, Cedar, Lower War Eagle, Glenalum Tunnel, and Gilbert. The seams are relatively thin (usually less than four feet in thickness individually), conformable, and continuous.

Several of the coal seams within the Elk Creek Complex occur in multiple benches. In some places, the interburden between benches is thin enough to allow the mining of multiple benches. This usually involves mining some parting, which is removed during processing at the preparation plant.

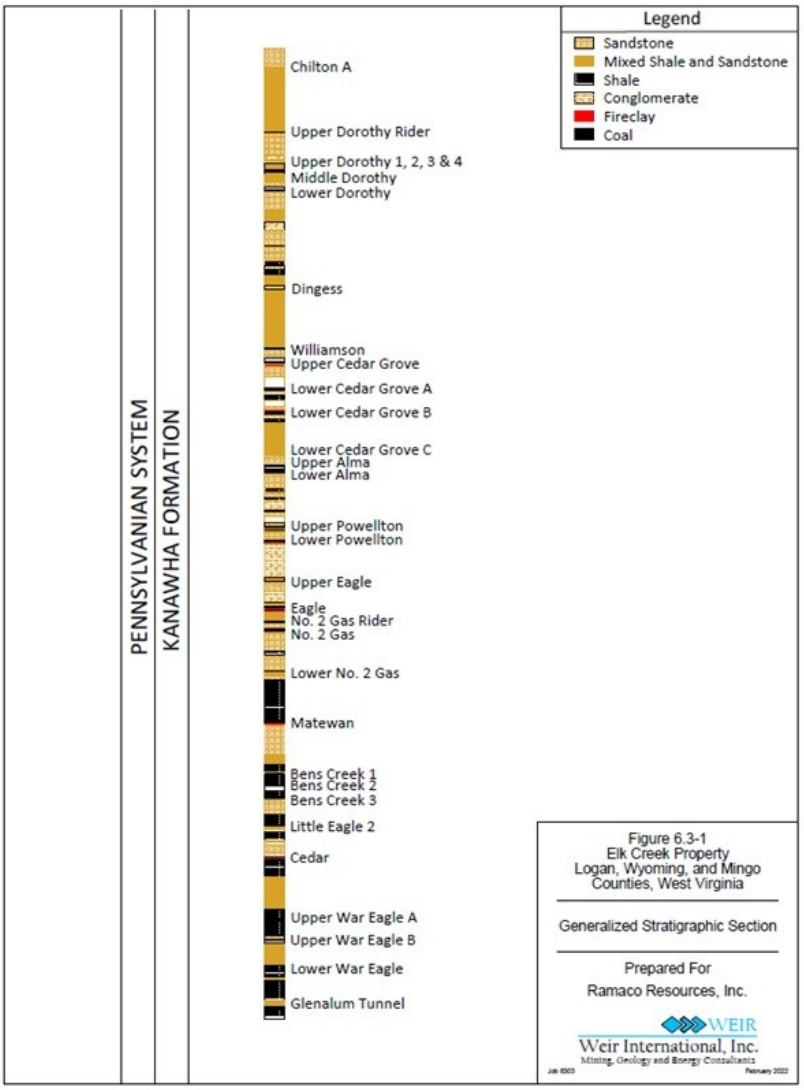
6.2 MINERAL DEPOSIT TYPE AND GEOLOGICAL MODEL

The Elk Creek Complex resource area is a relatively flat lying, sedimentary deposit of Pennsylvanian Age. Ramaco is actively mining multiple coal seams, including the Chilton A, Upper Dorothy, Middle Dorothy, Upper Cedar Grove, Lower Cedar Grove, Upper Alma, Lower Alma, Eagle and the No. 2 Gas at the Elk Creek Complex. Exploration consists of core drilling for all the mineable seams, which is performed each year in advance of mining, to refine the resource boundary and to define limits of the mine plans. For internal planning, Ramaco models the seams using the SurvCad® mine planning software package, completing model updates after each phase of exploration drilling. WEIR modeled the reserves and resources using Datamine MineScape® Stratmodel geological modeling software. The WEIR geological model is discussed in more detail in Section 9.1.

6.3 STRATIGRAPHIC COLUMN AND CROSS SECTION

Figure 6.3-1 shows the stratigraphic column for the Elk Creek Complex. Cross sections related to the Elk Creek Complex can be found on Exhibit 6.3-1.

Figure 6.3-1 Elk Creek Stratigraphic Column



7.0 EXPLORATION

7.1 NON-DRILLING EXPLORATION

Drilling has served as the sole form of exploration within the Elk Creek Complex. In addition to exploration drillholes, seam outcrop measurements and in-mine measurements taken from mine maps of previous operations were considered. A total of 346 seam outcrop measurements and 256 mine measurements were recorded. The gas and oil wells on the property were not considered for modeling data in this report, however, available historical drilling data from coalbed methane wells on the property, were included in the modeling data.

7.2 DRILLING

Ramaco's exploration activities exclusively involve continuous core drilling performed by competent contract drilling companies. Coreholes at the Elk Creek Complex are typically 3.76-inch diameter (yielding 2.5-inch diameter core samples). In addition to providing information about the coal seams present, the exploration drilling also provides core samples of roof strata and floor strata for geotechnical evaluation. The geologist's drilling logs are checked against the geophysical logs for thickness accuracy and to confirm core recovery. Drillholes with core recovery of less than 90 percent are noted and subsequently reviewed and potentially excluded from geological and coal quality modeling. WEIR did not exclude any holes due to poor core recovery, since none of holes within the project area were found to have a recovery below 90 percent. Ramaco's standard procedures state that holes with less than 95 percent core recovery are re-drilled in the same boring, using a wedge above the seam, so that offset drilling of a new hole is not required. During core drilling, all core samples are boxed, photographed, and stored. Roof and floor strata core samples are sent to laboratories for geotechnical strength tests. Coal seam core samples are sent to laboratories for quality analyses. Caliper, density, gamma, resistivity, and sonic downhole geophysical logs are completed as drill site and hole conditions allow. Each drillhole collar location is surveyed using RTK GPS equipment to obtain accurate coordinates for subsequent modeling efforts.

Table 7.2-1 summarizes data for Ramaco's drilling programs.

Table 7.2-1 Drilling Programs

			Hole Type		Number of Holes with Base Data							
Drilling Series	Program Dates	Total Number of Drill Holes	Footage	Rotary	Core	Survey Certificates	Geophysical Logs	Downhole Deviation Log	Geologist's Log	Driller's Log	Lab Analyis Certificates	Core Photographs
EC Series	2012-2019	33	21,742	—	33	33	32	—	33	33	33	33
ECCG Series	2018	36	2,014	41		41	41	—	41	41	—	—
EG Outcrop Series	2013-2015	11	330	11		11	-	—	11	—	—	—
Total		80	24,086	52	33	85	73		85	74	33	33

Referring to the drilling programs outlined in Table 7.2-1, the EC-series of drillholes is mainly intended as in-fill drilling on the complex. The ECCG series of drillholes established previous highwall mining extents of the Lower Cedar Grove Seam in the Ram No.1 and No. 2 Surface and Highwall Mines, and the Alma seams were also targeted. The EG outcrop series of drillholes were performed in the southeast portion of the property to better defined the Eagle Seam outcrop.

Quality control procedures followed by Ramaco geologists are clearly defined. Ramaco's field geologists take specified steps to protect sample integrity and to ensure core samples are always under Ramaco geologist's control. These steps include the following:

- Field geologist to be on site whenever drilling is occurring
- Geologist's log to be created for each drillhole
- Rock-quality designation (RQD) logs to be prepared for roof and floor strata for all underground mineable seams
- Each drillhole to be logged using geophysical methods if physically possible
- Geologist to compare field geologist's logs to the e-log data
- Geologist to compare the core samples against both field geologist's logs and e-logs to confirm coal thickness
- All immediate roof, coal and immediate floor core are to be boxed and photographed
- Quality sample sheets to be filled out, provided to a supervisor for approval and shipped to the laboratory
- Once core samples have been analyzed, field geologists to scrutinize the resulting quality data for accuracy

WEIR did not have direct involvement with the planning, implementation, or supervision of Ramaco's drilling programs. However, having reviewed the details of Ramaco's drilling programs, WEIR finds the results to be consistent with industry standards and appropriate for use in the estimation of reserves and resources.

WEIR did not observe core samples in person, however, Ramaco provided photos of core logs for 33 drillholes. In review of these photos, WEIR found the cores to be representative of the data reported for each drillhole.

7.3 HYDROGEOLOGICAL DATA

Hydrological data is generally obtained from existing wells and surface water monitoring locations in proximity to Ramaco's existing and planned operations. No additional exploration is performed specifically for the purposes of hydrological study. See Section 13.1.2, Hydrogeological Model, for more detail.

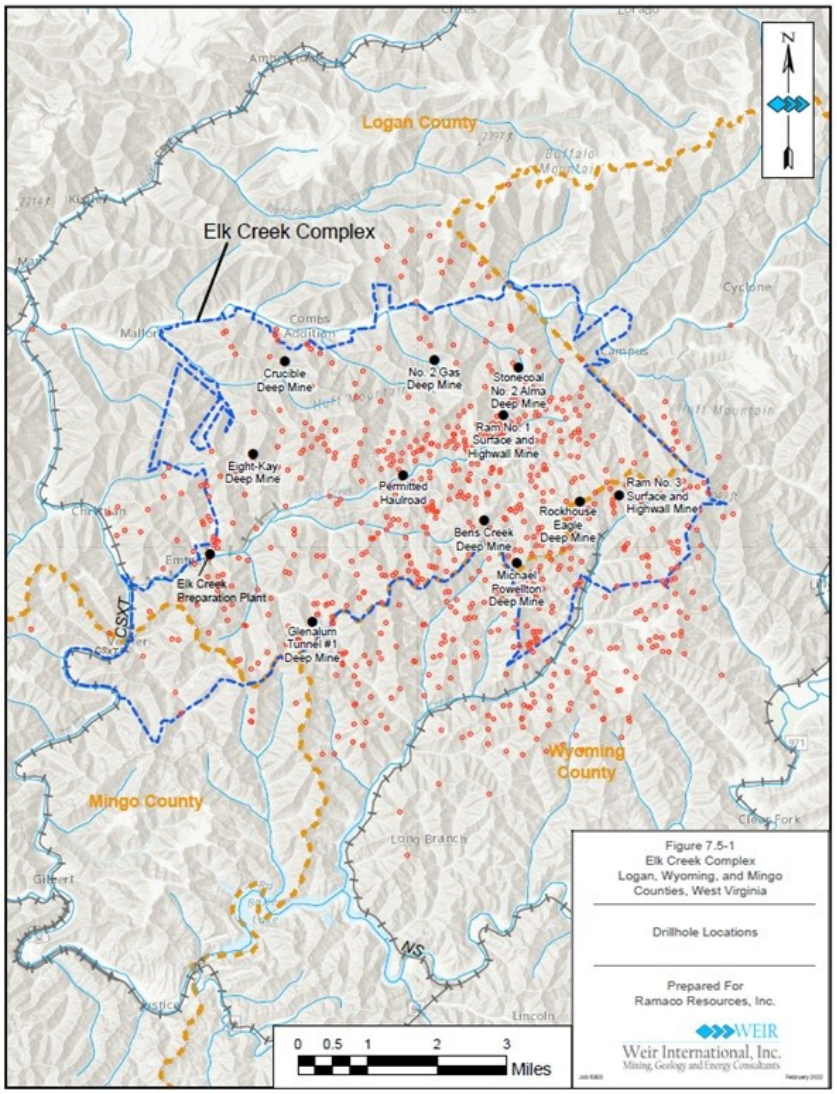
7.4 GEOTECHNICAL DATA

Ramaco does not specifically gather geotechnical data at its existing or planned operations at the Elk Creek Complex. See Section 13.1.1, Geotechnical Model, for more detail.

7.5 SITE MAP AND DRILLHOLE LOCATIONS

A map showing the location of all drillholes on the Elk Creek Complex is provided on Figure 7.5-1. Mine measurements are excluded from this figure to assist with legibility.

Figure 7.5-1 Drillhole Locations



7.6 OTHER RELEVANT DRILLING DATA

Ramaco generally uses one of several local drilling companies based on availability and pricing. Downhole geophysical logging is performed by Riley, Mannon & Sturgeon, Ltd., located in Barboursville, West Virginia. Coal quality analyses are currently performed by Precision Testing Laboratory, Inc. (Precision) located in Beckley, West Virginia.

8.0 SAMPLE PREPARATION, ANALYSES, AND SECURITY

8.1 SAMPLE PREPARATION METHODS AND QUALITY CONTROL

Relative to the drilling overseen by Ramaco, once the target coal seam has been drilled the coal core is stored in plastic lined wooden core boxes. The core is photographed, and the coal seam is measured and described by the geologist. The geologist's seam thickness measurements are cross checked against geophysical logs for thickness accuracy and to confirm core recovery.

8.2 LABORATORY SAMPLE PREPARATION, ASSAYING, AND ANALYTICAL PROCEDURES

8.2.1 SGS North America Inc.

Ramaco used SGS North America Inc. (SGS) located in Sophia, West Virginia as its primary laboratory for coal analyses, prior to 2016. Typically, once quality samples were bagged and labeled at the mine, the samples were delivered to SGS for quality analyses. The samples were first prepared by crushing, splitting, and sizing. The analyses performed included Proximate, Washability, Ash Fusion, Ultimate, Ash Mineral, Dilatometer, Plastometer, Trace Elements, and Petrographics. SGS is certified by the ANSI National Accreditation Board. SGS performs all of the coal analyses to ASTM standards.

8.2.2 Precision Testing Laboratory, Inc

Ramaco has utilized Precision Testing Laboratory, Inc. located in Beckley, West Virginia. (Precision) beginning in 2016. Also certified by the ANSI National Accreditation Board, Precision performs all of the coal analyses to ASTM standards. The process is similar to that stated above, once quality samples are bagged and labeled at the mine, the samples are delivered to Precision for quality analyses. The samples are first prepared by crushing, splitting, and sizing. The analyses performed included Proximate, Washability, Ash Fusion, Ultimate, Ash Mineral, Dilatometer, Plastometer, Trace Elements, and Petrographics.

8.2.3 Other Laboratories

As outlined in Section 5.2, WEIR relied upon quality analyses performed by prior property owners. In particular, data from Island Creek and Pittston, both of which were prominent, reputable coal producers, appeared to be valid and appropriate to include in this study based upon available documentation and consistency of the data between the different sources.

8.3 QUALITY CONTROL PROCEDURES AND QUALITY ASSURANCE

As an ANSI certified laboratory, Precision has in-house quality control and assurance procedures. Precision is a well-known and respected supplier of coal quality analyses services.

8.4 SAMPLE PREPARATION, SECURITY, AND ANALYTICAL PROCEDURES ADEQUACY

Once in possession of the samples, Precision's standard sample preparation and security procedures are followed. After the sample has been tested, reviewed, and accepted, the disposal of the sample is done in accordance with local, state and EPA approved methods.

WEIR has determined the sample preparation, security and analysis procedures used for the Elk Creek Complex's drillhole samples meet current coal industry standards and practices for quality testing, with laboratory results suitable to use for geological modeling, mineral resource estimation and economic evaluation.

9.0 DATA VERIFICATION

9.1 DATA VERIFICATION PROCEDURES

Ramaco provided WEIR copies of all available drilling records for the Elk Creek Complex, which included Excel spreadsheets, driller's log, field geologist's logs, quality results sheets from the coal quality laboratories, mine measurement tables, as well as drawing files or PDFs of the e-logs. Each hole in the database was individually checked by WEIR against a copy of the driller's and/or geologist's log to confirm data accuracy.

Geological reviews performed by WEIR included:

- Drillhole lithology database comparison to geophysical logs
- Drillhole coal quality database comparison to quality certificates

After completing the precursory verifications and validations described above, the drillhole data was loaded into Datamine's MineScape® Stratmodel, a geological modeling software. MineScape provides robust error checking features during the initial data load, which include confirmations of seam continuity, total depth versus hole header file data, interval overlap, and quality sample continuity with coal seams. Once the drillhole data was loaded, a stratigraphic model was created.

Several further verifications were then possible, which included:

- Creating cross sections through the model to visually inspect if anomalies occur due to miscorrelation of seams
- Creating structural and quality contour plots to visually check for other anomalies due to faulty seam elevations or quality data entry mistakes in the drillhole database

Typical errors which may impact reserve and resource estimates relate to discrepancies in original data entry. These errors may include:

- Incorrect drillhole coordinates (including elevation)
- Mislabeled drillhole lithology
- Unnoticed erroneous quality analyses where duplicate analyses were not requested
- Unrecorded drillhole core loss

WEIR conducted a detailed independent geological evaluation of data provided by Ramaco to identify and correct errors of the nature listed above. Where errors are identified and cannot be successfully resolved, it is WEIR's policy to exclude that data from the geological model. Based on WEIR's geological evaluation of data provided, three outcrop drillholes were excluded from the drillhole database due to invalid coordinates.

9.2 DATA VERIFICATION LIMITATIONS

Limitations of data verification included incomplete or missing records for some drillholes. The primary reason for this situation is incomplete data transfers upon change in property ownership. Based on its modeling results, WEIR found drillholes with incomplete data to be consistent with the deposit and appropriate to include in WEIR's geological model.

9.3 ADEQUACY OF DATA

It is WEIR's opinion that the adequacy of sample preparation, security, and analytical procedures for holes and procedures that were drilled by Ramaco after acquiring the property is acceptable and that these methods meet typical industry standards. Ramaco employs detailed process and procedures, described in Section 8.4, that are followed each time a core hole is to be sampled. The Ramaco geologist's logs for these holes contain sampling descriptions and lithologic descriptions that are sufficiently detailed to ascertain that an experienced geologist supervised the drilling and sampling. Ramaco coal quality analyses are performed by Precision to ASTM standards, as detailed in Section 8.0.

The adequacy of sample preparation, security, and analytical procedures are generally unknown for drillholes that were drilled prior to Ramaco acquiring the initial leases in 2012. However, the geologist's logs for these holes contain sampling descriptions and lithologic descriptions that are sufficiently detailed to ascertain that an experienced geologist supervised the drilling and sampling. It is unknown if all coal quality analyses were performed to ASTM standards by qualified laboratories, as detailed in Section 8.0, however, this legacy drillhole information was included as the samples matched the coal seam intervals and reported quality data that was consistent between the different data sources. Model verifications further support WEIR's high level of confidence that a representative, valid, and accurate drillhole database and geological model have been generated for the Elk Creek Complex that can be relied upon to accurately estimate coal resources and reserves.

10.0 MINERAL PROCESSING AND METALLURGICAL TESTING

10.1 MINERAL PROCESSING TESTING AND ANALYTICAL PROCEDURES

Daily sampling is performed by Precision Testing Laboratory on samples obtained from streams to clean coal storage locations prior to shipping clean coal products. The analyses performed include moisture, ash, sulfur, BTU/lb, and volatiles, which are reported on both an as-received and dry basis. FSI, oxidation, Audibert - Arnu Dilatometer Tests and Gieseler Plasticity Tests are also performed. These results help ensure both proper preparation plant operation and coal product classification. Coal tonnages for raw and post-processed products are estimated using standard belt scales, which are calibrated monthly against the end of month survey data summary reports.

Efficiency testing is performed on all critical preparation plant circuitry on an on-going basis ongoing to help ensure proper coal and non-coal separations are occurring throughout the plant operation. This performance testing is extensive and involves measuring flow rates, pressures, moistures, reagent application rates, size fractions, specific gravity, and coal quality at specific locations from raw feed through clean coal products and tailings.

10.2 MINERALIZATION SAMPLE REPRESENTATION

Coal deposits originate in flat, low-lying ground within deltas, alluvial plains, and coastal systems, and as such are a relatively homogeneous, sedimentary mineral occurrence. The deposit within the Elk Creek Complex area exhibits homogeneous characteristics and does not show any substantial variations in mineralization types or styles that would adversely affect processing of the coal. Sample data are well representative of the deposit as a whole.

10.3 ANALYTICAL LABORATORIES

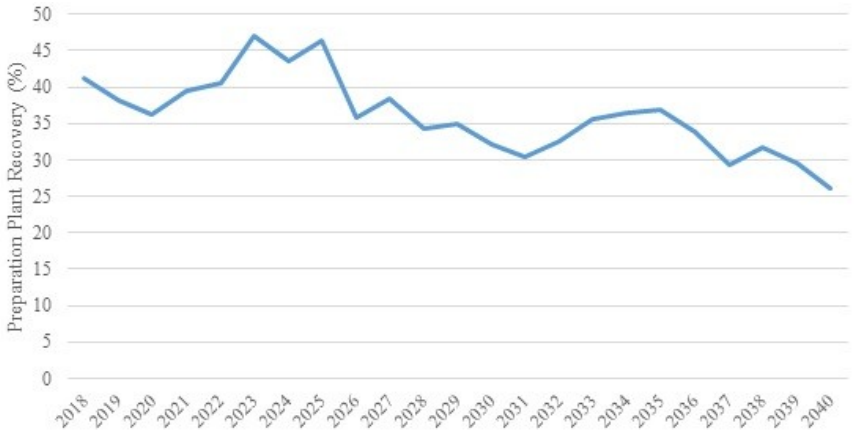
Coal sample analyses performed by Precision are described in Section 8.2.1. Preparation plant circuitry performance is maintained by plant staff through the plant monitoring systems. SGS performs daily analysis on the collected clean coal samples from automated samplers and any raw coal samples collected. Typical analysis on daily runs is proximate analysis only plus oxidation. Train and sublot samples with petrographics and rheology are performed per individual customer specifications.

10.4 RELEVANT RESULTS AND PROCESSING FACTORS

Coal recovery and resulting product qualities are primary concerns for any coal preparation plant. A coal preparation plant's recovery and resulting quality of its saleable products are dependent on ROM coal quality and the efficiency at which non coal impurities are removed by the preparation plant process. Tracking and adjusting throughput rates for different plant circuitry, based on ROM coal feed quality, are critical to plant efficiency and product quality. The coal quality at Elk Creek is exceptional, which allows the Elk Creek Preparation Plant to process the ROM coal at specific gravities ranging from 1.50 to 1.65 in order to produce clean coal metallurgical products, depending on customer specifications.

Historical (2018 through September 2021) and projected LOM Plan preparation plant recovery are shown on Figure 10.4-3.

Figure 10.4-3 Preparation Plant Recovery



Preparation plant recovery and saleable products quality are expected to track closely with the modeled recovery from raw coal analysis, once adjusted for out of seam dilution (OSD) material mined by the surface and underground mines.

Historical preparation plant recovery from 2018 through November 2021, based on plant belt scale records, is summarized in Table 10.4-4 as follows:

Table 10.4-4 Historical Preparation Plant Recovery

	2018	2019	2020	2021
Raw Tons Processed	3,796,911	4,271,158	4,272,188	4,011,376
Clean Tons Processed	1,567,990	1,629,804	1,547,612	1,583,636
Plant Yield (%)	41.30	38.16	36.23	39.48

The testing procedures described above provide validation for modeled data and help to ensure coal sales specifications are met for resulting saleable coal products. The testing also helps to maintain preparation plant efficiency at a high level so that processing costs are minimized.

10.5 DATA ADEQUACY

Ramaco employs testing and analytical procedures in accordance with industry standards, which result in efficient preparation plant operations and provides the necessary quality control to meet product quality and quantity projections. The testing performed is sufficient to support the projected preparation plant yield and saleable product quality for the LOM Plan.

11.0 MINERAL RESOURCE ESTIMATES

The coal resources, as of December 31, 2021, are reported as in-place resources and are exclusive of reported coal reserve tons (see Section 12.0 for reserve tonnage estimates). Resources are reported in categories of Measured, Indicated, and Inferred tonnage in accordance with Regulation S-K Item 1302(d).

11.1 KEY ASSUMPTIONS, PARAMETERS, AND METHODS

Data Sources

Planimetric data was provided by Ramaco in AutoCAD format and primarily included base map information such as rivers, drainages, roads, mine features, and property boundaries.

Ramaco provided WEIR drillhole data, which included survey, lithology, and coal quality information. This data was provided in different formats including Excel, ASCII files and PDFs. Geophysical logs, coal quality certificates, driller's logs, geologist's logs, downhole deviation data, and drillhole survey records were provided as scanned PDF files and AutoCAD drawing files. Data was provided for 655 drillholes, 652 holes of which are included in the geological model. Three outcrop drillholes were excluded from the drillhole database due to invalid coordinates.

In-mine seam thickness and floor measurement from previous operations' mine maps were provided in tabular file format. These mine measurements included 256 data points. Mine measurement data points were used to model coal seam thickness and structure, but were not used as points of observations in estimating resource confidence.

Coal quality data for 151 drillholes was provided for the Elk Creek Complex. Of the 151 drillholes, 149 holes were used in the quality model, as two drillholes were outside of the modeled area. Data was provided in Excel format along with quality certificates in PDF.

Reasons for excluding drillhole quality samples in the modeling process included:

- Poor core recovery noted in the driller's logs.
- Quality logs that could not be matched to a drillhole.
- The qualities listed for the hole were not relevant to the model (for example raw Btu/lb. or sulfur were supplied, but not final product Btu/lb. or sulfur). The only relevant raw values used are specific gravity and raw ash. Both are derivable from one another and have bearing on estimated in-place tons.

Geological Model

The Elk Creek Complex geological model was constructed by using seam surface grids that were created in Datamine's MineScape® Stratmodel (MineScape) geological modeling software.

Topography data was gridded using MineScape software and a grid cell size of 100 feet by 100 feet from the USGS on-line 3-D Elevation Project data source. The resolution of the topography data is 1/3 arc-second, which results in approximately a 30 by 30 feet data point spacing. The gridded USGS topography contours were compared to drillhole collars and showed that there are differences between the two sets of elevation data. On average, the drillhole collars are less than five feet above or below the USGS topography grid, with the maximum difference of 98 feet. These differences are not uncommon when comparing site topography to collar elevations since original drilling sites may currently be in fill areas, or in mined out cut areas. WEIR rationalized collar elevation discrepancies and as a result, did not excluded any drillholes.

The seam surfaces and thicknesses were created by loading the drilling and mine measurement data into MineScape and gridding the seam intercepts using a grid cell size of 100 feet by 100 feet. The parameters used to create the model are defined in the MineScape modeling schema which is a specification of modeling rules that is created for the site. The MineScape interpolators that were used in this study are common in most mine planning software packages. The Planar interpolator is a triangulation method with extrapolation enabled. Finite Element Analysis (FEM) is a widely used method for numerically solving differential equations arising in engineering and mathematical modeling. A trend surface is used in MineScape to promote conformability for the modeled seams to regional structures such as synclines, anticlines, or simply seam dip. MineScape caters to using different interpolators for thickness, roofs and floors (surfaces), and the selected trend surface as they are all modeled separately. The interpolator used for each of these items is selected on the basis of appropriateness to the data sets involved, as well as modeling experience. Stratigraphic Model Interpolators are shown in Table 11.1-1, as follows:

Table 11.1-1 Stratigraphic Model Interpolators

Interpolator	Parameter	Power/Order
Planar	Thickness	0
FEM	Surface	1
Planar	Trend	0

Forty-two (42) seams (including seam splits) were modelled for the Elk Creek Complex. A summary of drillhole statistics for the 26 seams that WEIR found as significant are shown in Table 11.1-2.

Table 11.1-2 Drillhole Statistics

Seam	In Mine Plan	Number of Intercepts	Average Thickness (Feet)	Minimum Hole Name	Minimum Thickness (Feet)	Maximum Hole Name	Maximum Thickness (Feet)	Standard Deviation (Feet)
Buffalo Creek 5	No	46	2.17	75B20	0.17	E77-08	10.34	1.89
Winifrede	No	53	1.34	328	0.17	338	3.69	0.85
Chilton A	Yes	61	2.75	1135-91	0.05	377	6.77	1.98
Upper Dorothy Rider	Yes	72	1.60	901-85	0.08	118	3.92	0.97
Upper Dorothy 1	Yes	54	1.47	331	0.17	E80-11	3.67	0.91
Upper Dorothy 2	Yes	117	2.24	E77-07	0.13	E80-11	6.25	1.20
Upper Dorothy 3 and 4	Yes	96	3.17	EC13-14	0.15	453-OC	5.75	1.19
Middle Dorothy	Yes	142	3.23	E80-24	0.25	SM4-3530-M	9.37	1.32
Lower Dorothy	No	121	2.10	1576-OC	0.37	1583-OC	6.55	1.56
Williamson	No	153	2.90	EC19-01	0.05	1136-92_S	20.65	2.81
Upper Cedar Grove	Yes	151	2.41	1123-91	0.20	KF11MM	5.50	0.83
Lower Cedar Grove A	Yes	171	2.49	81-BB-36	0.40	CLC5	5.00	0.62
Lower Cedar Grove B	Yes	246	3.02	EC19-02	0.15	E82-10	5.50	0.85
Lower Cedar Grove C	Yes	353	3.03	1088-89	0.30	985A-87	7.05	0.73
Upper Alma	Yes	97	1.58	262	0.08	977-87	3.40	0.79
Lower Alma	Yes	183	2.52	WP-5	0.08	5618OC	5.17	1.03
Powellton	Yes	138	2.55	75B22	0.08	WP-9	8.33	1.94
Eagle	Yes	168	2.66	EC12-06	0.05	CS-A-OS	8.35	1.33
No. 2 Gas	Yes	292	3.17	E80-22	0.08	11-9-OC	6.62	0.88
Bens Creek 1	Yes	132	2.27	987-87_S	1.06	E77-06	4.17	0.53
Bens Creek 2	Yes	96	0.84	865-81	0.04	1339-OC	2.60	0.45
Bens Creek 3	Yes	71	0.87	CLC6	0.05	804OCGS	2.25	0.42
Cedar	No	47	1.98	EC12-04	0.40	984A-87	6.30	1.26
Lower War Eagle	No	33	1.43	589	0.08	EC12-04	4.80	1.26
Glenalum Tunnel	Yes	53	2.22	GP-4	1.34	CLC4	5.38	0.56
Gilbert	No	23	2.31	EC12-04	0.20	EC13-03	4.53	1.28

The gridded coal seam structure and coal seam thicknesses were validated against drillhole information to ensure that the data was properly modeled. Inconsistencies between modeled seam surfaces and surrounding drillholes were investigated and any confirmed errors in the drillhole data or model parameters were corrected. This process was repeated until a final version of the model was developed.

Coal Quality Model

The drillhole data described previously in this report were used to create a washed coal quality model that included raw ash and raw relative density. The washed quality model values were based on a specific gravity of 1.50.

The drillholes were verified to ensure that the seam depths used in the lithology file matched the sample depths in the quality file. Coal quality samples were loaded into MineScape and composited against the drillhole thicknesses. The composited values were then gridded using a grid cell size of 200 feet by 200 feet and the inverse distance weighted (squared) interpolator. The following quality data was modeled for all seams:

- Raw
  - Ash, Dry weight percent
  - Relative Density
- Float @ 1.50 Specific Gravity
  - Ash, Dry weight percent
  - Calorific Value, Dry Btu/lb
  - Total Sulfur, Dry weight percent
  - Volatile Matter, Dry weight percent
  - Audibert-Arnu Maximum Dilation (ARNU), Dry percent
  - Coal Oxidation by Light Transmittance, Dry percent
  - Total Inerts, Dry weight percent
  - Rank Index
  - Composition Balance Index
  - Gieseler Maximum Fluidity, Dry DDPM
  - Hargrove Grindability Index
  - Reflectance (ROMAX), Dry percent
  - Calculated Stability Index
  - Free Swell Index
  - Yield, weight percent

Quality contours were generated from the grids to check outlier values.

Additional Resource Criteria and Parameters

Based on WEIR's review and evaluation of the data and plans relative to the Elk Creek Complex, resource estimation criteria were applied to ensure reported mineral resource tonnage has a reasonable prospect for economic extraction. Resource criteria and parameters for the Elk Creek Complex are as follows:

- Resources were estimated as of December 31, 2021.
- Underground areas where coal thickness did not meet a minimum thickness of 2.0 feet were excluded from the resource estimate.

- Underground areas within 200 feet of old mine workings were excluded from resource estimates.
- Underground areas with less than 100 feet of cover were excluded from resource estimates.
- Surface and highwall mining areas where coal thickness did not meet a minimum thickness of 1.0 feet were excluded from the resource estimate.
- Surface areas, where there was no subsequent highwall mining, where stripping ratio exceeds 20:1 were excluded from the resource estimate.
- Tonnage outside of current LOM plan, but within existing property control, and meeting the criteria listed here, is classified as Resource tonnage and is reported exclusive of Reserve tonnage.
- Coal density is based on apparent specific gravity data from dill holes and channel samples, where available. Otherwise, it is based on raw coal ash (dry basis) using the formula [1.25+(Ash/100)] x 62.4 pounds per cubic foot

11.2 ESTIMATES OF MINERAL RESOURCES

The coal resources, as of December 31, 2021, are reported as in-place resources and are exclusive of reported coal reserve tons (see Section 12.0). Resources are reported based on the coal resource estimate methodology described and are summarized in Table 11.2-1 as follows:

Table 11.2-1 In-Place Coal Resource Tonnage and Quality Estimate as of December 31, 2021

Mine / Seam	Average Coal Thickness (Feet)	In-Place Resources (000 Tons)				Coal Quality (Dry Basis) Raw	
		Measured	Indicated	Total	Inferred	Ash (%)	Relative Density (Lbs/CF)
Ram Surface Mine							
Buffalo Creek 5	2.78	2,255	520	2,775	—	23.56	93.87
Winifrede	2.90	775	365	1,140	—	30.06	97.98
Chilton A	4.27	8,220	250	8,470	—	32.56	98.69
Upper Dorothy Rider	1.45	300	10	310	—	15.80	85.49
Upper Dorothy 1	2.80	1,135	110	1,245	—	28.09	94.89
Upper Dorothy 2	2.56	2,095	340	2,435	—	6.69	94.30
Upper Dorothy 3 and 4	3.24	1,370	-	1,370	—	29.42	98.00
Middle Dorothy	2.63	8,140	810	8,950	—	9.33	92.25
Lower Dorothy	3.76	510	-	510	—	20.48	90.48
Williamson	3.06	935	290	1,225	—	25.01	90.97
Upper Cedar Grove	3.45	13,060	40	13,100	—	11.27	85.14
Lower Cedar Grove A	2.62	22,295	2,850	25,145	—	11.37	84.95
Lower Cedar Grove B	3.01	10,300	1,670	11,970	—	15.64	87.10
Lower Cedar Grove C	2.82	7,070	610	7,680	—	8.19	82.47
Upper Alma	2.46	1,660	320	1,980	—	17.93	89.32
Lower Alma	2.86	5,560	2,700	8,260	—	22.04	92.11

Mine / Seam	Average Coal Thickness (Feet)	In-Place Resources (000 Tons) Measured	Indicated	Total	Inferred	Coal Quality (Dry Basis) Raw Ash (%)	Relative Density (Lbs/CF)
Ram Surface Mine							
Powellton	2.64	1,700	270	1,970	—	21.88	91.07
Eagle	1.64	3,210	850	4,060	—	17.90	88.51
No. 2 Gas	3.35	3,390	475	3,865	—	21.66	90.67
Bens Creek 1	2.27	1,270	1,575	2,845	—	8.19	82.73
Total	2.92	95,250	14,055	109,305		15.74	88.65
Crucible Deep Mine							
Lower Cedar Grove A	2.74	1,095	380	1,475	—	14.28	86.57
Lower Cedar Grove C	2.41	1,190	350	1,540	—	3.43	81.61
Total	2.57	2,285	730	3,015		8.74	84.04
Stonecoal No. 2 Alma Deep Mine							
Lower Cedar Grove A	2.38	3,150	5	3,155	—	16.09	87.98
Lower Cedar Grove B	2.76	1,225	25	1,250	—	12.53	85.49
Lower Cedar Grove C	2.73	4,470	280	4,750	—	4.36	80.50
No. 2 Gas	3.01	10,760	1,395	12,155	—	11.41	84.53
Lower Alma	3.44	4,400	3,430	7,830	—	27.92	96.27
	3.00	24,005	5,135	29,140		15.25	87.44
Michael Powellton Mine							
Powellton	3.37	2,460	-	2,460	—	32.24	97.85
Rockhouse Eagle Deep Mine							
Eagle	3.09	4,065	35	4,100	—	19.62	89.07
Moorefork Mine							
No. 2 Gas	2.82	2,390	360	2,750	—	15.49	82.24
Bens Creek Deep Mine							
Bens Creek 1 and 2	2.68	15,510	24,425	39,935	—	25.83	93.81
Lower War Eagle Mine							
Lower War Eagle	2.66	4,965	2,870	7,835	70	21.76	90.64
Glenalum Tunnel #1 Deep Mine							
Glenalum Tunnel	2.06	9,295	10,855	20,150	815	4.80	81.13
Gilbert Deep Mine							
Gilbert	2.84	2,085	2,565	4,650	85	23.56	92.66
Grand Total	2.80	162,310	61,030	223,340	970	16.98	88.83

Notes:

- Mineral Resources reported above are not Mineral Reserves and do not meet the threshold for reserve modifying factors, such as estimated economic viability, that would allow for conversion to mineral reserves. There is no certainty that any part of the Mineral Resources estimated will be converted into Mineral Reserves. Mineral Resources reported here are exclusive of Mineral Reserves.
- Resource probable economic mineability based on underground minable resources with 2.0 feet minimum seam thickness, surface and highwall mines with 1.0 feet minimum seam thickness, area mining with a cutoff stripping ratio of 20:1, and predominately high volatile A and high volatile B metallurgical coal products realizing a sales price of $131 per ton at a cash cost of $77 per clean ton (FOB Mine)
- Numbers in the table have been rounded to reflect the accuracy of the estimate and may not sum due to rounding

11.3 TECHNICAL AND ECONOMIC FACTORS FOR DETERMINING PROSPECTS OF ECONOMIC EXTRACTION

A Preliminary Feasibility Study was conducted to assess the prospects for economic extraction of coal within the Elk Creek Complex.

Ramaco's forecasted Elk Creek Complex FOB mine coal sales price is $172.73 per ton in 2022, $127.39 in 2023, $127.67 in 2024 and ranges from $127.44 to $128.10 from 2025 through 2040. Ramaco's sales price projections conform to published forward price curves for coal of similar quality to that of the Elk Creek Complex. The sales price is further supported in Section 16.0 of this report.

Capital expenditures are discussed in further detail in Section 18.1 and are projected to average $10.95 per ton over the Elk Creek Complex LOM Plan, compared to actual capital expenditures of $10.29 per ton in 2018 through third quarter 2021.

Operating cash costs are discussed in further detail in Section 18.2 and are projected to average $77.01 per ton over the Elk Creek Complex LOM Plan, compared to actual Elk Creek Complex operating cost of $66.75 per ton in 2018 through third quarter 2021.

Total projected capital expenditures and operating cost of $87.88 per ton and a coal sales price per ton as indicated above, provide a reasonable basis for WEIR to determine that all underground mineable coal of thickness greater than 2.0 feet, surface and highwall mineable coal with seam thickness greater than 1.0 feet, and surface and contour mineable coal with stripping ratio of approximately 20:1 or lower, has prospects of economic extraction within the Elk Creek Complex.

11.4 MINERAL RESOURCE CLASSIFICATION

Mineral Resource estimates prepared for the Elk Creek Complex are based on the SEC Regulation S-K Item 1302(d), which established definitions and guidance for mineral resources, mineral reserves, and mining studies used in the United States. The definition standards relative to resources are as follows:

Mineral Resource:

Mineral resource is a concentration or occurrence of material of economic interest in or on the Earth's crust in such form, grade or quality, and quantity that there are reasonable prospects for economic extraction. A mineral resource is a reasonable estimate of mineralization, taking into account relevant factors such as cut-off grade, likely mining dimensions, location or continuity, that, with the assumed and justifiable technical and economic conditions, is likely to, in whole or in part, become economically extractable. It is not merely an inventory of all mineralization drilled or sampled.

- *Inferred mineral resource* is that part of a mineral resource for which quantity and grade or quality are estimated on the basis of limited geological evidence and sampling. The level of geological uncertainty associated with an inferred mineral resource is too high to apply relevant technical and economic factors likely to influence the prospects of economic extraction in a manner useful for evaluation of economic viability. Because an inferred mineral resource has the lowest level of geological confidence of all mineral resources, which prevents the application of the modifying factors in a manner useful for evaluation of economic viability, an inferred mineral resource may not be considered when assessing the economic viability of a mining project, and may not be converted to a mineral reserve.
- *Indicated mineral resource* is that part of a mineral resource for which quantity and grade or quality are estimated on the basis of adequate geological evidence and sampling. The level of geological certainty associated with an indicated mineral resource is sufficient to allow a qualified person to apply modifying factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit. Because an indicated mineral resource has a lower level of confidence than the level of confidence of a measured mineral resource, an indicated mineral resource may only be converted to a probable mineral reserve.
- *Measured mineral resource* is that part of a mineral resource for which quantity and grade or quality are estimated on the basis of conclusive geological evidence and sampling. The level of geological certainty associated with a measured mineral resource is sufficient to allow a Qualified Person to apply modifying factors, as defined in this section, in sufficient detail to support detailed mine planning and final evaluation of the economic viability of the deposit. Because a measured mineral resource has a higher level of confidence than the level of confidence of either an indicated mineral resource or an inferred mineral resource, a measured mineral resource may be converted to a proven mineral reserve or to a probable mineral reserve.

Geostatistical methods were applied to drillhole and mine measurement coal thickness data for five primary seams at the Elk Creek Complex to develop variogram ranges (radii) used for resource classification. Three of the seams (No. 2 Gas, Alma, and Lower Cedar Grove C) had almost identical curves. Figure 11.4-1 illustrates the variogram for the No. 2 Gas Seam, which has 1,779 seam thickness measurements. Table 11.4-1 shows the sample count, Measured and Indicated resource ranges determined by the variogram model, and average sample spacing in feet. As mentioned above, variograms for the Alma and Lower Cedar Grove Seams were almost identical to the variogram for the No. 2 Gas Seam. Variograms were also created for the Glenalum Tunnel and Powellton seams. The variograms were very similar to each other, however, the sill for both was at a distance of over 9,000 feet. Given that; 1) the variograms for the No. 2 Gas, Alma, and Lower Cedar Grove seams are very similar, 2) the range for the sill of the Glenalum Tunnel and Powellton seams is significantly larger, and 3) these seams are primary on the property, WEIR suggests that the theoretical ranges estimated for Measured (to 1,800 feet) and Indicated (to 5,500 feet) resources in their variographic analysis demonstrates the spatial continuity of mineable coal seam thickness at the Elk Creek Complex.

Figure 11.4-1 Variogram Model No. 2 Gas Seam Thickness

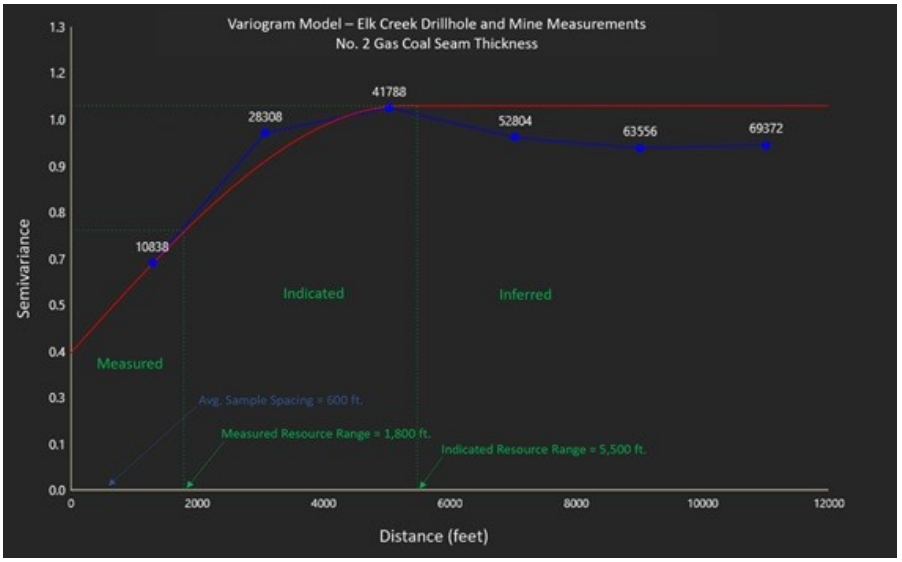


Table 11.4-1 Theoretical Variogram Ranges

Variogram	Sample Count	Measured Range (feet)	Indicated Range (feet)	Inferred Range (feet)	Avg. Sample Spacing (feet)
Elk Creek - Lower Cedar Grove C Seam	905	1,800	5,500	>5500	607
Elk Creek - Alma Seam	905	1,800	5,500	>5500	607
Elk Creek - Powellton Seam	905	1,800	5,500	>5500	607
Elk Creek - No. 2 Gas Seam	905	1,800	5,500	>5500	607
Elk Creek - Glenalum Tunnel Seam	53	1,800	5,500	>5500	2,747

As depicted above, variability in drillhole thickness measurements is highly correlated with the distance between individual drillholes, in particular within the theoretical ranges for Measured and Indicated tonnage. Additionally, WEIR's generation and review of the applicable quality contours further supports the continuity of coal quality throughout the deposit. Table 11.4-2 shows overall quality parameters for the coal seams at the Elk Creek Complex.

Table 11.4-2 Statistics for Elk Creek Complex Composited Samples

Quality Parameter	Number of Samples	Total Sample Length (ft)	Minimum Value	Maximum Value	Average Value
Audibert-Arnu Maximum Dialation (%)	285	841	14	300	186
Composition Balance Index	53	151	0.39	1.99	1.01
Free Swell Index	179	507	2	9	8
Gieseler Maximum Fluidity (DDPM)	290	855	535	30,000	26,694
HGI	231	625	40	77	57
Inerts (%)	115	336	13.5	42.2	26.1
Raw Ash (%)	770	2,064	1.2	66.0	16.6
In-Place Relative Density	900	2,491	1.17	2.11	1.40
Reflectance (ROMAX, %)	116	339	0.88	1.09	0.99
Rank	51	146	3.2	4.1	3.8
Stability Index	53	151	26.0	57.0	47.9
Coal Oxidation by Light Transmittance (%)	70	204	86.0	99.0	95.8
Ash (%)	897	2,483	1.1	13.8	5.3
BTU/lb	866	2,410	13,053	15,360	14,553
Sulfur (%)	898	2,487	0.50	4.21	0.99
Volatiles (%)	625	1,685	29.9	46.2	34.5
Yield (%)	888	2,452	26.2	100.0	81.8

Note: Unless otherwise specified, analyses are on a Dry Basis for coal washed at 1.50 specific gravity

In other words, within the Measured and Indicated ranges, WEIR has demonstrated a level of geological confidence sufficient to allow for the application of modifying factors to support detailed mine planning and evaluation of the economic viability of the deposit. Beyond the five seams mentioned above, there are no outlier seams being considered for resources that display anomalous behavior in comparison. As such, classification radii utilized by WEIR in this study are as follows:

- Measured: 0 - 1,800 feet (based on 905 observations informing estimate of coal thickness within this range)
- Indicated: 1,800 □ 5,500 feet (based on 905 observations informing estimate of coal thickness within this range)

- Inferred: greater than 5,500 feet (based on 905 observations informing estimate of coal thickness within this range)

11.5 UNCERTAINTY IN ESTIMATES OF MINERAL RESOURCES

Mining is a high risk, capital-intensive venture and each mineral deposit is unique in its geographic, social, economic, political, environmental, and geologic aspects. At the base of any mining project is the mineral resource itself. Potential risk factors and uncertainties in the geologic data serving as the basis for deposit volume and quality estimations are significant considerations when assessing the potential success of a mining project.

Geological confidence may be considered in the framework of both the natural variability of the mineral occurrence and the uncertainty in the estimation process and data behind it. The mode of mineralization, mineral assemblage, geologic structure, and homogeneity naturally vary for each deposit. Structured variability like cyclic depositional patterns in sedimentary rock can be delineated mathematically with solutions like trend surface analysis or variography. Unstructured variability, in the distribution of igneous rock composition, for example, is more random and less predictable.

The reliability of mineral resource estimation is related to uncertainties introduced at different phases of exploration. Resources meeting criteria for Measured, Indicated, and Inferred categories are determined by the quality of modeled input data, both raw and interpreted. An exploration program comprises several stages of progressive data collection, analysis, and estimation, including:

- Geological data collection
- Geotechnical data collection
- Sampling and assaying procedures
- Bulk density determination
- Geological interpretation and modeling
- Volume and quality estimation
- Validation
- Resource classification and estimation

Error may be introduced at any phase. Data acquisition and methodologies should be properly documented and subject to regular quality control and assurance protocols at all stages, from field acquisition through resource estimation. Managing uncertainty requires frequent review of process standards, conformance, correctional action, and continuous improvement planning. Risk can be minimized with consistent exploration practices that provide transparent, backwards traceable results that ultimately deliver admissible resource estimates for tonnage and quality.

As discussed in Sections 8.0, 9.0, and 10.0, it is WEIR's opinion that Ramaco's methodology of data acquisition, record-keeping, and QA/QC protocols are adequate and reasonable for resource estimation at the Elk Creek Complex.

In summary, WEIR has reviewed all geologic and geotechnical data inputs, collection protocols, sampling, assaying, and laboratory procedures serving as the basis for the deposit model, its interpretation, and the estimation and validation of the volume and quality of coal resources at the Elk Creek Complex. The spatial continuity of all seams with resource attributes at the Elk Creek Complex is well demonstrated by professionally developed, well maintained, quantitative and qualitative data. WEIR finds no material reason, regarding geologic uncertainty, that would prohibit acceptably accurate estimation of mineral resources.

11.6 ADDITIONAL COMMODITIES OR MINERAL EQUIVALENT

There are no other commodities or minerals of interest within the Elk Creek Complex resource area other than the coal deposit discussed in this TRS.

11.7 RISK AND MODIFYING FACTORS

The existing and planned underground mines in the complex are above drainage and relatively dry, which decreases risk for bad floor conditions from the presence of underclays. Similar drainage is expected at Ramaco's surface and highwall mines as well, resulting in generally favorable mining conditions.

The consistency of the seams within the complex, absence of any significant faulting or other detrimental geological structure, and good exploration drilling coverage combine to reduce geological risks at the complex. This also relates to product quality risks, which WEIR sees as low for the same reasons. The appearance and disappearance of partings within mined benches is expected and is difficult to accurately map without extensive drilling. However, these partings are of little consequence to the final product, apart from the marginal additional processing costs involved at the preparation plant for non-coal partings removal.

Many mining operations acquire uncontrolled property as the operation progresses, delaying the costs of acquisition until these uncontrolled properties are required for near-term mining. This is not the case at the Elk Creek Complex. The leases are established and there are no uncontrolled mineral rights required for existing or planned operations.

Risk is also associated with volatility of coal market prices. However, even significant variations in operating costs, capital expenditures, and productivity would not likely preclude the economic mineability of the Elk Creek Complex, at projected metallurgical coal sales prices.

Unforeseen changes in legislation and new industry developments could alter the performance of Ramaco by impacting coal consumer demand, regulation and taxes, including those aimed at reducing emissions of elements such as mercury, sulfur dioxides, nitrogen oxides, particulate matter or greenhouse gases. The emphasis on reducing emissions, however, is more of a concern for mines producing a thermal coal product, as opposed to the metallurgical coal produced from the Elk Creek Complex.

12.0 MINERAL RESERVE ESTIMATES

12.1 KEY ASSUMPTIONS, PARAMETERS, AND METHODS

The conversion of resources to reserves at the Elk Creek Complex considers the effects of projected dilution and associated loss of product coal quality, projected coal sales prices and operating costs, regulatory compliance requirements, and mineral control to determine if the saleable coal product will be economically mineable. The design of executable mine plans that accommodate the planned mining equipment and facilities and provide a safe work environment is also considered.

For Ramaco underground room and pillar operations, it should be noted that retreat mining will be implemented in most of the existing and planned underground operations within the complex. This will result in over 80 percent mining recovery of coal and will necessitate planned subsidence, all of which are addressed in the respective mining permits.

The Elk Creek Complex mine layouts have several key variables that will largely impact coal recovery. Pillar and panel dimensions are based on minimum, maximum, and optimal equipment operating parameters, as well as geotechnical considerations relative to the safety of the mining operations and subsidence predictions.

Based on a mine's historical performance and projected mineral continuity, the mine design is the primary consideration, apart from mineral resource classification, whereupon resources are converted to reserves at the Elk Creek Complex.

Based on WEIR's review and evaluation of the Elk Creek Complex LOM plans, the justification for conversion of resources to reserves was based on specific criteria. In addition to the criteria stated in Section 11.0 for resources, the following criteria were used to estimate reserves for the Elk Creek Complex:

- Reserves were estimated as of December 31, 2021.
- Underground mining recovery of 50 to 80 percent (dependent on whether retreat mining can be performed), a surface mining recovery of 90 percent, and a highwall mining recovery of 40 percent were assumed.
- A minimum of two inches of out of seam dilution is included in the ROM underground tonnage estimates, except in areas where the total seam thickness is greater than the maximum mining height.

- A highwall mining maximum penetration depth of 800 feet, and a minimum of 400 feet was assumed.
- The point of reference for reserve estimates is post preparation plant processing and recoverable tons were adjusted for a theoretical preparation plant yield based on drillhole and channel sample analyses washed at a 1.50 specific gravity.
- A conservative preparation plant efficiency factor of 95.0 percent was applied to reflect actual performance of the preparation plant, compared to theoretical laboratory results at a 1.50 specific gravity.
- The estimate of reserve tons includes areas that are exclusively within the current Elk Creek Complex LOM plans.

12.2 ESTIMATES OF MINERAL RESERVES

The coal reserves that represent the economically viable tonnage controlled by Ramaco at the Elk Creek Complex, based on the coal reserve estimate methodology described, are shown in Table 12.2-3 as follows:

Table 12.2-3 Recoverable Coal Reserve Tonnage and Quality Estimate as of December 31, 2021

							Coal Quality (Dry Basis)	
							Raw	
	Area	Average Coal Thickness	In-Place Tons	Clean Recoverable Tons (000) Reserves			Ash	Relative Density
Mine / Seam	(Acres)	(Feet)	(000)	Proven	Probable	Total	(%)	(Lbs/CF)
RamSurface No. 1 Surface and Highwall Mine								
Chilton A	135	5.01	765	235	—	235	35.1	100.5
Upper Dorothy Rider	50	2.29	250	100	—	100	9.8	83.6
Upper Dorothy 3 and 4	200	3.05	1,150	565	—	565	16.7	88.8
Middle Dorothy	180	2.31	530	295	5	300	9.1	83.4
Upper Cedar Grove	50	3.46	295	135	—	135	7.6	81.8
Lower Cedar Grove A	95	2.90	505	240	—	240	10.6	82.7
Lower Cedar Grove B	40	2.81	225	120	—	120	15.7	87.0
Lower Cedar Grove C	90	2.56	385	190	10	200	4.6	80.2
Alma	25	3.53	175	45	20	65	23.1	93.1
Powellton	30	2.00	110	40	—	40	23.0	92.1
Total	895	3.08	4,390	1,965	35	2,000	15.1	87.1
RamSurface No. 3 Surface and Highwall Mine								
Upper Dorothy Rider	17	1.80	55	20	—	20	9.8	84.2
Upper Dorothy 1 and 2	150	2.31	550	210	30	240	15.8	87.5
Upper Dorothy 3 and 4	196	3.54	1,480	480	—	480	31.2	98.0
Middle Dorothy	58	6.06	640	70	220	290	10.2	83.7
Lower Dorothy	43	3.55	300	115	—	115	20.3	90.4
Upper Cedar Grove	252	2.36	1,140	485	—	485	15.6	87.9
Lower Cedar Grove A	263	2.78	1,335	555	65	620	8.1	83.6
Lower Cedar Grove B	189	3.05	1,125	460	50	510	19.0	89.5
Lower Cedar Grove C	143	2.74	700	285	55	340	6.0	81.1
No. 2 Gas	7	3.07	45	10	20	30	22.3	91.3
Powellton	10	4.86	100	70	—	70	18.7	89.2
Total	1,328	2.97	7,470	2,760	440	3,200	15.8	87.8

Mine / Seam	Area (Acres)	Average Coal Thickness (Feet)	In-Place Tons (000)	Clean Recoverable Tons (000) Reserves			Coal Quality (Dry Basis) Raw	
				Proven	Probable	Total	Ash (%)	Relative Density (Lbs/CF)
Crucible Deep Mine								
Lower Cedar Grove B	880	3.90	6,545	2,300	310	2,610	15.7	87.0
Lower Cedar Grove C	990	2.91	5,155	2,005	335	2,340	4.5	80.9
Total	1,870	3.38	11,700	4,305	645	4,950	10.4	84.1
Stonecoal No. 2 Alma Deep Mine								
Lower Cedar Grove B	440	3.70	3,200	1,210	60	1,270	20.6	90.4
Lower Cedar Grove C	130	2.53	1,175	460	—	460	15.4	1.5
Upper Alma	920	1.86	2,580	1,010	90	1,100	27.0	94.9
Lower Alma	755	3.20	6,100	2,330	140	2,470	25.9	94.6
Total	2,245	2.71	13,055	5,010	290	5,300	23.9	85.6
Michael Powellton Mine								
Powellton	30	4.14	250	60	—	60	42.8	104.6
Rockhouse Eagle Deep Mine								
Eagle	690	3.83	5,420	1,915	495	2,410	14.6	86.7
No. 2 Gas	80	3.21	640	130	—	130	37.4	101.5
Total	770	3.77	6,060	2,045	495	2,540	15.8	87.4
No. 2 Gas Deep Mine								
No. 2 Gas	778	3.07	7,345	2,085	455	2,540	27.9	94.4
Eight-Kay								
No. 2 Gas	650	2.91	3,585	1,390	240	1,630	12.3	85.7
Bens Creek Deep Mine								
Bens Creek	601	4.14	5,850	1,670	170	1,840	28.6	95.8
Glenalum Tunnel #1 Deep Mine								
Glenalum Tunnel	2,520	2.16	10,700	2,380	2,190	4,570	5.9	81.8
Grand Total	10,359	3.31	70,405	23,670	4,960	28,630	16.5	86.7

Notes:

- Clean recoverable reserve tonnage based on underground mining recovery of 50 to 80 percent (contingent upon retreat mining capability), 90 percent for surface mining, 40 percent for highwall mining, theoretical preparation plant yield, and a 95 percent preparation plant efficiency
- Mineral Reserves estimated based on predominately high volatile A and high volatile B metallurgical coal products realizing a sales price of $131 per ton and cash cost of $77 per clean ton (FOB Mine)
- Numbers in the table have been rounded to reflect the accuracy of the estimate and may not sum due to rounding
- Mineral Reserves are reported exclusive of Mineral Resources

WEIR completed a validation check of its tonnage estimates by using the model to calculate the theoretical tonnage of the No. 2 gas Deep Mine in 2021 and comparing the results to the actual production tonnage mined in 2021. The results of the validation are shown in Table 12.2-4.

Table 12.2-4 Reserve Validation

Mine Area	Seam	Actual 2020 Production Tons	Estimated Model Tons	Variance (%)
No. 2 Gas Deep	2 Gas	386,000	379,000	0.98

12.3 ESTIMATES OF RESERVE CUT-OFF GRADE

The seams within the Elk Creek Complex display consistent quality attributes, and these quality attributes are representative of a high quality high volatile metallurgical coal product. The main variable is OSD which results in additional preparation plant costs to obtain a saleable coal product. Preparation plant throughput is also a consideration. However, preparation plant ROM throughput is not a limitation at the Elk Creek Complex, and the incremental cost of "washing out" the additional OSD as a result of minimum mining heights for equipment clearance does not forgo mining coal seams with thicknesses of 2.0 feet. Mining heights below 2.0 feet result in increased operational difficulty given equipment limitations and capabilities. WEIR did not discover any areas within the complex where washed coal quality parameters for planned mining tonnage was deficient relative to maintaining a high-quality metallurgical grade coal status. The coal on the property is consistently of high-quality.

In summary, based on Ramaco's historical saleable coal product quality, current coal sales contracts, and projected coal quality modeled, WEIR does not foresee future coal quality deviations from the historical coal quality that would adversely affect the saleable coal product.

12.4 MINERAL RESERVE CLASSIFICATION

WEIR prepared the Elk Creek Complex reserve estimates in accordance with Regulation S-K Item 1302(e), which establishes guidance and definitions for mineral reserves to be used in the United States. The SEC Regulation S-K Definition Standards relative to reserves are as follows:

> *Modifying factors* are the factors that a qualified person must apply to indicated and measured mineral resources and then evaluate to establish the economic viability of mineral reserves. A qualified person must apply and evaluate modifying factors to convert measured and indicated mineral resources to proven and probable mineral reserves. These factors include but are not restricted to: Mining; processing; metallurgical; infrastructure; economic; marketing; legal; environmental compliance; plans, negotiations, or agreements with local individuals or groups; and governmental factors. The number, type and specific characteristics of the modifying factors applied will necessarily be a function of and depend upon the mineral, mine, property, or project.

A *mineral reserve* is an estimate of tonnage and grade or quality of indicated and measured mineral resources that, in the opinion of the qualified person, can be the basis of an economically viable project. More specifically, it is the economically mineable part of a measured or indicated mineral resource, which includes diluting materials and allowances for losses that may occur when the material is mined or extracted.

- *Probable mineral* reserve is the economically mineable part of an indicated and, in some cases, a measured mineral resource.
- *Proven mineral reserve* is the economically mineable part of a measured mineral resource and can only result from conversion of a measured mineral resource.

Within the extent of the LOM Plan for the Elk Creek Complex, Measured Resources were converted to Proven Reserves and Indicated Resources were converted to Probable Reserves.

12.5 COAL RESERVE QUALITY AND SALES PRICE

Elk Creek Complex coal quality was determined by modeling the drillhole coal quality for the reserve areas. The average dry basis coal quality by seam, for raw coal and washed coal at a 1.50 specific gravity, for the reserves are shown in Table 12.5-1 as follows:

Table 12.5-1 Average Reserve Coal Quality

	Coal Quality (Dry Basis)						
	Raw		Washed @ 1.50 Specific Gravity				
Seam	Ash (%)	Relative Density (Lbs/CF)	Ash (%)	Sulfur (%)	Volatile Matter	Calorific Value (Btu/lb.)	Theoretical Plant Yield (%)
Chilton A	35.12	100.7	8.58	0.84	35.69	14,017	51.40
Upper Dorothy 3 and 4	16.74	88.8	5.73	0.65	35.53	14,420	82.73
Middle Dorothy	9.05	83.4	5.18	0.73	35.20	14,605	88.10
Upper Cedar Grove	8.03	81.9	4.88	0.66	35.06	14,644	93.21
Lower Cedar Grove A	10.63	82.7	5.62	1.17	33.98	14,578	92.22
Lower Cedar Grove B	20.24	88.4	5.78	0.77	34.78	14,389	82.23
Lower Cedar Grove C	4.49	80.9	2.00	0.58	34.09	15,030	95.43
Upper Alma	27.84	95.5	6.05	0.84	34.22	14,394	68.44
Lower Alma	26.01	94.8	5.04	0.97	34.30	14,580	67.13
Powellton	36.95	100.9	6.69	0.76	34.03	14,383	57.17
Eagle	36.95	100.9	6.69	0.76	34.02	14,382	57.19
No. 2 Gas	14.75	86.8	6.95	0.70	31.98	14,327	81.78
Bens Creek	28.56	95.8	4.62	2.36	34.86	14,757	69.09
Glenalum Tunnel	5.97	81.8	3.68	0.95	33.04	15,056	96.70

The average quality for the reserve tons shows that the Elk Creek Complex is a high volatile metallurgical coal product, with good coking properties. The range of dry washed volatile matter is between approximately 33 and 36 percent, with an average of 34.2 percent. The average proximate analyses reflect an overall coal product that is relatively low in ash and sulfur, and high in calorific value. Other quality parameters such as ROMAX, Free Swelling Index, Audibert-Arnu Maximum Dilation, and Gieseler Fluidity indicate a good quality metallurgical grade coal.

Ramaco's forecasted Elk Creek Complex FOB mine coal sales price is $172.85 per ton in 2022, $127.37 in 2023, $127.67 in 2024 and ranges from $127.44 to $128.10 from 2025 through 2040. Ramaco's sales price projections conform to published forward price curves for coal of similar quality to that of the Elk Creek Complex. The sales price is further supported in Section 16.0 of this report.

12.6 RISK AND MODIFYING FACTORS

Due to the relatively simple geology in the area, and the relatively high continuity of the coal seams within the Elk Creek Complex LOM plans (both in terms of structure and quality), geologic uncertainties do not appear to pose a significant mining risk.

The operating mines at Elk Creek Complex have excellent safety records and maintain diligent regulatory compliance. Workforce census has been and is expected to remain stable. The primary mining equipment is well-maintained, as observed from WEIR's site visit, and has sufficient capacity to attain projected levels of productivity and production. This further contributes to the Elk Creek Complex being a relatively low risk operation.

As previously noted, mineral rights are secure for all operating and planned mines.

Coal recovery is an important aspect in assessing the economic viability of a mine. Based on Ramaco's historical extraction rates and generally conservative pillar design, WEIR does not anticipate significant deviation of product recovery in the future. The recovery is based on the pillar size that has been designed for the underground mining operations, which is dependent on depth of cover and overlying rock quality. The pillar design is most importantly intended to provide safe operation of the primary coal extraction efforts. WEIR utilized an average mining recovery of 50 percent for the Elk Creek Complex continuous miners for first mining and an additional 30 percent mining recovery for areas of retreat mining. This is consistent with industry standards and with actual mining recovery reported by Ramaco.

Risk is also associated with the volatility of coal market prices. Significant variations in operating costs, capital expenditures, and productivity could impact the economic mineability of the Elk Creek Complex. Economic analyses and associated sensitivities are further detailed in Section 19.0.

13.0 MINING METHODS

The underground mining method at the Elk Creek Complex is room and pillar mining utilizing continuous miners. Mains and submains are generally developed on 120 feet by 90 feet centers. Panels are generally developed on 70 feet by 70 feet centers, depending on depth of cover and exposed surface structure concerns with potential subsidence. Mine entry widths are approximately 20 feet for all entries. Retreat mining in the panels, where it is permitted, increases overall mining recovery to at least 80 percent. Due to lack of surface structures within the complex, retreat mining is planned for the majority of the underground mining areas, which will result in planned subsidence. Although Ramaco has subsidence rights, Ramaco acknowledges the rules and regulations in regard to measures to be taken to mitigate or remedy any material damage or diminution in value that may occur to surface lands, structures, or facilities due to subsidence. No mining is proposed within 50 feet of gas wells.

Surface mining operations primarily involve contour mining methods which are almost exclusively intended to accommodate subsequent highwall mining. To accommodate the subsequent highwall mining, a minimum contour mining bench width of 125 feet projected by WEIR. Concerns regarding stripping ratio for Ramaco's contour operations are secondary in comparison to the access gained to coal seams to be mined by lower cost highwall mining. The surface mining operations also include small areas of mining points or ridges in lieu of highwall mining. This method is planned where the economically feasible in-place stripping ratio of approximately 20:1 (BCY per ton) or less occurs.

13.1 GEOTECHNICAL AND HYDROLOGICAL MODELS

13.1.1 Geotechnical Model

Ramaco bases its underground mine pillar design on; 1) the general characteristics of the roof, coal, and floor strata in concert with Analysis of Coal Pillar Stability (ACPS) and Analysis of Retreat Mining Pillar Stability (ARMPS) software which are both accepted industry standards, 2) experience in the mining industry, and 3) results from similar or adjacent mines. Underground mining conditions at the Elk Creek Complex are consistent with roof and floor being primarily shales and sandstones, with competent coals seams (See Figure 6.3-1). Pillars for first mining are designed according to minimum unconfined compressive strengths (UCS) of materials such that pillar stability is greater than 2.0. In the currently active and planned underground mines on the Elk Creek Complex, the first mining protection zones are limited to small areas where there are intermittent streams with less than 200 feet of cover.

Generally speaking, the UCS of shale ranges from 2,000 to 20,000 pounds per square inch (psi) while sandstone ranges from 7,000 to 35,000 psi. The compressive strength of the coal used in the coal pillar stability analysis is 900 psi. This means that there is a safety factor of at least 2.0 above the safety factor in the coal pillar analysis, when using the lowest value for the compressive strength of shale. Due to this large safety factor when using the minimum commonly accepted UCS value for shale, and since the only protection zones are for intermittent streams in areas of less than 200 feet of cover, Ramaco has waivers in its WVDEP permits for analysis of the engineering properties of soft rock.

The subsidence surveys have identified some gas wells and associated gas lines in proposed underground mining areas. The owners of the gas wells have been identified on the Subsidence Survey Map in the associated WVDEP permits. No mining is proposed within 50 feet of the gas wells. No protection is proposed for the gas lines that lie within the proposed mining areas.

Ramaco has roof control plans for all of its permitted underground mines. The plans must be approved by the MSHA before mining can commence. The MSHA routinely performs inspections to ensure that the roof control plans are being properly implemented.

For surface mining operations, standing highwall configurations are not that maintained substantial to warrant specific geotechnical studies. Maximum cut slopes and safety benches are maintained according to MSHA-approved Ground Control Plans.

For highwall mining operations, hole spacing is based on; 1) ACPS analysis, and 2) previous results in combination with accepted industry standards. The maximum anticipated recovery within highwall mining areas is less than 50 percent, which should not result in subsidence. No other measures are required to prevent or minimize subsidence or subsidence related damage. Because no subsidence is anticipated from the proposed highwall mining, no plan for monitoring the extent of subsidence is proposed at this time. No water supplies are located above the proposed highwall mining areas. The subsidence surveys have identified some gas wells and associated gas lines in proposed highwall mining areas. The owners of the gas wells have been identified on the Subsidence Survey Map in the WVDEP permits. No mining is proposed within 50 feet of the gas wells. No protection is proposed for the gas lines that lie within the proposed highwall mining areas.

In summary, no specific detailed geotechnical models or data sets have thus far been created for Ramaco's existing or planned mining operations at the Elk Creek Complex. WEIR notes that to date, Ramaco has not experienced any significant stability problems at their Elk Creek Complex mines. Based on WEIR's experience in the industry and Ramaco's successful operating history, both in regard to geotechnical considerations, Ramaco is operating its mines in accordance with industry acceptable geotechnical evaluation and standards.

13.1.2 Hydrogeological Model

The Elk Creek Complex is within the Upper Guyandotte River watershed of West Virginia. The Guyandotte River is the primary hydrological feature in the local area and is a tributary of the Ohio River. Elk Creek, which flows through the Elk Creek Complex, is a tributary of the Guyandotte River. The major hydrogeological unit in the area is the Lower Pennsylvanian.

Recharge rates for aquifers in this area are relatively low at approximately 12 inches per year. Transmissivity data for the Kanawha Formation in Logan County shows relatively high rates of 100 to 2000 square feet per day (Aquifer-Characteristics Data for West Virginia, Water-Resources Investigations Report 01-4036, USGS/West Virginia Bureau for Public Health, 2001). These data both suggest unconfined aquifers, and this generally supports the hydrology sections of permits for the Ramaco mines on the property.

Due to the rural nature of the area, there are several common and private water wells on and adjacent to the Elk Creek Complex. There are also structures that utilize the Logan County Public Service District water services, and those that utilize both. This ground water inventory information has been summarized by Ramaco in its permit applications.

The operating and planned Ramaco mines will be constructed above drainage and above all domestic surface and groundwater sources. Due to above drainage construction and low aquifer recharge rates in the area, the Ramaco mines are relatively dry with little concern for water infiltration. Fracturing and weathering are invariably present in varying degrees in shallow rocks throughout the property. Fracturing affects the hydrologic regime by controlling subsurface water flow (and thus weathering) due to the very low permeability of un-fractured strata. Infiltration due to this fracturing is sometimes encountered but is insignificant to mine operations.

Surface Water Runoff Analyses are included in permit submittals and indicate that stream flows will not increase during or after mining, therefore there will be no increased potential for flooding or channel scouring. In general, diminution, or interruption of any water supply, as a result of the Ramaco mines, is not anticipated.

Groundwater inventories, water quality data, water balance, recharge and seepage rates have been reviewed in the approved permits and current permit revisions, including hydrologic impact assessments outlining risks, monitoring program detail, and mitigation obligations. Ramaco's approach to obtaining and managing its surface and groundwater data for the Elk Creek Complex has been demonstrated to be adequate and aligned with regulatory requirements and standard industry practices. WEIR finds no material barriers to the continued success of the Elk Creek Complex regarding hydrologic impact or compliance.

13.1.3 Other Mine Design and Planning Parameters

Mine ventilation is a primary design concern for underground mines. WEIR has reviewed Ramaco's designs and planning for this aspect of its mining operations and has found no significant problems concerning adequacy of ventilation fans or fan locations.

Proximity to previously underground mined areas above or below the operating or planned underground mine is an important consideration at the Elk Creek Complex, since there are many areas that have been previously mined in many coal seams. WEIR reviewed Ramaco's mines in proximity to previous mine workings and associated fracture depths and cones used by Ramaco, and found no concerns for its existing or planned operations.

Underground mine surface facilities and surface mining sites require drainage designs to control surface water runoff. WEIR has reviewed Ramaco's designs, which have been approved in its WVDEP and NPDES permits, and found the designs to be adequate and consistent with industry standards.

13.2 PRODUCTION, MINE LIFE, DIMENSIONS, DILUTION, AND RECOVERY

13.2.1 Production Rates

Rockhouse Eagle Seam Deep Mine

Two continuous miners operate in a supersection at this mine. Supersections are continuous miner sections with split ventilation that allows two continuous miners to operate simultaneously, which significantly enhances productivity for a mine. The Eagle Seam and No. 2 Gas seams are mined together in some areas of this mine. This mine was previously operated by Island Creek. The mine employs approximately 50 people on average.

No. 2 Gas Deep Mine

Two continuous miners operate as a supersection at this mine. Ramaco commenced production at this mine in January 2018. There are no mineable seams below the No. 2 Gas Seam, however, the Eagle Seam is less than 20 feet above the No. 2 Gas Seam in the northern portion of the complex. The No. 2 Gas Seam is the most appealing seam in this area and there has been no previous mining of the Eagle Seam at this location. This mine employs approximately 50 people on average.

Stonecoal No. 2 Alma Deep Mine

This mine currently operates two supersections, with plans for adding a third supersection in 2022. Three different seams are mined, including the Alma, Lower Cedar Grove C, and Lower Cedar Grove B, in ascending order. The Lower Cedar Grove seams can be mined together in some areas. This mine was previously operated by Island Creek. The mine currently employs 79 people.

Ram No. 1 & No. 2 Surface and Highwall Mine

The No. 1 and No. 2 Surface and Highwall Mines are in the same general area and are contiguous. The No. 2 Mine is an additional permitted area, but the same equipment fleet will be used for mining and the mines are generally considered one in the same as the No. 1 Surface and Highwall Mine. The mine employs contour mining in addition to limited area mining. Highwall mining follows behind the contour mining. Stripping ratio averages approximately 20:1 BCY/ton, excluding highwall miner production. The highwall miner has the ability to penetrate approximately 800 feet into coal seams as thin as two feet in thickness. Highwall mining in an area is avoided if the holes cannot average more than 400 feet in penetration, as a result of boundary restrictions or seam thickness shortcomings.

This relatively new mine is a multiple seam operation involving the Chilton A down through the Powellton (11 seams). The operation employs a total of 35 people.

Planned Mines

Other planned mines that will start/re-start production in the future include:

- Crucible Deep Mine (Lower Cedar Grove B and C Seams)
- Michael Powellton Deep Mine (Powellton Seam)
- Ram No. 3 Surface and Highwall Mine (multiple seams)
- Bens Creek Deep Mine (Bens Creek Seam)
- Glenalum Tunnel #1 Deep Mine (Glenalum Tunnel Seam)
- Eight-Kay Deep Mine (No. 2 Gas Seam, currently inactive)

Actual ROM and clean coal production, preparation plant yield and productivity achieved by the Elk Creek Complex continuous miner units for 2018 through September 2021 are shown in Table 13.3.1-1 as follows:

Table 13.2.1-1 Elk Creek Complex Historical ROM and Clean Production, Preparation Plant Yield, and Productivity

	2018			2019			2020			September 2021 YTD			Average		
	Tons (000)		Yield	Tons (000)		Yield	Tons (000)		Yield	Tons (000)		Yield	Tons (000)		Yield
Mine	ROM	Clean	(%)	ROM	Clean	(%)	ROM	Clean	(%)	ROM	Clean	(%)	ROM	Clean	(%)
Rockhouse Eagle Deep Mine	1,480	539	36.43	1,597	488	30.58	1,433	489	34.10	1,433	563	39.30	1,486	520	34.99
No. 2 Gas Deep Mine	755	259	34.33	905	274	30.23	1,043	324	31.07	1,075	337	31.38	944	298	31.61
Stonecoal No. 2 Alma Deep Mine	1,376	603	43.84	1,270	554	43.60	1,033	375	36.30	1,162	388	33.43	1,210	480	39.67
Ram No. 1 & No. 2 Surface Mine	136	115	84.52	179	146	81.61	177	153	86.48	157	124	78.92	162	134	82.90
Ram No. 1 & No. 2 Highwall Miner	292	153	52.52	354	207	58.55	372	208	55.88	250	159	63.48	317	182	57.35
Elk Creek Total	4,038	1,669	41.34	4,305	1,669	38.77	4,057	1,548	38.16	4,076	1,571	38.54	4,119	1,614	39.19

Ramaco's projected ROM and clean coal production, and preparation plant yield for the Ram Surface Mine and each of the underground mines for the Elk Creek Complex LOM Plan are shown in Table 13.2.1-2 as follows:

Table 13.2.1-2 Elk Creek Complex LOM Plan Projected ROM and Clean Production, and Preparation Plant Yield

	2021 [1]	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total
ROM Tons (000)																					
Rockhouse Eagle Deep Mine	327	866	691	769	703	572	609	542	660	508	—	—	—	—	—	—	—	—	—	—	6,248
No. 2 Gas Deep Mine	201	777	769	733	629	1,057	897	965	854	836	—	—	—	—	—	—	—	—	—	—	7,718
Stonecoal No. 2 Alma Deep Mine	562	1,821	2,024	2,441	1,967	3,365	1,833	1,039	1,188	—	—	—	—	—	—	—	—	—	—	—	16,240
Ram No. 1 Surface Mine	63	184	244	169	372	190	101	—	—	—	—	—	—	—	—	—	—	—	—	—	1,323
Ram No. 1 Highwall Miner	53	298	320	286	393	153	69	—	—	—	—	—	—	—	—	—	—	—	—	—	1,572
Ram No. 3 Surface Mine	—	—	235	343	379	451	295	188	—	—	—	—	—	—	—	—	—	—	—	—	1,890
Ram No. 3 Highwall Miner	—	—	31	611	528	347	659	635	—	—	—	—	—	—	—	—	—	—	—	—	2,810
Michael Powellton Deep Mine	—	133	48	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	180
Crucible Lower Cedar Grove Deep Mine	159	516	599	597	611	628	624	633	760	629	646	248	716	724	1,179	709	715	715	455	—	11,864
Bens Creek Deep Mine	—	—	—	—	—	175	120	328	365	396	408	290	263	318	367	347	702	499	499	507	5,583
Glenalum Tunnel #1 Deep Mine	—	—	—	—	—	—	542	1,343	1,237	1,189	1,196	1,198	1,268	1,235	1,407	1,407	1,407	1,407	1,407	1,322	17,568
Eight Kay Deep Mine	—	—	—	—	—	—	701	1,562	535	582	625	569	780	—	—	—	—	—	—	—	5,354
Total	1,365	4,594	4,961	5,950	5,583	6,938	6,449	7,235	5,600	4,139	2,875	2,306	3,027	2,277	2,953	2,464	2,824	2,622	2,362	1,830	78,351

	2021 (1)	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total
Clean Tons (000)																					
Rockhouse Eagle Deep Mine	129	331	375	266	279	253	306	313	273	195	—	—	—	—	—	—	—	—	—	—	2,720
No. 2 Gas Deep Mine	63	295	313	324	280	298	278	257	268	264	—	—	—	—	—	—	—	—	—	—	2,640
Stonecoal No. 2 Alma Deep Mine	188	686	761	819	671	891	559	340	520	—	—	—	—	—	—	—	—	—	—	—	5,435
Ram No. 1 Surface Mine	50	152	203	140	309	158	84	—	—	—	—	—	—	—	—	—	—	—	—	—	1,094
Ram No. 1 Highwall Miner	34	171	184	164	226	88	39	—	—	—	—	—	—	—	—	—	—	—	—	—	906
Ram No. 3 Surface Mine	—	—	195	285	314	374	245	156	—	—	—	—	—	—	—	—	—	—	—	—	1,567
Ram No. 3 Highwall Miner	—	—	18	351	303	199	378	364	—	—	—	—	—	—	—	—	—	—	—	—	1,613
Michael Powellton Deep Mine	—	42	18	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	60
Crucible Lower Cedar Grove Deep Mine	63	188	256	268	239	218	223	209	252	228	203	102	359	341	592	340	332	335	202	—	4,950
Bens Creek Deep Mine	—	—	—	—	—	42	42	107	96	116	138	110	108	154	154	154	154	154	154	157	1,840
Glenalum Tunnel #1 Deep Mine	—	—	—	—	—	—	141	353	361	345	330	334	340	335	342	342	342	342	342	321	4,570
Eight Kay Deep Mine	—	—	—	—	—	—	198	386	187	182	201	208	268	-	-	-	-	-	-	-	1,630
Total	526	1,865	2,323	2,617	2,621	2,520	2,492	2,485	1,958	1,329	873	753	1,075	830	1,088	836	828	831	698	478	29,025
Preparation Plant Yield (%)																					
Rockhouse Eagle Deep Mine	39.3	38.2	54.3	34.6	39.7	44.3	50.2	57.7	41.4	38.4	—	—	—	—	—	—	—	—	—	—	44.8
No. 2 Gas Deep Mine	31.4	38.0	40.7	44.2	44.5	28.2	31.0	26.7	31.4	31.6	—	—	—	—	—	—	—	—	—	—	35.3
Stonecoal No. 2 Alma Deep Mine	33.4	37.7	37.6	33.6	34.1	26.5	30.5	32.7	43.8	—	—	—	—	—	—	—	—	—	—	—	34.2
Ram No. 1 Surface Mine	78.9	82.9	82.9	82.9	82.9	82.9	82.9	—	—	—	—	—	—	—	—	—	—	—	—	—	82.7
Ram No. 1 Highwall Miner	63.5	57.4	57.4	57.4	57.4	57.4	57.4	—	—	—	—	—	—	—	—	—	—	—	—	—	57.6
Ram No. 3 Surface Mine	—	—	82.9	82.9	82.9	82.9	82.9	82.9	—	—	—	—	—	—	—	—	—	—	—	—	82.9
Ram No. 3 Highwall Miner	—	—	57.4	57.4	57.4	57.4	57.4	57.4	—	—	—	—	—	—	—	—	—	—	—	57.4	
Michael Powellton Deep Mine	—	31.3	38.6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	33.6
Crucible Lower Cedar Grove Deep Mine	39.7	36.5	42.8	44.9	39.1	34.7	35.8	33.0	33.1	36.2	31.4	40.9	50.1	47.0	50.2	47.9	46.5	46.9	44.5	—	42.7
Bens Creek Deep Mine	—	—	—	—	—	24.1	35.1	32.6	26.3	29.4	33.8	37.9	41.3	48.5	42.0	44.3	21.9	30.9	30.9	30.9	34.6
Glenalum Tunnel #1 Deep Mine	—	—	—	—	—	—	25.9	26.3	29.2	29.0	27.6	27.9	26.8	27.1	24.3	24.3	24.3	24.3	24.3	24.3	26.1
Eight Kay Deep Mine	—	—	—	—	—	—	28.2	24.7	34.9	31.2	32.2	36.5	34.4	—	—	—	—	—	—	—	31.1
Total	41.6	43.1	50.8	48.8	52.6	44.5	44.5	39.9	36.0	32.5	30.5	33.5	37.9	39.3	40.9	37.6	32.8	34.6	31.6	26.5	37.0

(1) Projected Fourth Quarter 2021

13.2.2 Expected Mine Life

Individual mines at the Elk Creek Complex have expected mine lives varying from two years and beyond, with 10 years as an approximate average. Because the mines are being staged in development, estimation of an expected life of mine for the complex is not appropriate, since there are fairly vast resources available to be mined as reported in Section 11.0. As the complex progresses, future mines will be planned and scheduled as necessary to meet internal Ramaco goals as they align with market conditions. For these reasons, WEIR considers that review of a 10-year time frame is appropriate for this report. WEIR and Ramaco both acknowledge that this reporting methodology may result in the need for future updates to this TRS.

13.2.3 Mine Design Dimensions

The projected mining through 2031 for the various mine plans are shown on Figures 13.5-1 through 13.5-8.

Mine design criteria utilized for these mine plans are as follows:

- Gas Wells
  - State Permit required to mine within 500 feet of a well
  - MSHA Permit required to mine within 150 feet of a well

- Active Well barrier - tangent of 15 degrees x depth of cover or 50 feet, whichever is greater
- Inactive Well barrier - tangent of 5 degrees x depth of cover or 50 feet, whichever is greater
- Plugged Wells - mine-through is allowed with acquisition of proper State and MSHA Permits

- Pillar Size
  - ARPMS stability factor of 2.0 or greater for mining under protected areas, which is primarily intermittent streams with less than 200 feet of cover. This is true throughout the complex.
  - ARMPS stability factor of 1.5 or greater for all other room and pillar development.

- Depth of Cover
  - Ramaco implements a 100 feet minimum depth of cover for all of their underground mines

- Areas without Subsidence Rights
  - ARMPS stability factor of 2.0 or greater will be maintained during first mining.
  - Retreat mining will come no closer than a tangent of 30 degrees times depth of cover to the property boundary.

- Coal Thickness
  - Mining is not planned in areas of coal seams less than 2.0 feet in thickness.
  - Continuous miner units are assumed to mine the entire seam thickness (averaging approximately 3.0 feet, and ranging from 2.0 to 10.0 feet).

13.2.4 Mining Dilution

OSD on continuous miner units for Ramaco's Elk Creek Complex typically consists of a total of 2 to 3 inches of waste from the roof and/or floor. Some areas may require mining more OSD to accommodate mine facilities such as ventilation tubing or conveyors. OSD is not included in this report's reserve or resource estimates since all ROM coal is processed at the preparation plant, which effectively eliminates OSD from the final saleable product.

13.2.5 Mining Recovery

Mining recovery when utilizing continuous mining recovery is based on the pillar design, which is in turn based on depth of cover. Mining recovery varies based on whether the panel is a main or sub-main entries, or a production panel due to the longevity requirements for the mine entries. Mining recovery for first mining for mines at the complex varies from approximately 40 to 60 percent, based on pillar design. In the areas where retreat mining is conducted, an additional 30 percent mining recovery is attainable. The continuous miners have the cutting height capacity to recover the entire seam thickness in the planned mining areas.

For surface mining, a recovery of 90 percent was projected. The hole spacing for highwall mining results in a mining recovery of approximately 40 percent.

13.3 DEVELOPMENT AND RECLAMATION REQUIREMENTS

13.3.1 Underground Development Requirements

The Elk Creek Complex currently has three active underground mines and an active surface mine. As the underground mines progress, and as with similar mining operations, continuous development is required for extensions of belt conveyors, mine power, pipelines, track, and ventilation facilities.

The Stonecoal and Crucible mines will require construction of in mine slopes to access overlying mineable seams.

Future ventilation punchouts, or bleeder holes, are anticipated for areas where retreat mining is executed, applicable for most deep mines within the complex. Each bleeder hole installation will be completed just prior to starting panel development.

Minor development such as drilling holes for rock dust and electrical distribution from the surface may be required at some of the mines, where existing underground mine development is extensive.

13.3.2 Reclamation (Backfilling) Requirements

The construction of underground mines requires the removal of material to create an adequate working surface for the underground mine face-up, haul roads, mine surface facilities, and access roads. Upon mine closure, selected areas will be reclaimed to near Approximate Original Contour (AOC). Other areas will be left in-place as per the approved alternate post-mining land use requirements. Regrading and backfilling activities will commence within 180 days after the mining operations are complete.

As part of its surface mine plans, the contour mining method which will require backfilling as mining progresses. Some of these areas involve facing up Abandoned Mine Lands (AML or, pre-1977 Surface Mine Reclamation Act law). Material from the current contour cuts will be used to re-slope previously contour-mined areas to AOC. To the extent possible, Ramaco avoids the use of valley fills during surface mining operations in preference to backfilling of previously contour mined working areas.

WEIR has reviewed Ramaco's 6/28/21 Asset Retirement Obligations (ARO) summary and backfilling obligations appear to be properly accounted for at its mines. Based on Ramaco's permit filings with the WVDEP, bonding requirements are also current and at satisfactory levels at the Elk Creek Complex (see Section 17.3 and 17.5 for additional details on bonding and mine closure planning).

13.4 MINING EQUIPMENT AND PERSONNEL

13.4.1 Mining Equipment

The Elk Creek Complex is currently utilizing the following industry standard mining equipment on the continuous miner sections, as shown in Table 13.4-1.

Table 13.4.1-1 Standard/Typical Continuous Miner Section Equipment

Units		Continuous Miner Supersection Equipment
2	-	Joy 1415 Continuous Miners
3	-	Narco 10SC32 Shuttle Cars
2	-	Fletcher CHDDR15 Roof Bolters
2	-	Fairchild 35C Battery Scoops
1	-	Feeder Breaker
2	-	Mantrips

Table 13.4.1-2 shows the total underground equipment fleet expected at the Elk Creek Complex over the next 10 years. Mines that commence later in the schedule (i.e., the Glenalum Tunnel and Michael Powellton Deep Mines) will utilize equipment currently being used at other mines at the Elk Creek Complex.

Table 13.4.1-2 Elk Creek Complex Primary Underground Equipment Fleet

Mine	Supersections	Continuous Miners	Shuttle Cars	Roof Bolters	Battery Scoops	Feeder Breakers	Mantrips	Service Locomotive
Rockhouse Eagle Deep	1	2	4	3	4	1	2	2
No. 2 Gas Deep	1	2	4	5	4	2	4	1
Stonecoal No. 2 Alma Deep	2	4	8	3	5	2	2	2
Total	4	8	16	11	13	5	8	5

Current equipment at the Ram No. 1 and No. 2 Surface and Highwall Mine is shown in Table 13.4.1-3. The Ram No. 3 Surface and Highwall Mine is expected to commence production in 2023 and will require an additional fleet of mining equipment, since both mines will be operating concurrently.

There will be one highwall miner at the Ram No. 1 and No. 2 Highwall Mine. An additional highwall miner will be operated at the Ram No. 3 Highwall Mine. The equipment for the highwall mining operations will be owned, operated, and maintained by Ramaco.

Table 13.4.1-3 Surface Mining Equipment

Units		Surface Mining Equipment
1	-	Caterpillar 992G Front End Loader (15 Cu. Yard)
1	-	Caterpillar 988H Front End Loader (10 Cu. Yard)
1	-	Caterpillar 980H Front End Lader (8 Cu. Yard)
1	-	John Deere 724K Front End Loader (4.5 Cu. Yard)
3	-	Caterpillar 777 Overburden End Dump Haul Trucks (100 - Ton)
1	-	Caterpillar D10T Track Dozer
1	-	Caterpillar D9T Track Dozer
1	-	Superior Highwall Miner #55
1	-	Caterpillar 16H Road Grader
1	-	Atlas-Copco DM 50 Overburden Drill
1	-	Caterpillar 773B 20,000 Gallon Water Truck
1	-	Komatsu PC360LC Excavator (Utility 2.5 Cu. Yards)
1	-	John Deere 250G Excavator (Utilitiy 1.5 Cu. Yard)
4	-	Service Trucks (International 4300-4400 series)
5	-	Ford F250 Pickup Trucks

No changes are planned in the type of mining equipment used during the Elk Creek Complex LOM Plan. Based on WEIR's experience in the industry and on Ramaco's historical performance, WEIR believes that Ramaco can meet planned production requirements with the mining equipment described in this section using prudent operating methods and operating schedules.

13.4.2 Staffing

The current Elk Creek Complex staffing is summarized in Table 13.4.2-1 as follows:

Table 13.4.2-1 Current Staffing

	Salary	Hourly	Total
Rockhouse Eagle Deep Mine	8	44	52
No. 2 Gas Deep Mine	8	42	50
Stonecoal No. 2 Alma Deep Mine	19	60	79
Ram No. 1 & No. 2 Surface Mine	4	19	23
Ram No. 1 & No. 2 Highwall Mine	—	11	11
Environmental Crew	4	6	10
Preparation Plant	11	72	83
Administration	6	—	6
	60	254	314

Note: Staffing as of September 2021

Each operating mine at the Elk Creek Complex is scheduled to produce coal on two production shifts each day, the A Shift and the B Shift. Underground mine crews on the night idle shift provide support services including production unit moves, off-shift maintenance and other support functions as required. In addition, general underground support crews work each shift performing routine supply, belt maintenance and outby support functions. Hourly personnel are not affiliated by any union, with no anticipated changes to this in the near term.

The preparation plant is staffed with three crews to process ROM coal 24 hours per day and seven days per week. Each crew works three, 12-hour shifts and is off for four days, then works four days and is off for three days (3-on, 4-off, 4-on, 3-off).

The actual and projected staffing for the LOM Plan is shown in Table 13.4.2-2 as follows:

Table 13.4.2-2 LOM Plan Staffing

	Total
Current[1]	314
2022	395
2023	435
2024	435
2025 - 2040	436

[1]As of September 31, 2021.

The staffing increase from current levels is due to startup of the Crucible Deep Mine in 2022 and the Ram No. 3 Surface and Highwall Mine in 2023. After 2023, staffing levels are expected to be relatively constant.

Most of Ramaco's employees live nearby in Logan, Wyoming, and Mingo Counties. Ramaco has had no major issues hiring qualified candidates for open positions and relies considerably on employee referrals.

Based on industry experience and Ramaco's historical performance, WEIR believes that the staffing levels are adequate to meet Ramaco's planned production.

Mine Safety

An industry standard for safety performance is the Non-Fatal Days Lost (NFDL) Incidence Rate, which is determined by the number of lost time injuries multiplied by 200,000 divided by the manhours worked.

The Elk Creek Complex mines (excluding the preparation plant) manhours worked, NFDL injuries, and NFDL Incidence Rate reported to the MSHA for 2018 through the third quarter 2021, compared to the national average NFDL Incidence Rate for United States surface and underground coal mines are shown in Table 13.4.2-3 for each of the active mines.

Table 13.4.2-3 Elk Creek Complex Manhours Worked, NFDL Injuries and NFDL Incidence Rate

		NFDL Injuries		NFDL Incidence Rate	
	Manhours Worked	Employee	Contractor	Mine Total	National Average
		Ram No. 1 Surface Mine			
2021 (1)	61,487	—	—	—	0.67
2020	67,343	1	1	2.97	0.77
2019	70,018	—	—	—	0.78
2018	66,240	1	—	3.02	0.77
		Ram No. 1 Highwall Mine			
2021 (1)	24,325	—	—	—	0.67
2020	29,506	—	—	—	0.77
2019	31,719	—	—	—	0.78
2018	26,278	—	—	—	0.77
		Stonecoal No. 2 Deep Mine			
2021 (1)	174,248	2	—	2.30	3.76
2020	165,552	3	—	3.62	3.18
2019	154,616	1	—	1.29	3.08
2018	154,532	4	—	5.18	3.20

	Manhours Worked	NFDL Injuries		NFDL Incidence Rate	
		Employee	Contractor	Mine Total	National Average
	Rockhouse Eagle Deep Mine				
2021 (1)	113,906	4	—	7.02	3.76
2020	132,839	1	—	1.51	3.18
2019	129,628	2	—	3.09	3.08
2018	121,224	6	—	9.90	3.20
	No. 2 Gas Deep Mine				
2021 (1)	99,153	3	—	6.05	3.76
2020	114,430	3	—	5.24	3.18
2019	134,367	—	—	—	3.08
2018	76,935	2	—	5.20	3.20

(1)Through Third Quarter 2021

The Elk Creek Complex NFDL Incidence Rate was generally higher than the national average from 2018 through 2021. Given Ramaco's low staffing levels, minimal injury counts result in high NFDL Incidence Rates, as compared to the national average.

The Elk Creek Preparation Plant manhours worked, NFDL injuries, and NFDL Incidence Rate reported to the MSHA for 2018 through Second Quarter 2021, compared to the national average NFDL Incidence Rate for United States preparation plants are shown in Table 13.4-6 as follows:

Table 13.4.2-4 Plant Manhours Worked, NFDL Injuries and NFDL Incidence Rate

	Manhours Worked	NFDL Injuries		NFDL Incidence Rate	
		Elk Creek	Contractor	Elk Creek Prep Plant	National Average
2021 (1)	152,061	1	—	1.32	1.14
2020	187,622	2	—	2.13	1.18
2019	167,213	1	1	1.20	1.67
2018	112,029	1	1	1.79	1.43

(1)Through Third Quarter 2021

The Elk Creek Preparation Plant historical NFDL Incidence Rates are similar to the national average.

13.5 LIFE OF MINE PLAN MAP

The projected mining for the Elk Creek Complex LOM Plans are shown on Figures 13.5-1 through 13.5-9.

Figure 13.5-1 Life of Mine Plan, No. 2 Gas and Eight-Kay Deep Mine

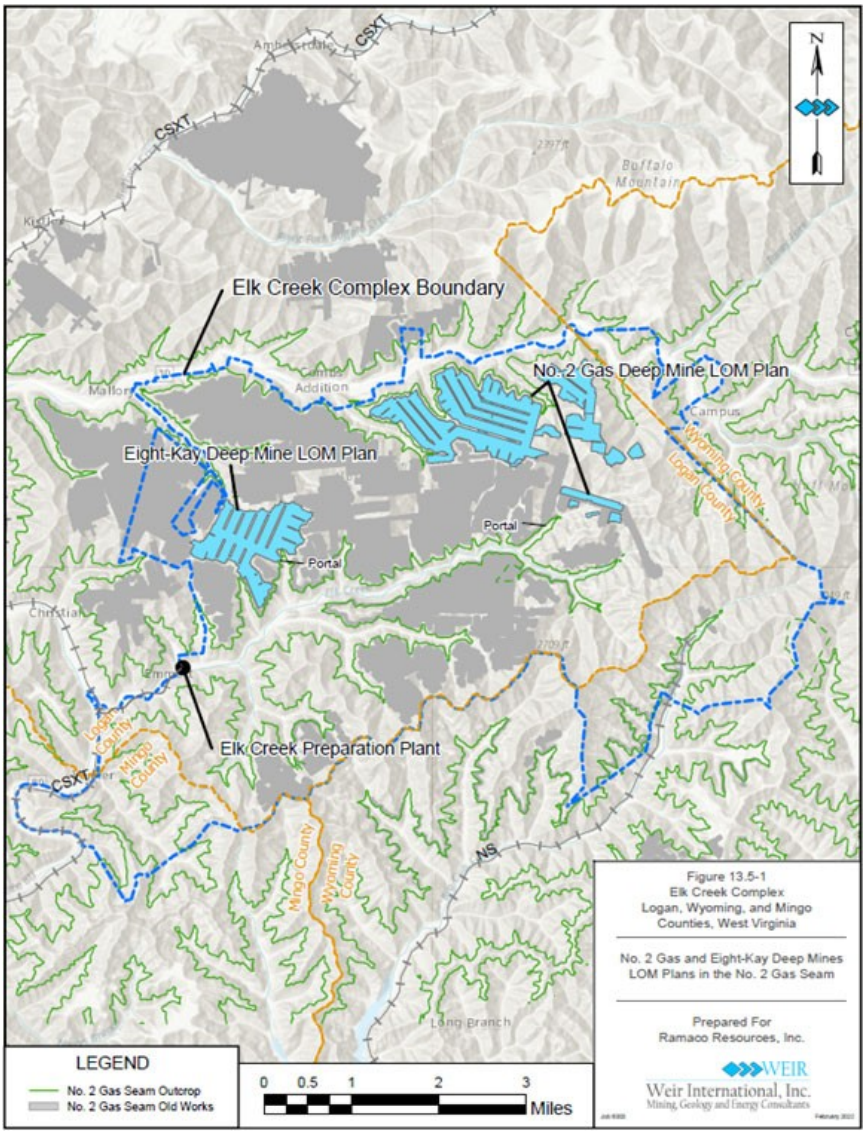


Figure 13.5-2 Life of Mine Plan, Ram No. 1 and No. 3 Surface and Highwall Mines

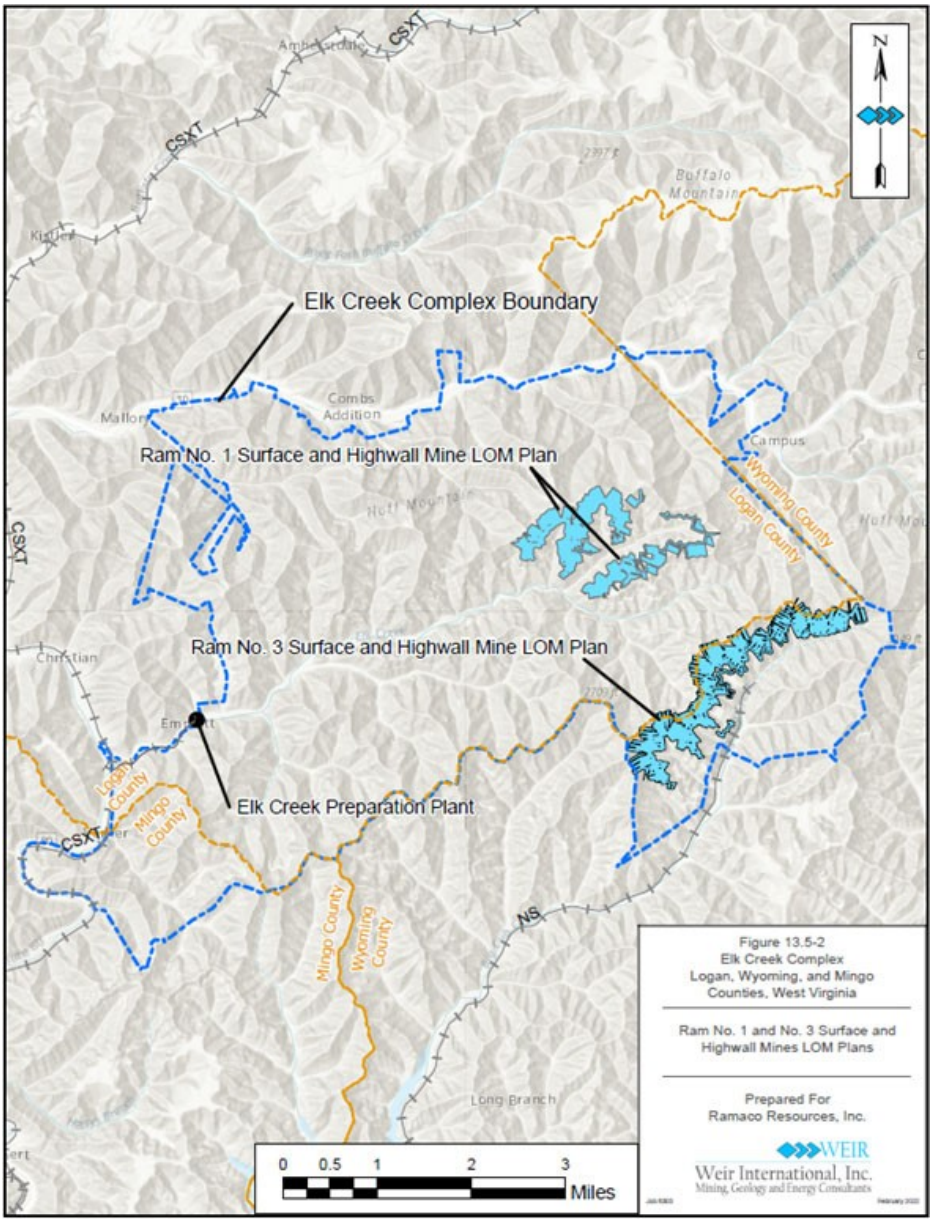


Figure 13.5-3 Life of Mine Plan, Rockhouse Eagle Deep Mine

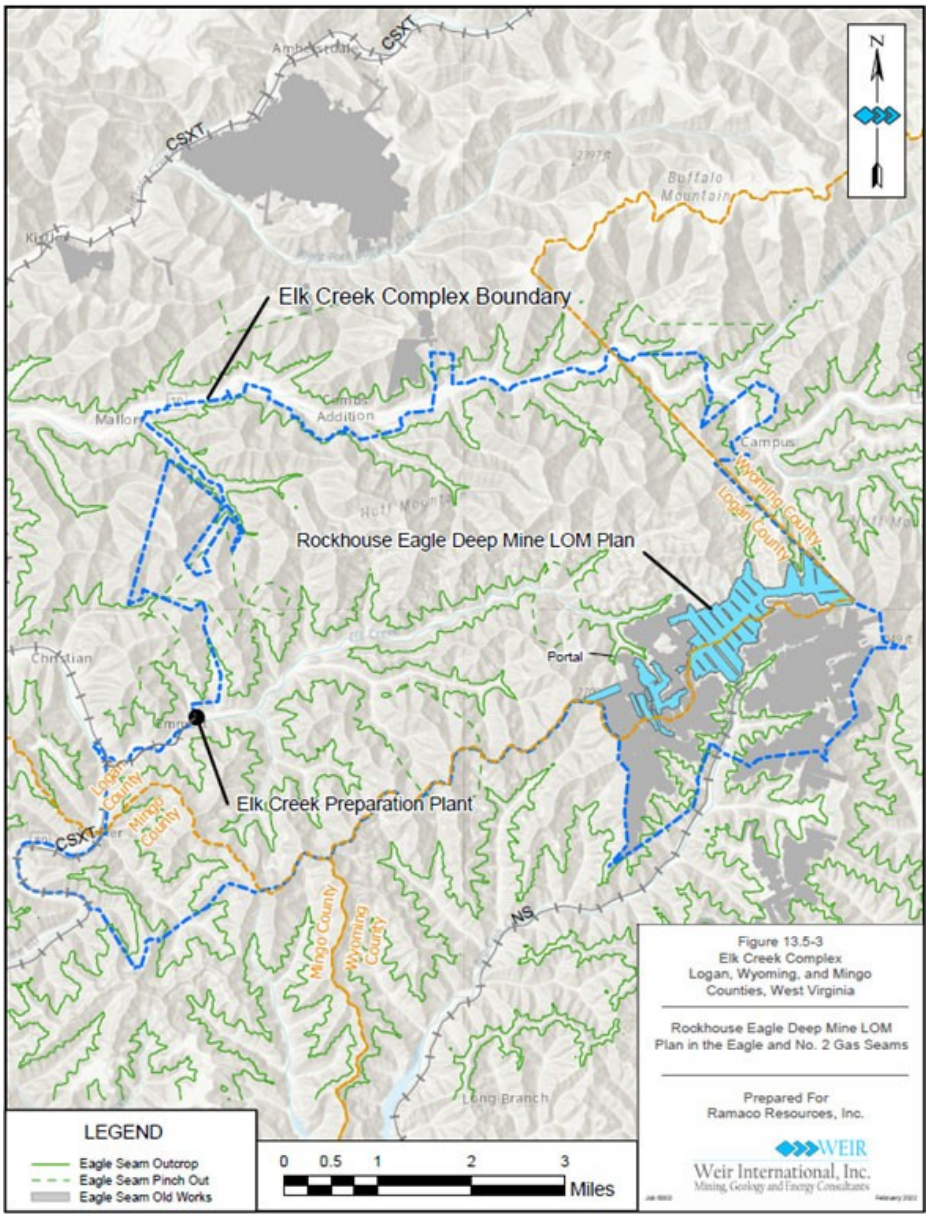


Figure 13.5-4 Life of Mine Plan, Glenalum Tunnel #1 Deep Mine

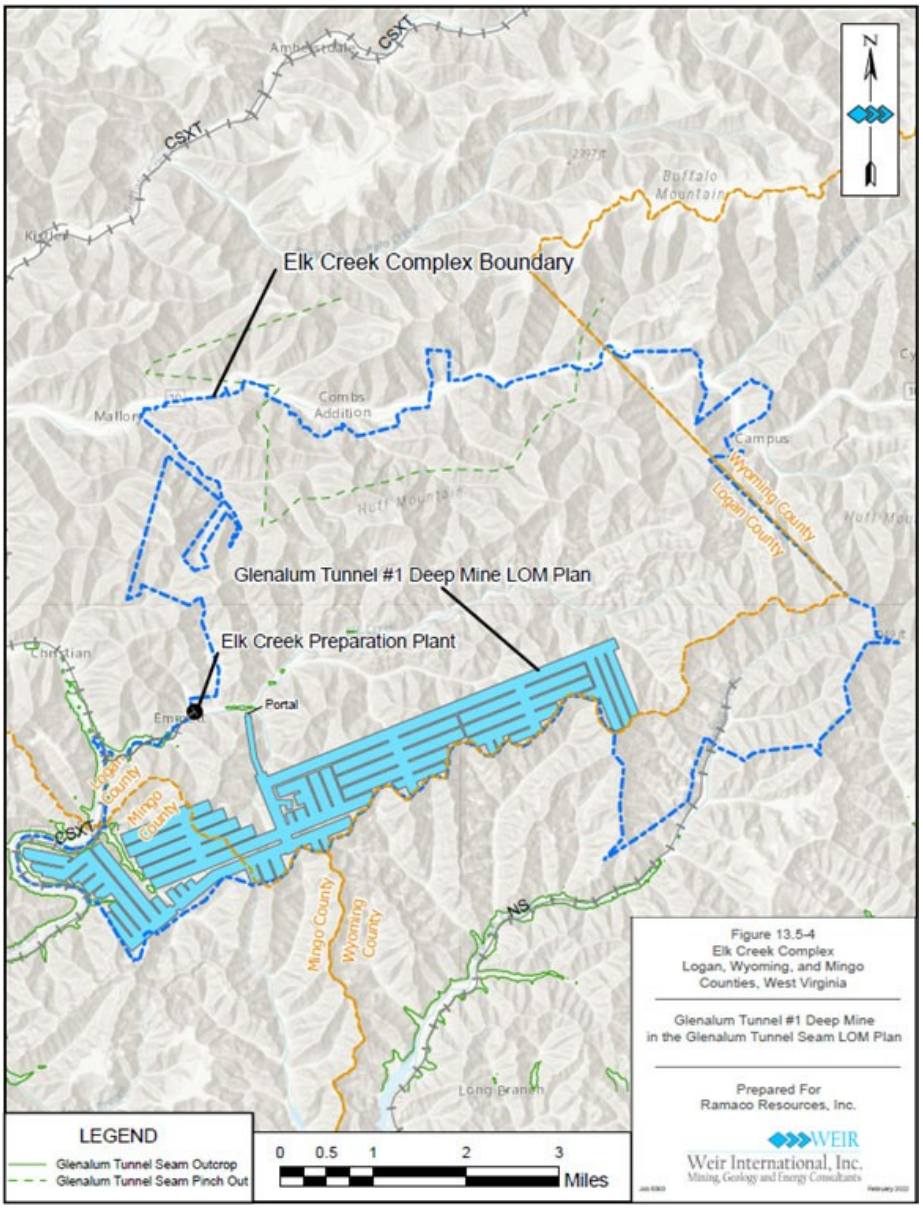


Figure 13.5-5 Life of Mine Plan, Bens Creek Deep Mine

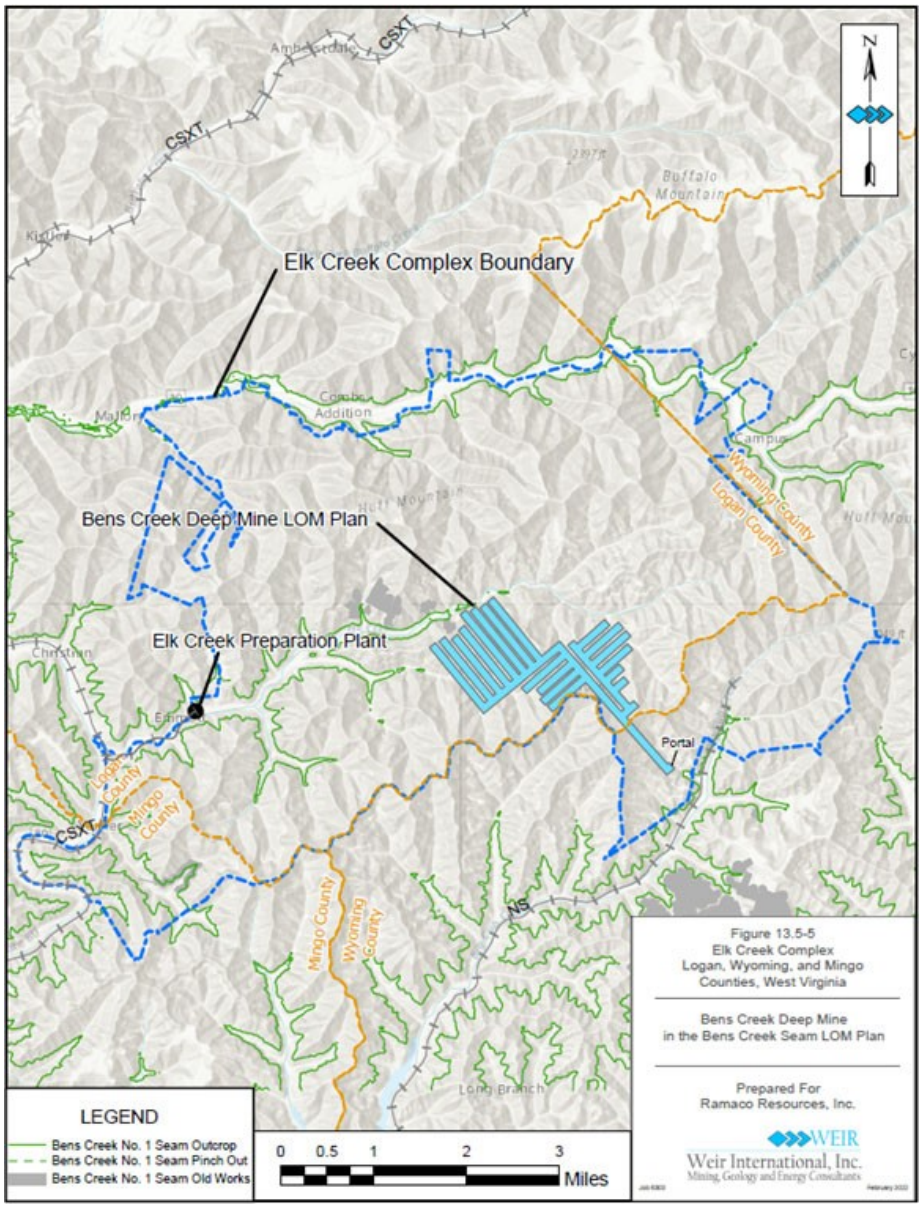


Figure 13.5-6 Life of Mine Plan, Michael Powellton Deep Mine

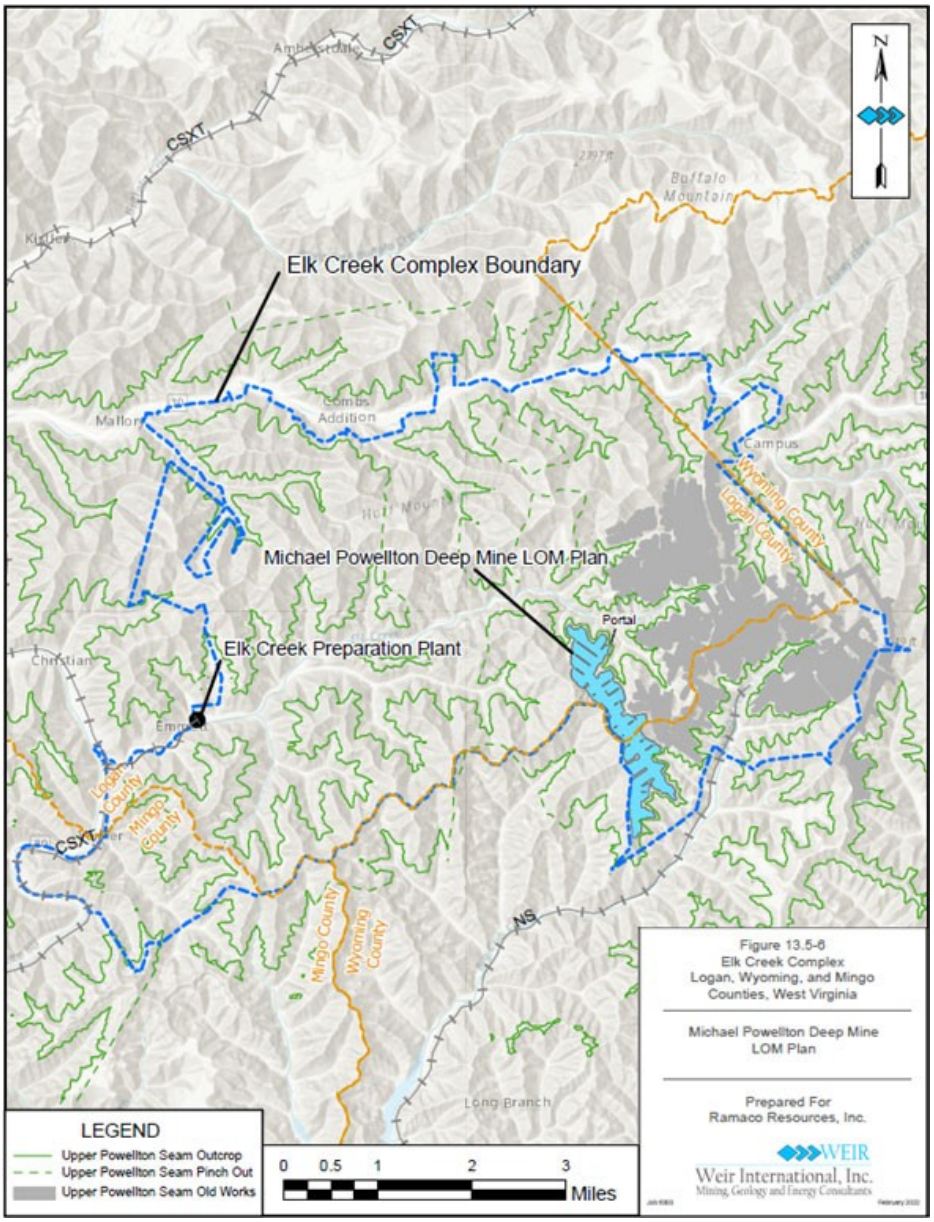


Figure 13.5-7 Life of Mine Plan, Crucible and Stonecoal No. 2 Deep Mines

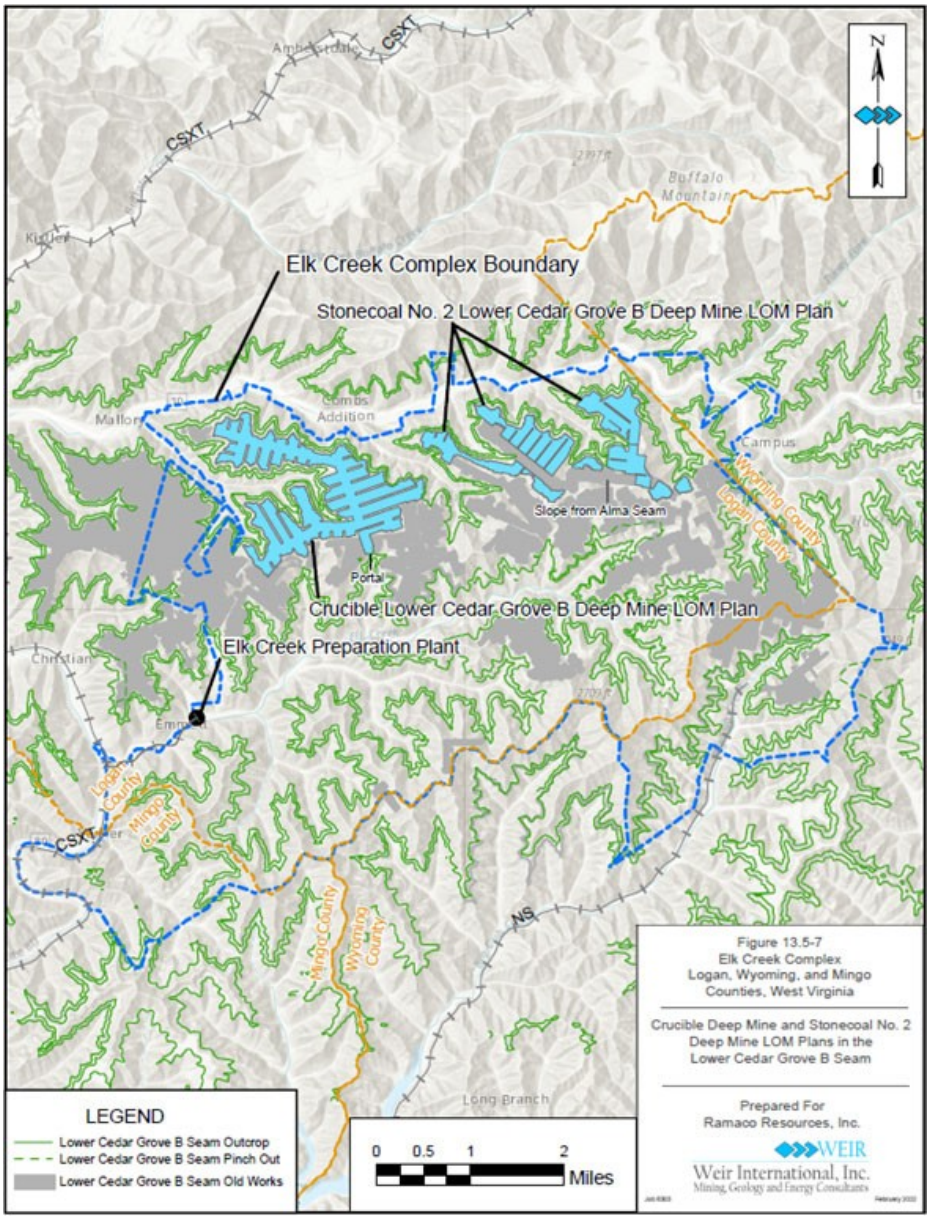


Figure 13.5-8 Life of Mine Plan, Crucible Lower Cedar Grove Deep Mine

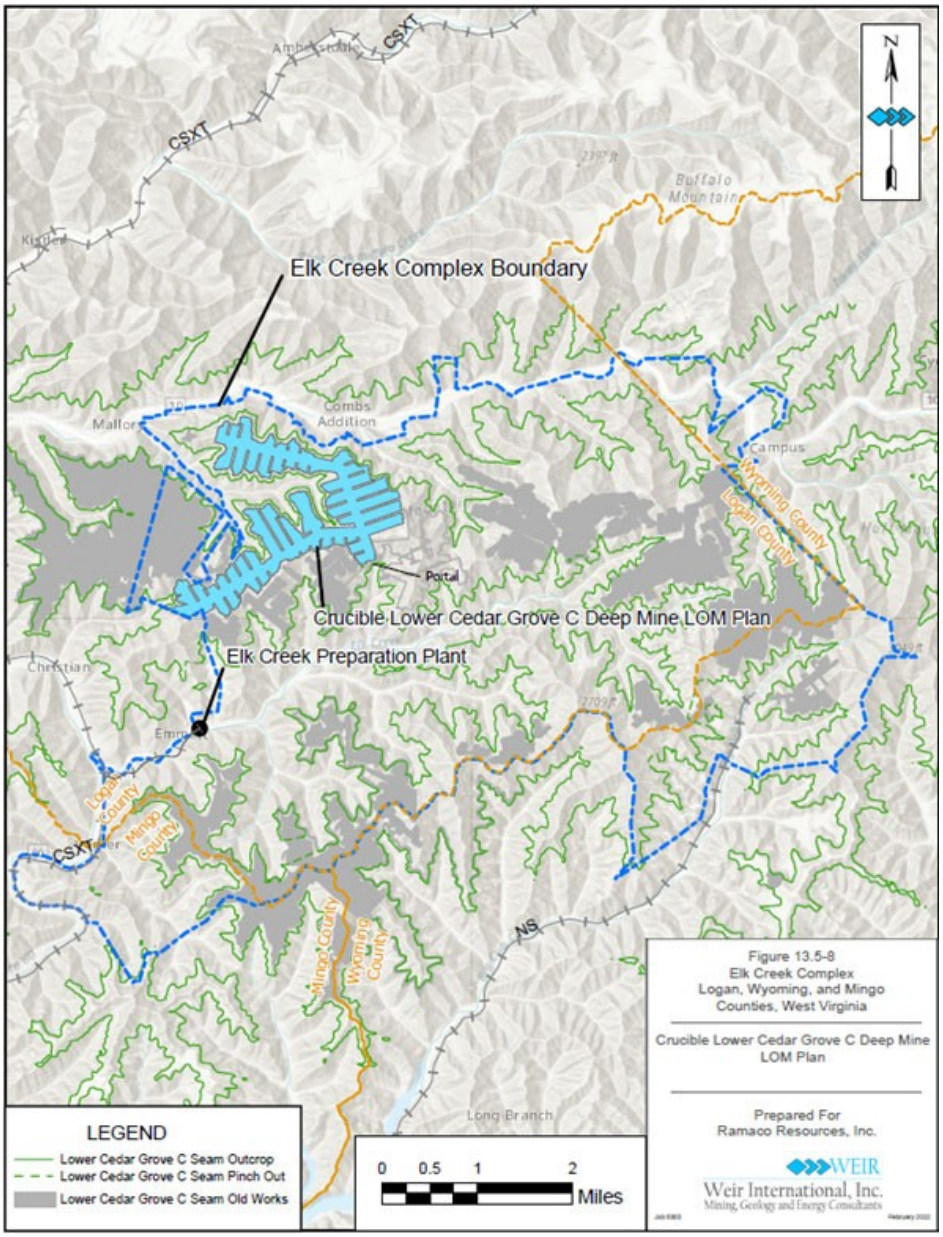
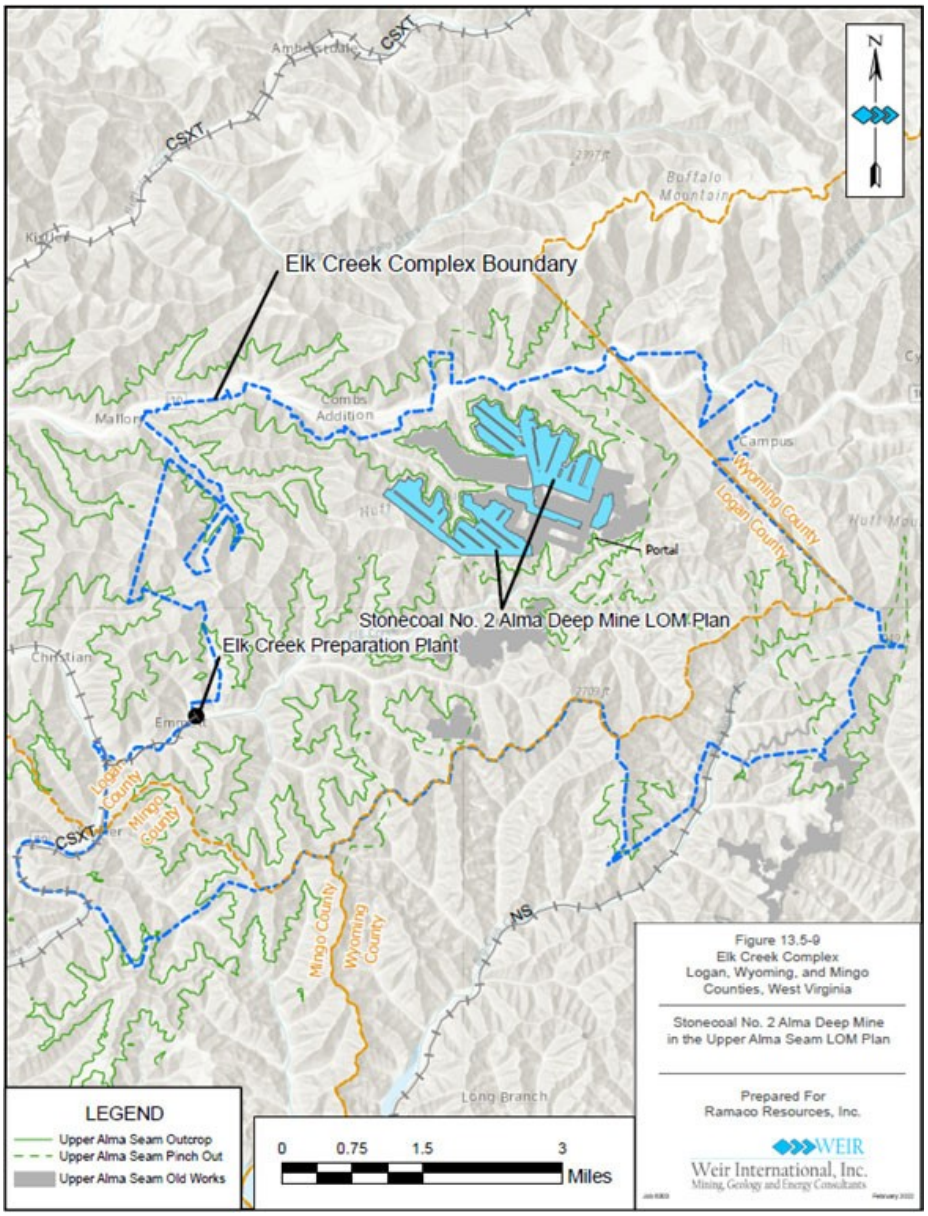


Figure 13.5-9 Life of Mine Plan, Stonecoal No. 2 Alma Deep Mine

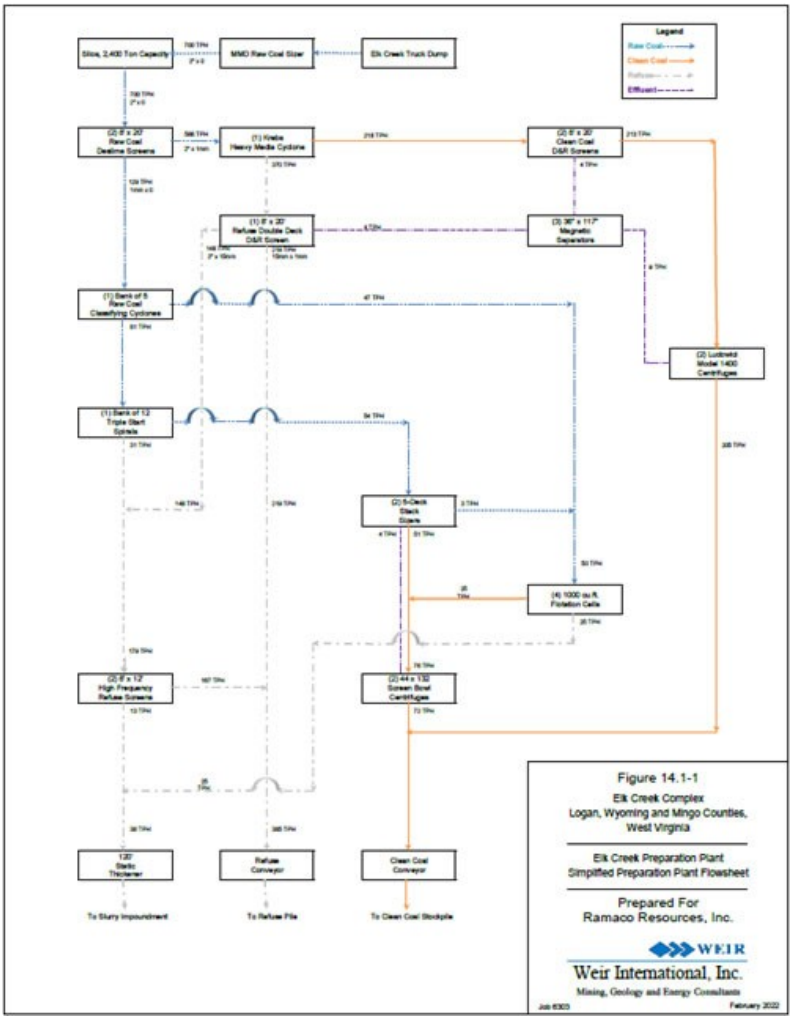


14.0 PROCESSING AND RECOVERY METHODS

14.1 PLANT PROCESS AND FLOWSHEET

The Elk Creek processing circuits include a heavy media cyclone, classifying cyclones, spirals, and conventional self-aspirating flotation cells. A simplified flowsheet for the Elk Creek Preparation Plant is shown on Figure 14.1-1.

Figure 14.1-1 Simplified Preparation Plant Flowsheet



14.2 PLANT PROCESSING DESIGN, EQUIPMENT CHARACTERISTICS AND SPECIFICATIONS

The Elk Creek Preparation Plant, built in 2017 by Raw Resources Group located in Princeton, West Virginia, is a well designed and constructed preparation plant. The preparation plant has a design capacity of 700 ROM tons per hour. Based on the Elk Creek Complex LOM Plan average projected preparation plant yield of 37.0 percent, a 24/7 processing schedule, and 95 percent plant mechanical availability, the plant has a capacity of approximately 2.5 million clean tons per year with its existing circuitry.

ROM coal from the mines on the complex is hauled by over the highway end-dump trucks to the Elk Creek Preparation Plant and dumped into a drive-over-hopper. The ROM coal enters a 2 inch sizer and conveyed to one of two ROM coal silos. From the ROM silos, a 42 inch silo collecting conveyor feeds the 36-inch plant feed conveyor.

The plant feed ROM coal material is screened at +2 inch, 2 inch x 1 mm and 1 mm x 0. The 2 inch x 1 mm ROM coal is washed in a heavy media cyclone. The 1mm x 100M material is washed by way of Humphry triple-start spirals. The ultrafine 100 mesh x 325 mesh material is cleaned by way of one bank of 4-1000 cubic feet conventional self-aspirating flotation cells.

Course reject material is conveyed and stored in a 300-ton bin prior to being trucked to the disposal sets. Fine reject material from the thickener underflow was previously pumped to the impoundment for disposal. However, in 2020, plate presses were added allowing for the dewatering of this material. The existing impoundment has been converted principally into a combined refuse facility, having approximately 20 years of disposal life.

The preparation plant operates two, 12-hour shifts per day, seven days per week, and averaged 14,802 ROM and 5,844 clean tons per day through September 2021 year to date. The Elk Creek Preparation Plant averaged 95.2 percent mechanical availability in 2021.

The preparation plant and coal handling facilities consist of the following equipment shown in Table 14.2-1:

Table 14.2-1 Major Preparation Plant and Material Handling Equipment

ROM Coal Handling System		
1	-	Truck Scale
1	-	Truck Dump, Drive Over
1	-	Single Stage ROM Coal Sampler
2	-	Silos, 2,400 Ton Total Capacity
3	-	ROM Coal Reclaim Feeders
1	-	Reclaim Conveyor, 42-Inch x 212-Feet
1	-	ROM Coal Double Deck Scalping Screen, 8-Feet x 20-Feet
1	-	MMD 500 Sizer
2	-	Belt Scales
1	-	Plant Feed Conveyor, 36-Inch x 373-Feet
Preparation Plant - 700 ROM TPH		
1	-	Tramp Iron Magnet
2	-	ROM Coal Single Deck Deslime Screens, 8-Feet x 20-Feet
1	-	Heavy Media Cyclone, 40-Inch Diameter
2	-	Clean Coal Single Deck Screens, 8-Feet x 20-Feet
2	-	Centrifuges, 300 Tons Per Hour
1	-	Refuse Double Deck Drain and Rinse Screen, 8-Feet x 20-Feet
5	-	Water Only Cyclones, 15-Inch Diameter
1	-	Bank of 12 Triple Start Spirals
2	-	High Frequency Refuse Dewatering Screens, 6-Feet x 12-Feet
2	-	Five Deck Stack Sizers
4	-	Flotation Cells, 1,000 Cubic Feet
2	-	Screen Bowl Centrifuges, 44-Inch x 132-Inch
1	-	Thickener, 120-Feet Diameter
Clean Coal Handling System		
1	-	Clean Coal Conveyor, 36-Inch x 355-Feet
2	-	Two Stage Clean Coal Samplers
2	-	Stacking Tubes, 80-Feet
1	-	Transfer Conveyor, 36-Inch x 160-Feet
1	-	Reclaim Tunnel
8	-	Reclaim Feeders
1	-	Loadout Conveyor, 60-Inch x 1,000-Feet
2	-	Belt Scales
1	-	300-Ton Surge Bin
1	-	150-Ton Batch Weigh Railroad Car Loadout
Refuse Handling System		
4	-	Refuse Conveyors, 36-Inch x 2,823-Feet (Total)
1	-	Belt Scale
1	-	Refuse Bin, 300-Ton

Total stockpile capacity at the Elk Creek Preparation Plant is approximately 2,400 tons of ROM coal, in two silos, and 50,000 tons of clean coal in ground storage. There is limited ground storage for ROM coal at the truck dump and each of the mine sites as well as some permitted, satellite ROM coal stockpile areas. The rail loadout facility has a capacity of 4,000 tons per hour and it can load 150-car unit trains. The load-out facility is served by the CSX Railroad.

14.3 ENERGY, WATER, PROCESS MATERIALS, AND PERSONNEL REQUIREMENTS

The preparation plant consumes approximately 4.0 million kilowatt-hours of electricity/month. Requirements for make-up water is minimal as all water is recirculated and re-used. The make-up water, when needed, can be obtained from either Elk Creek, available deep wells, or from abandoned underground mine pools.

Magnetite consumption is approximately 0.55 pounds per ROM ton processed. The preparation plant chemicals utilized cost approximately $0.51 per ROM ton processed (excluding magnetite).

Personnel requirements to operate the processing shifts at the preparation plant are three salary and 22 hourly employees per shift, including the environmental crew. In addition, there are two salary and six hourly personnel that perform administrative and maintenance duties associated with the preparation plant.

15.0 INFRASTRUCTURE

15.1 ROADS

The Elk Creek Complex can be accessed by state roads SR 10 and SR 80, and US Route 52. Multiple state, county and local roadways traverse the area, providing broad access to the central portion of the property, however, roads to the higher elevation ridges are limited.

15.2 RAIL

The CSX Railroad runs north/south along SR 80 and the Guyandotte River, with a spur line to the Elk Creek rail load-out facility. The NS Railroad has a rail spur that accesses the east side of the property.

15.3 POWER

Electrical power on the Elk Creek Complex mines is provided by AEP through 46 kV transmission lines, which is stepped down to 34.5 kV for transmission on the Elk Creek Property. One main substation is located near the preparation plant with two circuits; one circuit for the preparation plant and one circuit for the mines The average industrial price for electrical power is 6.4 cents per KWH.

15.4 WATER

Water for the mining operations is provided from Elk Creek, various deep well sites, from settling ponds located on the surface, and from abandoned underground mine pools. Clarified water from the settling ponds is used for dust sprays on the mining equipment. Potable water service is provided to the Elk Creek Preparation Plant and mine offices via the city of Logan.

15.5 PIPELINES

There are numerous gas collection lines that service gas wells within the Elk Creek Complex, with any construction and earth moving activities in proximity to these lines requiring coordination with the gas line owner.

15.6 PORT FACILITIES, DAMS, AND REFUSE DISPOSAL

Port Facilities

Coal from the Elk Creek Complex is railed, via the CSX, primarily to Dominion Terminal Associates LLP (DTA), located at the Port of Hampton Roads in Newport News, Virginia. Elk Creek Complex saleable coal has also been railed to the Pier IX terminal, operated by Kinder Morgan Energy Partners, also located at the Port of Hampton Roads.

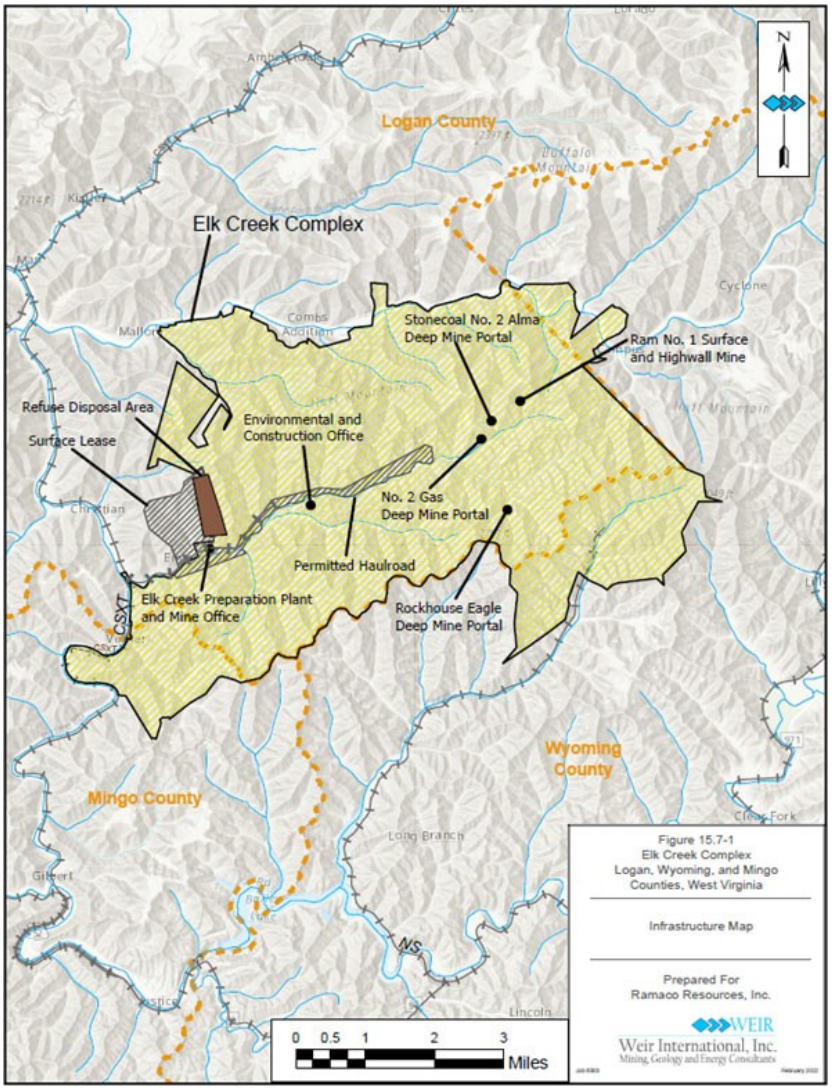
Dams and Refuse Disposal

Coal refuse from the Elk Creek Preparation Plant is currently disposed at the Oldhouse Branch Refuse Disposal Area which is a permitted impoundment. There are no other dams or impoundments on the Elk Creek Complex. Refer to Section 17.2 for details on coal refuse disposal for the complex.

15.7 MAP OF INFRASTRUCTURE

Mine facilities are generally kept to a minimum. At the mine portal locations, there is typically a small bath house and office with a parking lot, and a parts trailer. There are no significant facilities at the Ram No. 1 Surface and Highwall Mine. The Elk Creek Complex infrastructure is summarized below on Figure 15.7-1.

Figure 15.7-1 Mine Infrastructure



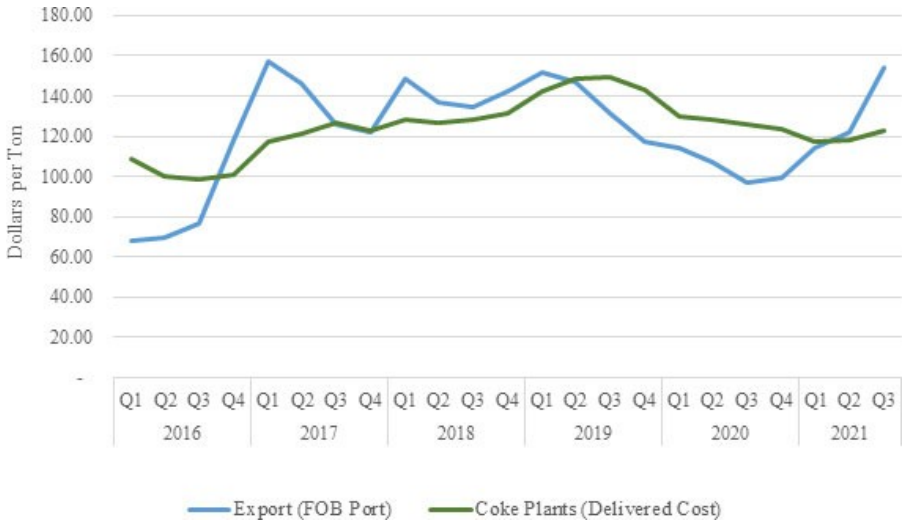
16.0 MARKET STUDIES

16.1 MARKETS

The Elk Creek Complex can produce high volatile A and high volatile B saleable coal products. The high volatile A and B products represent approximately 95 percent of the complex's projected annual sales, with the remainder of coal sales consisting of specialty coal products and a thermal coal product.

The market for metallurgical coal from the Elk Creek Complex consists of both domestic metallurgical coal consumers and exports into the global seaborne metallurgical coal market. The US Energy Information Administration (EIA) compiles average historical price data for metallurgical coal delivered to domestic coke plants and metallurgical coal delivered to tidewater terminals for export. Note that the EIA data includes all classifications of metallurgical coal (high, mid and low volatile) as well as both spot and contract sales prices. Historical prices for metallurgical coal, as reported by the EIA, are shown on Figure 16.1-1 as follows:

Figure 16.1-1 Metallurgical Coal Sales Prices



Source: EIA Quarterly Coal Report

Between 2016 and Third Quarter 2021, export prices (FOB port) and domestic coke plant prices (delivered cost) have averaged $121.81 and 124.33 per ton, respectively.

A thermal coal product is sold from the Elk Creek Complex which is produced from oxidized coal recovered from Ramaco's surface mining operations. Most of this oxidized coal is sold raw while on occasion it is processed at the Elk Creek Preparation Plant. This coal is sold on spot markets (no contracts), based on product availability.

16.2 MATERIAL CONTRACTS

On October 28, 2021, Ramaco announced completion of 2022 sales negotiations with its North American steel customers. Ramaco (across all of its operations) is contracted to sell 1.67 million tons of both low volatile and high volatile metallurgical coal at an overall average price of roughly $196 per ton FOB mine.

Contracted domestic metallurgical coal sales from the Elk Creek Complex represent approximately 68 percent of Ramaco's 2022 projected coal sales tonnage, with metallurgical coal exports representing 27.5 percent and thermal and specialty coals representing 2.5 and 2.0 percent, respectively, of Ramaco's 2022 projected coal sales.

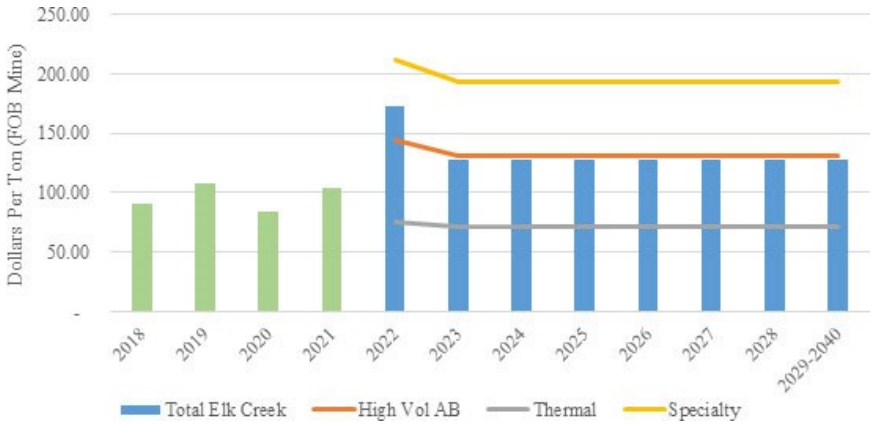
Ramaco has a contract with CSX for rail transportation of its saleable coal, which is renewed annually. For coal exports, CSX transports coal from the Elk Creek Preparation Plant to Dominion Terminal Associates LLP, located at the Port of Hampton Roads in Newport News, Virginia.

16.3 PRICE FORECAST

For purposes of this report, WEIR utilized price forecasts which Ramaco prepared for its Elk Creek Complex coal sales. Ramaco based its Elk Creek Complex FOB mine pricing on available FOB Port index forward pricing and Ramaco's estimated adjustments for Elk Creek coal quality, freight expense, and loading expense. Ramaco's price forecasts and adjustments reflect its experience in selling and transporting Elk Creek Complex saleable coal since 2016.

Ramaco's historical (2018 through 2021) and forecast (2022 through 2040) FOB mine coal sales price for the Elk Creek Complex is shown on Figure 16.1-2.

Figure 16.1-2 Historical and Forecast Coal Sales Price



Ramaco's forecasted Elk Creek Complex FOB mine coal sales price is $172.85 per ton in 2022, $127.37 in 2023, $127.67 in 2024 and ranges from $127.44 to $128.10 from 2025 through 2040.

17.0 ENVIRONMENTAL STUDIES, PERMITTING, AND LOCAL INDIVIDUALS OR GROUPS AGREEMENTS

17.1 ENVIRONMENTAL STUDIES

As part of the permitting process required by the WVDEP, numerous baseline studies or impact assessments were undertaken by Ramaco. These baseline studies or impact assessments included in the permit are summarized as follows, with pertinent text from the permit replicated below:

- Groundwater Inventory and Baseline Quality
- Surface Water Baseline Quality and Quantity
- Surface Water Runoff Analysis
- Probable Hydrologic Consequences

Groundwater Inventory and Baseline Quality
Ramaco conducted surveys to inventory water use and to determine the extent and purpose of ground water usage in the areas that could be affected by existing and planned mines within ½ mile of proposed mining limits for each permitted mine site. Field teams made door-to-door visits to these potentially affected residents to gather information by way of completing questionnaire forms regarding water supply source(s), extent of reliance, purpose of reliance (domestic, agricultural, etc.), depth of well(s), character of springs, and other data. The teams measured water level depths in wells where possible and agreeable by owners and obtained surveyed locations accordingly. The detailed results of the surveys are included in each site's WVDEP permit application.

Surface Water Baseline Quality, Quantity, and Runoff Analysis
Baseline surface water monitoring for flow and quality parameters was conducted at strategic, WVDEP-approved locations over a period of six months for each of the permit areas. During mining and through the final release of the permit, the stations selected for each site are monitored in accordance with the approved surface water monitoring plans submitted in the site's permits. Data collected during this period will be compared with the pre-mining baseline data to determine if and how the proposed operation is affecting the surface water systems. If necessary, remedial measures can be taken to assure the protection of the surface water systems.

Based on samples from adjacent mining and the baseline surface water sampling there should be no acid or toxic mine drainage. However, all coal wastes will be treated as potentially toxic material and handled accordingly using encapsulation cells that are discussed below.

Surface water runoff analyses were performed over the watershed(s) associated with each permit site to evaluate the potential impact of proposed operations on flooding and streamflow alteration. Peak discharges were calculated for the "pre-mining", "during-mining", and post-mining" conditions and were compared. These evaluations were performed using SEDCAD 4 software, developed by the University of Kentucky. These analyses and results are included in the individual sites' permits and show that there will be no increase in peak discharge during mining or post mining for any of the permit areas. It should be noted that in order to attain these acceptable results, the construction of some additional sediment control structures was required at the Ram No.1 Surface and Highwall Mine. Original laboratory data sheets for surface and ground water baseline monitoring are included in the permit.

Probable Hydrologic Consequences
PHCs were evaluated for each permit application. Planned subsidence will occur where retreat mining has been executed as approved. It is expected that direct fracturing of overburden will occur with consequently increased porosity (increased storage capacity) and lateral permeability in response to mining. The little water that is present in that strata will be drained into the underground mines, but the overlying intervals contains no significant aquifers other than, perhaps, the coal seams. Highwall mining will be conducted in such a manner that subsidence will not occur and as thus, should be of no consequence to PHC.

In summary, all of the Ramaco existing and proposed mines are well above any significantly producing aquifers. The PHC studies and results are included in each individual sites' permit application. The PHC studies showed no significant ground or surface water resource is likely to be contaminated, diminished, or interrupted, providing that the approved drainage control and revegetation plans are adhered to throughout existing and planned mining activities.

17.2 REFUSE DISPOSAL AND WATER MANAGEMENT

Refuse Disposal
The Elk Creek Complex Facility (MSHA ID No. 46-02444) is a coal refuse disposal facility that is fully permitted and active. This facility is known as the Oldhouse Branch Refuse Disposal Area. There are also two additional proposed refuse disposal fill areas (Christian Branch Refuse Disposal Area and Bear Brach Refuse Disposal Area) which also include multiple access roads and haul roads. These two proposed refuse fill areas are currently partially permitted.

The Oldhouse Branch Refuse Disposal Area was initiated in the early 1990s by Island Creek. The proposed Christian Branch Refuse Disposal Area is located to the west of Oldhouse Branch. The proposed Bear Branch Refuse Disposal Area is located to the east of Oldhouse Branch. Both of these new areas will be constructed in a stair-step fashion using course refuse as buttress material for constructing lifts for the refuse impoundments, similar to the current Oldhouse Branch methodology.

Designed subdrains effectively consolidate the fine refuse impoundment layers by draining excess moisture. As with other permit sites on the complex, any site outflow from the refuse disposal area is required to meet WVDEP standards and such outflow will be monitored similarly to the other sites as described in Section 17.2.

A PHC investigation completed in 2020 concluded that the refuse disposal facilities' operation should not result in water supply contamination or impact availability for any underground or surface water source currently being used for domestic, agricultural, industrial, or any other legitimate purpose situated adjacent to the proposed operation. Ramaco obtained a waiver for ground water monitoring for the facility on the same basis outlined in permits for its mine sites. Surface water monitoring is performed in a similar manner to those outlined for the mine sites. A set of piezometers are currently used to closely monitor the phreatic water table adjacent to the Oldhouse Branch refuse disposal structure.

These refuse disposal structures will not be constructed in such a size or manner that will be subjected to the West Virginia Dam Control Act and/or MSHA regulations. Stability analyses of both refuse disposal structures show that design of the structures exceeds the minimum safety factors of 1.5 for static stability and 1.2 for dynamic stability that are required by the current West Virginia State Code of Regulations. The stability analyses were performed using the Rotational Equilibrium Analysis of Multilayered Embankments software that is copyrighted by the University of Kentucky.

No mining is proposed for Elk Creek refuse disposal operations, other than incidental coal removal associated with the construction of roads and drainage controls. No coal or non-coal disposal is planned at any of the mine sites.

Water Monitoring and Management

In order to determine the impact of existing and proposed operations on the hydrologic balance, surface water samples are collected bi-monthly with a minimum seven days between sample dates at each of the permitted sites. Samples are sent to a qualified laboratory and analyzed for the following parameters: flow, pH, total acidity, total alkalinity, total iron, total manganese, total sulfates, total suspended solids, and total dissolved solids or specific conductance at 25 degrees C. The samples collected during and after mining will be compared with each other, and with the data collected during the baseline surface water study and used to determine the impact of the operation on the water in the receiving streams.

A waiver of groundwater monitoring during mining was requested for the mine sites due to the proposed mining being well above any groundwater users and any significant aquifers that insure water use.

All water samples collected are sent to Compliance Monitoring Laboratories, Inc., located in Chapmanville, West Virginia for analysis. This laboratory has its own internal quality control and quality assurance protocols. Results of water sampling has shown no significant levels of surface water contamination at the mine sites.

No specific water treatment facilities other than sediment control are required or planned for any of the mine sites. Based on previous mining and collected water samples. the operations will not contaminate any of the ground or surface water systems of the Elk Creek Complex.

Surface water management for both Ramaco's surface and underground permitted mining areas on the Elk Creek Complex generally involves a combination of structures such as; 1) sediment ditches, 2) temporary sedimentation ponds, 3) soil encapsulation cells that are specifically designed to contain potentially hazardous soil in regards to acid forming materials, 4) permanent and temporary diversion ditches, 5) corrugated metal pipe placement for drainages that cross access roads or haulroads, and 6) drainage diversion ditches and collections for excess spoil disposal areas. The surface mines such as the Ram No. 1, No. 2, and No. 3 Surface and Highwall Mines have a relatively large network of this construction. The underground mine locations have a significantly smaller footprint, however, these locations use the same surface water management design considerations as the surface mines. Detailed designs for all drainage and sediment control structures are included in permit. There are no significant water retention structures subject to West Virginia Dam Control Act or MSHA regulations. There are no permanent impoundments planned at any of the mine permit sites.

Detailed designs for haul roads that connect the mine sites with the Elk Creek Preparation Plant have been provided in the permits along with associated drainage control and abandonment plans. Rail systems only serve the Elk Creek Preparation Plant. No conveyor systems connect the mines with the preparation plant, only over-the-highway trucks are used in this capacity.

The Guyandotte River is considered a navigable waterway by the Army Corps of Engineers (Corps), and therefore, Corps approval must be obtained for earthwork affecting any tributaries. Approvals by the Corps has in general been favorable for Ramaco efforts to date. This has primarily involved earthwork activities such as CMP installations for haulroads and underground mine site face ups that have or will impact some intermittent streams that ultimately flow into the Guyandotte River.

All permitted mine sites have a Materials Handling Plan designed to mitigate the potential for acid mine drainage generation in regard to those materials excavated during the land disturbance activities associated with development of the proposed mining facility. Some areas have known potentially acid generating materials. This is determined from Acid Base Accounting data that is collected as part of the permitting requirements. Also, selenium data is documented within the water chemistry of the equivalent mine discharge samples. The equivalent water data provides a more appropriate geochemical characterization as compared to in-situ strata testing.

Material that requires special handling for potentially acidic discharges meets the following standards: have a net acid base accounting that is ≥-5 and at least 1 foot thick; have Selenium concentrations greater than 1 mg/kg and at least 1 foot thick; have a pH ≤4 and be at least 1-foot-thick. Materials to be specially handled will be placed in encapsulation cells to assure there is no potential for acid producing material. The cells will be located on the mine bench in an area free of any seeps, springs, or mine drainage, "high and dry", and sealed with a minimum of 4.0 feet of the most imperious material available. The approximate location of planned encapsulation cells are shown on the Geohydrologic Maps that are included in the permit applications.

Discharges from these structures will be monitored in accordance with the approved plans. Sediment structures will be cleaned or enlarged, if the total suspended solids exceed effluent limitations. All discharges will go through sediment control structures. The pond discharges will be monitored in accordance with approved plans and treated to meet effluent limitations, if needed.

In regard to highwall mining concerns, there is no residual head of water anticipated on any of the designed outcrop barriers which are designed at a minimum of 50 feet width. There is potential for a gravity discharge from the Lower Cedar Grove A and C Seam highwall mining in the area south of Stonecoal Branch since the highwall mining is up-dip. However, based on water samples collected from adjacent mining, there is not anticipated to be any acid, alkaline, or iron laden drainage. The majority of all other highwall mining is down dip and therefore, there is not anticipated to be gravity discharge of groundwater resulting from highwall mining.

All permitted sites have a surface water runoff monitoring plan. Within twenty-four hours of a one-year frequency, twenty-four hour storm event (which is 2.40 inches in Logan County) or greater, a permit-wide inspection and report of the drainage systems is completed and submitted to the WVDEP. The inspection and subsequent report note any damages or deficiencies in the drainage system so that repairs can be implemented immediately. It also indicates if any sediment structure is at or near it's clean out capacity (60 percent). A rain gauge, located at the mine office on Elk Creek Complex is used to monitor precipitation events. In-stream monitoring stations are used to take stream flow measurements. The rain gauge is monitored daily and reported monthly to the WVDEP.

17.3 PERMITS AND BONDING

Coal mines in West Virginia are required to file applications for and receive approval of mining permits issued by the WVDEP to conduct surface disturbance and mining activities. The Elk Creek Complex has been issued mining permits and associated NPDES permits by the WVDEP as shown in Table 17.3-1 as follows:

Table 17.3-1 Elk Creek Complex Mining and NPDES Permits

Facility Name	Permit Number	Permitted Surface Are (Acres)	Issue Date	Current Status	NPDES Permit No.
Ram No. 1 Surface and Hiwall Mine	S500713	502	1/5/2015	Renewed	WV1028090
Ram No. 2 Surface and Hiwall Mine	S500217	309	12/14/2017	Active	WV1028421
Ram No. 3 Surface and Hiwall Mine	S500219	474	3/2/2020	New	WV1028545
No. 2 Gas Deep Mine	U500115	31	12/1/2015	Renewed	WV1028227
Eight-Kay Deep Mine	U500316	9	9/27/2017	New	WV1028413
Michael Powellton Deep Mine	U500320	8	9/1/2020	New	WV1031015
Rockhouse Eagle Seam Deep Mine	U500413	32	2/14/2014	Renewed	WV1004751
Glenalum Tunnel #1 Deep Mine	U500518	5	5/20/2019	New	WV1028511
Crucible Lower Cedar Grove Deep Mine	U501115	13	9/6/2017	Not Started Extended	WV1028341
Stonecoal No. 2 Alma Deep Mine	U502596	51	2/11/1997	Renewed	WV1004671
Island Creek Eagle Mine No. 1 Portal	U505687	8	12/8/1987	Active	WV1004751
Oldhouse Branch C Seam Portal	U506186	10	10/1/1986	Phase 1 Released	WV0064840
Elk Creek Preparation Plant	P059000	242	1/18/1981	Renewed	WV0064840
Elk Creek Haulroad	H045600	152	1/4/1993	Renewed	WV0064840
Phase 5E Prospect (09/04/2020)	P500520	1	9/28/2020	New	NA
No. 2 Gas Outcrop Prospect	P500820	1	12/4/2020	New	NA
Phase 8 Prospect	P502519	9	11/12/2019	New	NA
Coal Mountain Loadout	O500321	29	NA	Pending Application	WV1028545
Elk Creek Refuse Facility	O500620	388	NA	Pending Application	WV1031058
Total		2,273			

The total bond amount of $6.4 million held by Ramaco is based on the mine closure reclamation liability cost estimate as of June 28, 2021. The ARO estimate for all sites on the complex is $5.3 million, as of June 28, 2021. The WVDEP utilizes a bond matrix that determines the rate per acre based upon the activity that the land is to be used for. This rate per acre is simply applied to the permit sites' acreage to obtain the bond requirement. WEIR concludes that Ramaco's overall bonding approach, the bond amounts, and the ARO estimates that are currently allocated for the Elk Creek Complex sites appear reasonable.

The Elk Creek Complex has an environmental compliance record without a history of significant fines or citations. The following citations are noted for 2021:

- Preparation Plant P-0590-00 4/7/21 coal placed in off-site area near preparation plant
- Ram No. 1 Surface and Highwall Mine S-5007-13 4/26/21 Failure to follow performance standards for contemporaneous reclamation, performed highwall mining outside mineral removal and subsidence control plan limits
- Ram No. 1 Surface and Highwall Mine S-5007-13 7/12/21 failure to follow permit conditions for Excess Spoil Disposal Area
- Stonecoal No. 2 Alma Deep Mine U-5025-96 4/7/21 off-site disturbance
- Stonecoal No. 2 Alma Deep Mine U-5025-96 9/27/21 off-site disturbance

These citations were promptly abated by Ramaco.

17.4 LOCAL STAKEHOLDERS

As indicated in Section 13.4.2, Ramaco currently employs 314 personnel at the Elk Creek Complex and is projected to have a maximum employment of 436 personnel during the Elk Creek Complex LOM Plan. The mine also creates substantial economic value with its third-party service and supply providers, utilities and through payment of taxes and fees to local, state and federal governmental agencies.

The Elk Creek Complex is located in a rural and fairly isolated area of West Virginia. Reportedly, there have been no social or community impact issues relative to the Elk Creek Complex. The local area supports Ramaco for the jobs that it provides for people in the surrounding communities.

17.5 MINE CLOSURE PLANS

Construction for all of the currently permitted areas at the Elk Creek Complex will require the movement of an estimated 89.9 million cubic yards (swelled) of material to create an adequate working surface for the surface mined areas and fills, underground mine face-ups, haul roads, access roads, load-out facility, preparation plant facility, storage, coal stockpiles, and truck scales. Upon mine closure, areas will be reclaimed to near AOC configuration. Regrading and backfilling activities are required to commence within 180 days after the mining operations are complete.

The primary pre-mining land use for the Elk Creek Complex is forestland. The approved post-mining land use for Ramaco's permits is forestland. No land within the permit areas have been historically used for prime farmland. The slope of all land within the existing and proposed permit areas is ten percent or greater, which also precludes post-mining land use as prime farmland.

Upon completion of mining operations and regrading, topsoil will be redistributed over the disturbed areas. Mine soil that served as a base for coal stockpiles will be tested to determine if supplemental liming is necessary prior to blending this material with the other mine soil onsite. After the permit area has been graded, soil analysis will be performed to determine the quantity of agricultural limestone, or an equivalent supplement, and fertilizer necessary to achieve the post-mining land use.

All regraded areas will be revegetated as soon as practical to establish quick vegetative cover and minimize erosion. Disturbed and un-reclaimed acreage including excess spoil disposal sites, will not exceed two hundred (200) acres or fifty (50) percent of the permit area, whichever is less. Runoff from these regraded areas will be routed through properly constructed and maintained sediment structures that are designed to retain site runoff along enough for the suspended solids to settle.

Streams on the complex are generally approximately 1,000 feet below the ridges. Soils within the permit area formed in residual parent material derived from interbedded shale, siltstone and sandstone. Eighty percent of the soils in Logan County are made up of the Matewan-Highsplint-Guyandotte association. This consist of very steep soils on narrow ridge tops and on side slopes. The annual precipitation in the area averages approximately 47 inches. Woodlands make up about 85 percent of the total area in this county and soils in this area are well suited to growing forests. The areas to be disturbed and later reclaimed are in the oak-hickory type, of the Appalachian Forest and consists of yellow poplar, basswood, red and black oak, hickory, sugar maple, chestnut oak, white oak, beech, pine/hemlock, scarlet oak, other miscellaneous hardwoods. On dry ridges, spurs and southern slopes white oak, hickory, chestnut oak, Virginia pine and pitch pine are the dominant species. These sites tend to be less productive, and the timber has slower growth, while the moist coves and northern and eastern slopes contain yellow poplar, sugar maple, red oak, black oak, beech, and basswood and are more productive sites. The overall growth of these stands range from 53 cubic feet per acre per year for black oak on a Matewan soil to about 72 cubic feet per acre per year for red oak on a Guyandotte soil.

Both hardwoods and pine seedlings will be hand planted by a reputable tree planting contractor to create a diverse and productive forest. Several species will be selected to create a diverse forest. The overall stocking density for all woody plants on the permitted mine site is at least 500 plants per acre. The stocking density for trees is at least 350 plants per acre. All final land use is planned as forestland except small areas of permanent drainage structures and access roads that have been approved to remain.

Temporary erosion control vegetative cover is established as contemporaneously as practical, with backfilling and grading, until a permanent tree cover can be established. A tree-compatible cover will be used to keep the vegetation that is being established for erosion control from competing too aggressively with the tree seedlings.

17.6 ENVIRONMENTAL COMPLIANCE, PERMITTING, AND LOCAL INDIVIDUALS OR GROUPS ISSUES

Based on WEIR's review of Ramaco's plans for environmental compliance, permit compliance and conditions, and dealings with local individuals and groups, Ramaco's efforts appear to be adequate and reasonable in order to obtain approvals necessary relative to the execution of the Elk Creek Complex mining plans.

18.0 CAPITAL AND OPERATING COSTS

Ramaco provided historical operating costs and capital expenditures for the Elk Creek Complex, which were an adequate check and basis for the LOM Plan cost projections. The operating costs and capital expenditures are included in the financial statements that are audited annually by Briggs & Veselka Co. for Ramaco's 10-K reporting to the SEC. The auditing performed by Briggs & Veselka Co. is conducted in accordance with the standards of the Public Company Accounting Oversight Board.

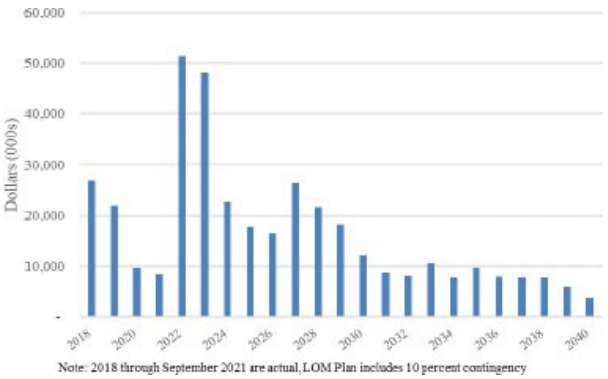
18.1 CAPITAL EXPENDITURES

The Elk Creek Complex will require capital to be expended each year for infrastructure additions/extensions, as well as for mining equipment rebuilds/replacements to continue to produce coal at currently projected annual levels of production.

Ramaco's Elk Creek Complex development costs since 2012 are considered "Sunk Costs" and as economic returns in this economic analysis are presented only on a forward-looking basis, Sunk Costs are not included in the economic return of the project, as estimated in this study.

The projected capital expenditures are categorized according to each mining operation, the Elk Creek Preparation Plant, and the Environmental Crew. Actual capital expenditures for 2018 through September 2021 and projected capital expenditures, in 2021 dollars, for 2021 through 2040, are shown on Figure 18.1-2:

Figure 18.1-2 Historical and Projected LOM Plan Capital Expenditures



The capital expenditures in 2022 and 2023 relate to startup of the Crucible underground mine, the Ram No. 3 Surface and Highwall Mine, and an upgrade of the Elk Creek Preparation Plant.

Ramaco began development of the Elk Creek Complex in 2012 and commenced mining in 2016. Mine management has had several years of experience estimating capital expenditures for surface and underground mining and the risk of inaccurate estimates is low. The LOM Plan projected average capital cost of $10.95 per ton is $0.64 per ton higher than the historical average of $10.29 per ton, from 2018 through September 2021, based on the projected mining equipment and infrastructure requirements. Capital expenditures estimates per annual ton are estimated to have an accuracy within +/- 25.0 percent.

Contingency costs account for undeveloped scope and insufficient data. Contingency for required major projects and mining equipment is estimated at 10 percent and is intended to cover unallocated costs from lack of detailing in scope items. It is a compilation of aggregate risk from estimated cost areas.

18.2 OPERATING COSTS AND RISKS

Operating costs are projected based on historical operating costs and adjusted based on projected changes in staffing, hours worked, and production and productivity for mining areas in the LOM Plan. The Elk Creek Complex actual and LOM Plan projected operating costs in dollars and dollars per ton, are shown on Figure 18.2-1:

Figure 18.2-1 Elk Creek Complex Historical and LOM Plan Operating Costs

Note: 2018 through September 2021 are actual

Descriptions or explanations of the operating costs considered in the LOM Plan are as follows:

Direct Cash Cost:

- Labor cost, which includes wages and benefits for hourly and salary personnel at the mine and preparation plant.
- Maintenance and supplies, which are expenses related to upkeep of mining equipment and associated infrastructure.
- Utility expenses, which are expenses related primarily to purchase of electrical power to operate mining equipment at the mines and preparation plant equipment, telephone and data lines, water, and garbage services.
- Trucking costs, which are expenses primarily related to transportation of ROM coal from the mines to the preparation plant.
- Allocations (in/out), which are various costs for the preparation plant and Environmental Crew.
- Professional services, which are expenses related to legal, engineering, and other firms providing services to the Elk Creek Complex.
- Property Tax and Insurance are expenses related to property taxes and liability insurance for risk management purposes.
- Other costs, which are miscellaneous expenses related to operation of the mines and preparation plant.
- Sales related costs are expenses related to Black Lung Excise Tax, West Virginia Severance Tax, and West Virginia and Office of Surface Mining reclamation taxes.
- Royalties are expenses related to leased surface and mineral properties.
- General and Administrative, which include expenses related to administrative offices and personnel to manage the mining operations.

Selling, General and Administrative Costs:

- Expenses related to coal sales and corporate administrative costs

Non-Cash Costs:

- Asset retirement obligation accretion, depreciation, and amortization costs

Detailed LOM Plan annual operating costs and capital expenditures are shown below in Table 18.2-1.

Table 18.2-1 LOM Plan Annual Operating Cost and Capital Expenditures

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total
Labor costs	33.0	42.7	41.8	42.2	42.4	42.8	44.2	38.5	26.7	16.8	13.9	21.5	17.0	23.4	17.1	16.9	17.0	13.7	8.3	520.1
Maintenance & supplies	37.0	45.1	49.1	51.1	47.8	47.8	46.8	36.6	25.6	15.0	12.4	19.3	15.4	21.3	15.5	15.3	15.4	12.3	7.3	535.9
Utility expenses	2.5	2.8	2.8	2.6	2.9	3.0	3.3	3.2	2.1	1.5	1.3	1.8	1.4	1.8	1.4	1.4	1.4	1.2	0.8	39.2
Trucking costs	10.1	13.0	14.0	13.5	13.6	13.7	14.1	12.2	8.5	5.3	4.5	6.7	5.2	7.0	5.2	5.2	5.2	4.3	2.7	164.1
Allocations in/out	27.6	33.0	35.8	31.3	32.1	32.2	33.5	29.4	20.4	12.7	10.8	15.8	12.3	16.3	12.4	12.2	12.3	10.2	6.8	396.9
Professional services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Property tax & insurance	1.6	2.1	2.0	2.2	2.1	2.1	2.1	1.7	1.1	0.7	0.6	0.9	0.7	0.9	0.7	0.7	0.7	0.6	0.4	24.0
Other costs	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	1.9
Sales related tax costs	28.6	27.8	32.5	33.3	29.2	28.9	26.7	18.4	13.0	7.8	6.1	10.5	8.6	12.4	8.6	8.5	8.6	6.5	3.4	319.3
Royalties	15.9	13.9	12.7	6.3	12.3	13.8	12.0	11.1	8.9	8.7	8.6	8.8	6.1	4.4	4.4	4.4	4.4	4.4	4.3	165.5
Administrative costs	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	1.9
Transportation	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2
SG&A	1.6	1.7	1.8	1.5	1.9	1.9	2.2	2.2	1.4	1.0	1.0	1.1	0.7	0.8	0.8	0.8	0.8	0.8	0.7	24.6
Asset retirement obligation	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1
Depreciation and amortization	12.3	17.7	18.3	18.9	16.2	18.2	18.2	15.4	9.0	5.9	5.0	7.5	5.9	7.9	5.9	5.8	5.9	4.8	3.1	201.9
Total costs and expenses	170.7	200.3	211.4	203.3	200.9	204.8	203.8	169.1	117.0	75.6	64.4	94.0	73.5	96.5	72.2	71.5	71.8	59.0	38.0	2,397.8
Capital Expenditures	51.4	48.2	22.7	17.7	16.5	26.5	21.6	18.1	12.0	8.7	8.0	10.5	7.8	9.7	7.8	7.7	7.8	5.9	3.7	312.2

The LOM Plan projected cash operating cost of $76.15 per ton is $9.40 per ton higher than the four-year historical average of $66.75 per ton. With the long history of cost of sales, no contingency is included, although the accuracy of the LOM Plan projected cost of sales should be considered to be within 15 percent of the historical average.

Capital and Operating Cost Estimation Risk

The Elk Creek Complex has been in operation since 2016 and has had a relatively long period of experience with capital expenditure costs and operating costs. Since the mining operations will continue in similar coal seams and mined in the same manner as historically, there is little risk associated with the specific engineering estimation methods used to arrive at projected capital expenditures and operating costs. An assessment of accuracy of estimation methods is reflected in the sensitivity analysis in Section 19.3.

For purposes of the Preliminary Feasibility Study relative to the Elk Creek Complex LOM Plan, capital expenditure costs are estimated to an accuracy of +/- 15 percent, with a contingency of 10 percent, and operating costs are estimated at an accuracy of +/- 15 percent, with no contingency.

19.0 ECONOMIC ANALYSIS

19.1 ASSUMPTIONS, PARAMETERS, AND METHODS

A Preliminary Feasibility Study financial model has been prepared in order to assess the economic viability of the Elk Creek Complex LOM Plan. Specifically, plans were evaluated using discounted cash flow analysis, which consists of annual revenue projections for the Elk Creek Complex LOM Plan. Cash outflows such as capital, including preproduction costs, sustaining capital costs, operating costs, transportation costs, and taxes are subtracted from the inflows to produce the annual cash flow projections. Cash flows are recognized to occur at the end of each period. There is no adjustment for inflation in the financial model, and all cash flows are in 2021 dollars. WEIR's study is conducted on an un-levered basis, excluding costs associated with any debt servicing requirements.

To reflect the time value of money, annual net cash flow projections are discounted back to the project valuation date, using a discount rate of 10 percent. The discount rate appropriate to a specific project depends on many factors, including the type of commodity and the level of project risks, such as market risk, technical risk, and political risk. The discounted present values of the cash flows are summed to arrive at the Elk Creek Complex NPV.

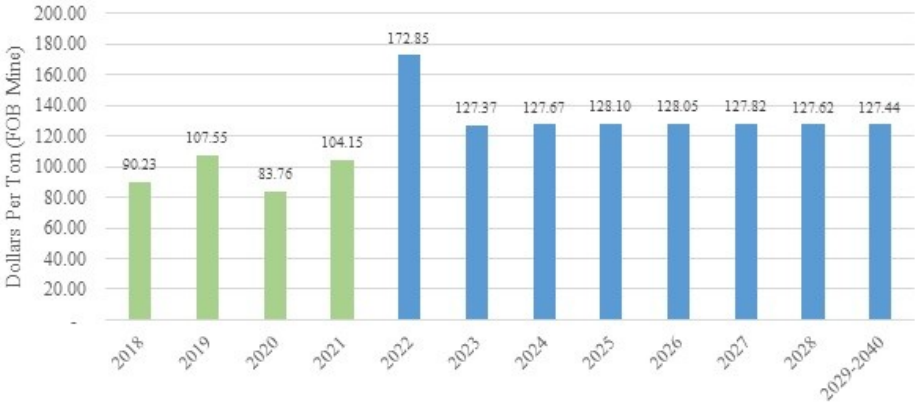
Projected cash flows do not include allowance of any potential salvage value. Additionally, capital previously expended (sunk cost) is not included in the assessment of economic returns.

WEIR's after-tax NPV assumes a projected corporate income tax rate of 21 percent, as provided by Ramaco.

In addition to NPV, the Internal Rate of Return (IRR) is also calculated. The IRR is defined as the discount rate that results in an NPV equal to zero. Payback Period is calculated as the time required to achieve positive cumulative cash flow for the Elk Creek Complex at a 10 percent discount rate. As the Elk Creek Complex is ongoing with no initial investment required (i.e., already sunk cost), payback period is less than one year.

The actual and LOM Plan coal sales price forecast used to estimate Elk Creek Complex revenue are depicted on Figure 19.1-1.

Figure 19.1-1 FOB Mine Coal Sales Price Forecast



Note: 2018 through September 2021

19.2 ECONOMIC ANALYSIS AND ANNUAL CASH FLOW FORECAST

The annual cash flow for the Elk Creek Complex LOM Plan are summarized on Figure 19.2-1 and Table 19.2-1 as follows:

Figure 19.2-1 Annual Cash Flow Forecast

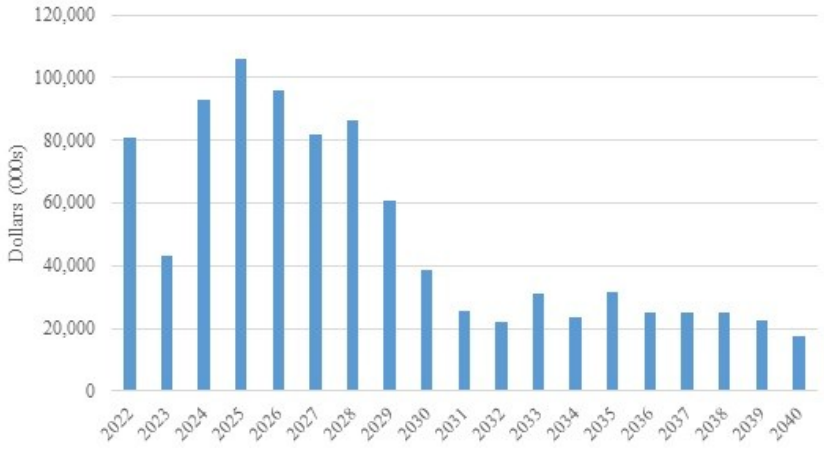


Table 19.2-1 Annual Cash Flow Forecast Detail

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total
Revenues	322.1	293.5	334.1	335.7	322.6	318.5	317.2	249.5	169.4	111.2	96.0	137.0	105.7	138.7	106.5	105.5	105.9	89.0	60.9	3,719.1
Total costs and expenses	170.7	200.3	211.4	203.3	200.9	204.8	203.8	169.1	117.0	75.6	64.4	94.0	73.5	96.5	72.2	71.5	71.8	59.0	38.0	2,397.8
Income before taxes	151.5	93.2	122.7	132.4	121.7	113.7	113.4	80.4	52.4	35.6	31.5	43.0	32.2	42.2	34.3	34.1	34.2	30.0	22.9	1,321.4
Income tax expense	31.8	19.6	25.8	27.8	25.6	23.9	23.8	16.9	11.0	7.5	6.6	9.0	6.8	8.9	7.2	7.2	7.2	6.3	4.8	277.5
Net income	119.6	73.6	97.0	104.6	96.2	89.8	89.6	63.5	41.4	28.1	24.9	34.0	25.5	33.3	27.1	26.9	27.0	23.7	18.1	1,043.9
Adjusted EBITDA	132.0	91.5	115.4	123.6	112.5	108.2	107.9	79.0	50.5	34.1	29.9	41.5	31.4	41.3	33.0	32.8	32.9	28.6	21.1	1,246.9
Capital Expenditures	51.4	48.2	22.7	17.7	16.5	26.5	21.6	18.1	12.0	8.7	8.0	10.5	7.8	9.7	7.8	7.7	7.8	5.9	3.7	312.2
Total Cash Flow	80.6	43.2	92.7	105.9	96.0	81.7	86.3	60.8	38.4	25.4	22.0	31.0	23.6	31.6	25.2	25.0	25.1	22.7	17.4	934.8

Cash flows begin to decline in 2029, as current LOM plans conclude. While not included in these cash flows, Ramaco plans to commence other mining operations within the Elk Creek Complex, as existing operations phase out. Significant tonnage associated with those future, to-be-planned operations, is currently classified as Resource tonnage. As LOM plans are prepared for operations within the current Resource areas of the Elk Creek Complex, updates will be made to this analysis.

The Elk Creek Complex LOM Plan has an after-tax NPV of $536.6 million, at a base case discount rate of 10 percent (Table 19.2-2). As the Elk Creek Complex is ongoing with no initial investment required (i.e., already sunk cost), the IRR indicates that the Elk Creek Complex NPV is infinite. Cumulative (undiscounted) cash flow over the LOM Plan is positive, at $934.8 million. The Return on Investment (ROI), at a 10 percent discount rate, is 174 percent.

The after-tax NPV, IRR, cumulative cash flow and ROI are summarized in Table 19.2-2 as follows:

Table 19.2-2 After-Tax NPV, IRR, Cumulative Cash Flow, and ROI

	LOM Plan
NPV ($000)	536,557
IRR (%)	Infinite
Cumulative Cash Flow ($000)	934,754
Return on Investment (%)	174

Table 19.2-3 presents key operational statistics for the LOM Plan on an after-tax basis. Over the LOM Plan, the average cash operating cost is $77.01 per clean ton. Operating costs include mining, processing, G&A, but exclude amortization costs on capital expenditures.

Table 19.2-3 Key Operating Statistics

	LOM Plan
ROM Tons Produced (000s)	76,990
Clean Tons Produced (000s)	28,499
Preparation Plant Yield (%)	37.0
Marketable Tons Sold (000s)	28,499
	($ Per Ton)
Coal Sales Realization	130.50
Cost of Sales	76.15
SG & A	0.86
Non-cash Costs	7.12
Total Operating Cost	84.13
Profit / (Loss) ($/Ton)	46.41
EBITDA ($/Ton)	53.53
CAPEX ($/Ton)	10.95

19.3 SENSITIVITY ANALYSIS

A sensitivity analysis was undertaken to examine the influence of changes to assumptions for coal sales prices, production, operating cost, capital expenditures, and the discount rate on the base case after-tax NPV. The sensitivity analysis range (+/- 25 percent) was designed to capture the bounds of reasonable variability for each element analyzed. The basis for reasonable variability for each element analyzed is summarized as follows:

- Sales Price - Historical coal sales price variability of 28 percent between 2018 and September 2021
- Production - Variability in production of up to 8 percent from the 2018 through 2020
- Operating Cost - Estimated accuracy of +/- 15 percent
- Capital Costs Estimated accuracy of +/- 25 percent
- Discount Rate - based on range of variability from 7.5 to 12.5 percent

Figure 19.3-1 depicts the results of the NPV sensitivity analysis.

Figure 19.3-1 Net Present Value Sensitivity Analysis

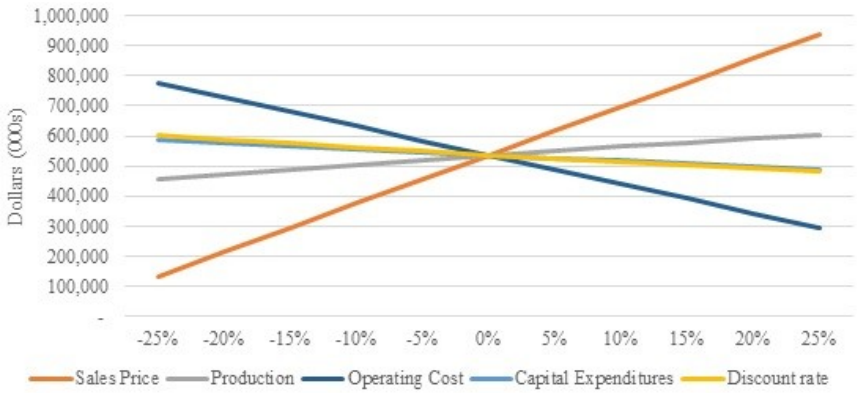


Figure 19.3-1 shows that the Elk Creek Complex NPV is most sensitive to changes in coal sales prices and operating cost. It is less sensitive to changes in production and least sensitive to changes in discount rates and capital expenditures.

20.0 ADJACENT PROPERTIES

This TRS does not include any estimates of coal resources or coal reserves associated with adjacent uncontrolled properties.

21.0 OTHER RELEVANT DATA AND INFORMATION

Conducting a due diligence investigation relative to the mineral and surface rights of Ramaco's mining operations was not part of WEIR's scope of work. This TRS is based on Ramaco controlling, by lease or ownership, or having the ability to acquire the coal reserves and surface lands necessary to support its mine plans.

The ability of Ramaco, or any coal company, to achieve production and financial projections is dependent on numerous factors. These factors primarily include site-specific geological conditions, the capabilities of management and mine personnel, level of success in acquiring reserves and surface properties, coal sales prices and market conditions, environmental issues, securing permits and bonds, and developing and operating mines in a safe and efficient manner. Unforeseen changes in legislation and new industry developments could substantially alter the performance of any mining company.

Coal mining is carried out in an environment where not all events are predictable. While an effective management team can identify known risks and take measures to manage and/or mitigate these risks, there is still the possibility of unexpected and unpredictable events occurring. It is not possible therefore to totally remove all risks or state with certainty that an event that may have a material impact on the operation of a coal mine will not occur.

22.0 INTERPRETATIONS AND CONCLUSIONS

22.1 SUMMARY OF INTERPRETATIONS AND CONCLUSIONS

Interpretation
Ramaco has a long operating history of resource exploration, mine development, and mining operations at the Elk Creek Complex, with extensive exploration data including drillholes, in-mine seam thickness and elevation measurements, and in-mine channel samples supporting the determination of mineral resource and reserve estimates, and projected economic viability. The data has been reviewed and analyzed by WEIR and determined to be adequate in quantity and reliability to support the coal resource and coal reserve estimates in this TRS.

Conclusion
The coal resource and coal reserve estimates and supporting Preliminary Feasibility Study were prepared in accordance with Regulation S-K 1300 requirements. There are 220 million in-place tons of measured and indicated coal resources, exclusive of reserves, and 29 million clean recoverable tons of mineable reserves within the Elk Creek Complex as of December 31, 2021. Reasonable prospects for economic extraction were established through the development of a Preliminary Feasibility Study relative to the Elk Creek Complex LOM Plan, considering historical mining performance, historical and projected metallurgical coal sales prices, historical and projected mine operating costs, and recognizing reasonable and sufficient capital expenditures.

22.2 SIGNIFICANT RISKS AND UNCERTAINTIES

Risk, as defined for this study, is a hazard, condition, or event related to geology and reserves, mine operations and planning, environmental issues, health and safety, and general business issues that when taken individually, or in combination, have an adverse impact on Ramaco's development of the Elk Creek Complex. Risks can disrupt operations, adversely affect production and productivity, and result in increased operating cost and/or increased capital expenditures.

In the context of this TRS, the likelihood of a risk is a subjective measure of the probability of the risk occurring, recognizing the magnitude of the risk defined as follows:

Low Risk indicates that the combined probabilities (low/medium/high) together with the economic impact (minimal/significant/adverse), if conditions exist, should not have any material adverse effect on the economic viability of the project.

Moderate Risk indicates that the combined probabilities (low/medium/high) together with the economic impact (minimal/significant/adverse), if conditions exist, could have a detrimental effect on the economic viability of the project.

High Risk indicates that the combined probabilities (low/medium/high) together with the economic impact (minimal/significant/adverse), if conditions exist, could have a seriously adverse effect the economic viability of the project.

Based on a review of available information and discussions with Ramaco personnel, WEIR identified potential risks associated with the Elk Creek Complex LOM Plan. The risks, WEIR's assessment of risk magnitude, and comments based on WEIR's experience with surface and underground mining operations are summarized in Table 22.2-1 as follows:

Table 22.2-1 Elk Creek Complex Risk Assessment Summary

Area of Risk	WEIR Risk Assessment	Comments
Coal Quality	Low	Based on previous production and core hole quality data, coal quality appears to be a consistently good metallurgical coal product.
Horizontal Stress	Low	Observed mining conditions do not indicate horizontal stress problems.
Land Acquisition	Low	All mineral control is maintained through current leases and subleases. No additional acquisitions are necessary for the LOM Plan.
Methane	Low	Although methane gas is present in the seams, gas liberation experienced to date has been low to undetectable and is expected to remain low, undetectable or at levels that can be safely mitigated during mining. Procedures and continuous gas monitoring are in place to prevent, to the extent possible, methane ignitions and mine fires.
Overburden Stress	Low	The potential for a coal pillar bump or release of stress when mining will be monitored as a part of the normal mining operation. Due to the mountainous terrain, overburden can approach 1,000 feet when mining under ridges. However, the risk of bumps occurring is minimal, since coal outbursts, as a result of sudden release of energy, are typically associated with depth of cover of 1,500 to plus 2,000 feet.
Qualified Employees	Low to Moderate	Recent changes in the coal mining industry have resulted in many coal miners being closed resulting in fewer qualified employees available in general. Ramaco has existing operations with sufficient qualified employees. However, additional mine startups may cause some employee shortages. Ramaco can train inexperienced miners along their experienced miners.

Area of Risk	WEIR Risk Assessment	Comments
Rail Lines	Low to Moderate	There is currently a shortage of coal rail transportation capacity. The recent upswing in coal prices has resulted in short term increases in rail capacity. This capacity will likely be a relative unknown for the medium to long term.
Refuse Disposal	Low	Ramaco's currently permitted refuse disposal capacity is sufficient for the long term.
Roof Lithology	Low to Moderate	All underground coal mines have the potential to experience unstable roof conditions. The relative consistency of the Kanawha Formation that primarily consists of competent sandstones and shales help decrease this risk at the Elk Creek Complex Deep Mines. Additionally, this potential risk can be kept in the low range through proper ground control engineering and following approved roof control plans.
Geology	Low	The structure of the seams at the Elk Creek Complex all have a relatively gentle dip of approximately two degrees to the northwest. There are no significant faults in the area. There are no known structural anomalies such as sand channels that cut out seams.
Spontaneous Combustion	Low	Seams at the Elk Creek Complex have a low potential for spontaneous combustion, and Ramaco has not experienced any loss of production due to spontaneous combustion.
Water Inflow	Low	Ramaco mines at the Elk Creek Complex are relatively dry since the mines are well above drainage.
Market Conditions	Moderate	Market conditions remain volatile for metallurgical coal. Blast Furnace methods for making steel is under pressure from various world-wide government entities due to CO_2 emissions. Markets in China and India are likely to be primary drivers for the metallurgical coal industry. Ramaco should prioritize maintaining good relations with existing and potential clients.

It is WEIR's opinion that the majority of the risks can be kept low and/or mitigated with efficient and effective mine planning and mine engineering, and monitoring of the mining operations.

23.0 RECOMMENDATIONS

The Elk Creek Complex has sufficient geologic exploration data to estimate mineral reserves and resources. Future exploration work will be undertaken by Ramaco to continuously provide geological data primarily for use by mine operations personnel related to effective implementation of the Mine Plans. Future exploration work and mineral property acquisition should include what has been historically implemented related to the following:

Geology

- Have an experienced geologist log core holes, measure core recovery, and complete sampling. Geophysically log core holes to verify seam and coal thickness and core recovery.
- Geophysically log rotary holes to verify strata and coal thickness.
- Continue to prepare laboratory sample analysis at 1.40 and 1.50 specific gravities to better match the preparation plant specific gravity when processing a metallurgical coal.
- Continue collecting channel samples (include parting).

24.0 REFERENCES

References used in preparation of this TRS are as follows:

- Ramaco. 2021. *2Gas Mine Plan 2022*
- Ramaco. 2021. *Turkey Pen Mine Plan 2020*
- Ramaco. 2021. *Ram No. 1 Surface and Highwall Min Plan 2021*
- Ramaco. 2021. *Stonecoal No.2 Deep Mine Upper Alma Seam Plan 2022*
- Ramaco. 2021. *Stonecoal LCGB Seam Plan 2022*
- Ramaco. 2021. *GlenAlum Tunnel #1 Deep Mine Plan*
- Ramaco. 2021. *Eagle Mine Plan 2022*
- Ramaco. 2021. *Powellton Mine Plan 2022*
- Ramaco. 2021 *Bens Creek Projections 9-11-15*
- Ramaco. 2021 *Ram No. 3 Surface and Highwall Budget Mine Plan 2021*

Websites Referenced:

- Securities and Exchange Commission - Modernization of Property Disclosures for Mining Registrants - Final Rule Adoption
  https://www.sec.gov/rules/final/2018/33-10570.pdf
- MSHA Data Retrieval Site
  https://www.msha.gov/mine-data-retrieval-system
- WVDEP Permits
  https://apps.dep.wv.gov/webapp/_dep/securearea/public_query/ePermittingApplicationSearchPage.cfm

25.0 RELIANCE ON INFORMATION PROVIDED BY THE REGISTRANT

In preparing this report, WEIR relied upon data, written reports and statements provided by the registrant. It is WEIR's belief that the underlying assumptions and facts supporting information provided by the registrant are factual and accurate, and WEIR has no reason to believe that any material facts have been withheld or misstated. WEIR has taken all appropriate steps, in its professional opinion, to ensure information provided by the registrant is reasonable and reliable for use in this report.

The registrant's technical and financial personnel provided information as summarized in Table 25.1 as follows:

Table 25.1 Information Relied Upon from Registrant

Category	Information	Report Section
Legal	Mineral control and surface rights	3
Geotechnical	Pillar design, roof control plans, and rock quality analyses	13.1.1
Hydrogeological	Hydrogeological Analysis including inflow rates, permeability and tranmisivity calculations, and watershed analysis	13.1.2
Marketing	Coal sales price projections	16
Environmental	Permits, bond, and reclamation liability	17
Macroeconomic	Real price growth (coal sales, labor and other cash costs)	18
Income Tax	Income Tax Rate	19

APPENDIX A - EXHIBIT

Exhibit 6.3-1 Elk Creek Complex, Geological Cross Sections