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DELTA REPORT

10-K

RAMACO RESOURCES, INC.

10-K - DECEMBER 31, 2023 COMPARED TO 10-K - DECEMBER 31, 2022

The following comparison report has been automatically generated

TOTAL DELTAS	12622
CHANGES	299
DELETIONS	10402
ADDITIONS	1921

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UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

(Mark One)

☒ ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended December 31, 2022 December 31, 2023

or

☐ TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the transition period from to

Commission File Number: 001-38003

RAMACO RESOURCES, INC.

(Exact name of registrant as specified in its charter)

Delaware	38-4018838
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)
250 West Main Street, Suite 1900 Lexington, Kentucky (Address of principal executive offices)	40507 (Zip Code)

(859) 244-7455

(Registrant's telephone number, including area code)

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol	Name of each exchange on which registered on which registered
Class A Common Stock, $0.01 par value	METC	NASDAQ Global Select Market
Class B Common Stock, $0.01 par value	METCB	NASDAQ Global Select Market
9.00% Senior Notes due 2026	METCL	NASDAQ Global Select Market

Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☐ No ☒

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes ☐ No ☒

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

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Indicate by check mark whether the registrant has submitted electronically, if any, every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☒ No ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and “emerging growth company” in Rule 12b-2 of the Exchange Act.

Large accelerated filer	☐	Accelerated filer	☒
Non-accelerated filer	☐	Smaller reporting company	☒ ☐
		Emerging growth company	☐

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued is audit report. ☒

If securities are registered pursuant to Section 12(b) of the Act, indicate by check mark whether the financial statements of the registrant included in the filing reflect the correction of an error to previously issued financial statements. ☐

Indicate by check mark whether any of those error corrections are restatements that required a recovery analysis of incentive-based compensation received by any of the registrant's executive officers during the relevant recovery period pursuant to § 240.10D-1(b). ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes ☐ No ☒

As of June 30, 2022 June 30, 2023, the last business day of the registrant's most recently completed second fiscal quarter, the aggregate market value of common stock held by non-affiliates of the registrant was $318.8 million approximately $269.1 million.

As of February 28, 2023 February 29, 2024, the registrant had 44,451,850 44,263,429 and 8,825,928 outstanding shares of Class A and Class B common stock, outstanding. respectively.

Documents Incorporated by Reference:

Certain information required to be furnished pursuant to Part III of this Annual Report on Form 10-K is set forth in, and is hereby incorporated by reference herein from, the definitive proxy statement for our 2023 2024 Annual General Meeting of Stockholders, to be filed by Ramaco Resources with the Securities and Exchange Commission pursuant to Regulation 14A within 120 days after December 31, 2022 December 31, 2023.

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CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

The information in this Annual Report on Form 10-K (the "Annual Report") includes "forward-looking statements" within the meaning of Section 27A of the Securities Act of 1933, as amended (the "Securities Act") and Section 21E of the Securities Exchange Act of 1934, as amended (the "Exchange Act"). All statements, other than statements of historical fact included in this report, regarding our strategy, future operations, financial position, estimated revenue and losses, projected costs, prospects, plans and objectives of management are forward-looking statements. When used in this Annual Report, the words "could," "believe," "anticipate," "intend," "estimate," "expect," "project" and similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain such identifying words. These forward-looking statements are based on management's current expectations and assumptions about future events and are based on currently available information as to the outcome and timing of future events. When considering forward-looking statements, you should keep in mind the risk factors and other cautionary statements described under the heading "Risk Factors" included in this report Annual Report.

Forward-looking statements may include statements about:

- anticipated production levels, costs, sales volumes and revenue;
- timing and ability to complete major capital projects;
- economic conditions in the metallurgical coal and steel industries;
- expected costs to develop planned and future mining operations, including the costs to construct necessary processing, refuse disposal and transport facilities;
- estimated quantities or quality of our metallurgical coal reserves;
- our ability to obtain additional financing on favorable terms, if required, to complete the acquisition of additional metallurgical coal reserves as currently contemplated or to fund the operations and growth of our business;

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- maintenance, operating or other expenses or changes in the timing thereof;
- the financial condition and liquidity of our customers;
- competition in coal markets;
- the price of metallurgical coal or thermal coal;
- compliance with stringent domestic and foreign laws and regulations, including environmental, climate change and health and safety regulations, and permitting requirements, as well as changes in the regulatory environment, the adoption of new or revised laws, regulations and permitting requirements;
- potential legal proceedings and regulatory inquiries against us;
- the impact of weather and natural disasters on demand, production and transportation;
- purchases by major customers and our ability to renew sales contracts;
- credit and performance risks associated with customers, suppliers, contract miners, co-shippers and traders, banks and other financial counterparties;
- geologic, equipment, permitting, site access and operational risks and new technologies related to mining;
- transportation availability, performance and costs;
- availability, timing of delivery and costs of key supplies, capital equipment or commodities such as diesel fuel, steel, explosives and tires;
- timely review and approval of permits, permit renewals, extensions and amendments by regulatory authorities;
- our ability to comply with certain debt covenants;
- tax payments to be paid for the current fiscal year;
- our expectations relating to dividend payments and our ability to make such payments;
- the anticipated benefits and impacts of previous acquisitions;
- risks related to Russia's invasion of Ukraine and the international community's response;
- risks related to weakened global economic conditions and inflation;
- risks related to the impact of the novel coronavirus ("COVID-19") global pandemic, such as the scope and duration of the outbreak, the health and safety of our employees, government actions and restrictive measures implemented in response, delays and cancellations of customer sales, supply chain disruptions and other impacts to the business, or our ability to execute our business continuity plans;
- anticipated production levels, costs, sales volumes and revenue;
- timing and ability to complete major capital projects;
- economic conditions in the metallurgical coal and steel industries generally, including any near-term or long-term downturn in these industries as a result of the COVID-19 global pandemic and related actions;
- expected costs to develop planned and future mining operations, including the costs to construct necessary processing, refuse disposal and transport facilities;
- estimated quantities or quality of our metallurgical coal reserves;
- our ability to obtain additional financing on favorable terms, if required, to complete the acquisition of additional metallurgical coal reserves as currently contemplated or to fund the operations and growth of our business;
- maintenance, operating or other expenses or changes in the timing thereof;
- the financial condition and liquidity of our customers;
- competition in coal markets;
- the price of metallurgical coal or thermal coal;
- compliance with stringent domestic and foreign laws and regulations, including environmental, climate change and health and safety regulations, and permitting requirements, as well as changes in the regulatory environment, the adoption of new or revised laws, regulations and permitting requirements;
- potential legal proceedings and regulatory inquiries against us;
- the impact of weather and natural disasters on demand, production and transportation;
- purchases by major customers and our ability to renew sales contracts;
- credit and performance risks associated with customers, suppliers, contract miners, co-shippers and traders, banks and other financial counterparties;
- geologic, equipment, permitting, site access and operational risks and new technologies related to mining;
- transportation availability, performance and costs;
- availability, timing of delivery and costs of key supplies, capital equipment or commodities such as diesel fuel, steel, explosives and tires;
- timely review and approval of permits, permit renewals, extensions and amendments by regulatory authorities;
- our ability to comply with certain debt covenants;
- tax payments to be paid for the current fiscal year;
- our expectations relating to dividend payments and our ability to make such payments;
- the anticipated benefits and impacts of the Ramaco Coal, LLC ("Ramaco Coal") and Maben Coal, LLC ("Maben Coal") acquisitions;

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- risks related to Russia's invasion the Company's tracking stock structure and separate performance of Ukraine and the international community's response;
- risks related to weakened global economic conditions and inflation; its Carbon Ore-Rare Earth ("CORE") assets; and
- other risks identified in this Annual Report that are not historical.

We caution you that these forward-looking statements are subject to a number of risks, uncertainties and assumptions, which are difficult to predict and many of which are beyond our control, incident to the development, production, gathering and sale of coal. Moreover, we operate in a very competitive and rapidly changing environment and additional risks may arise from time to time. It is not possible for our management to predict all of the risks associated with our business, nor can we assess the impact of all factors on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in any forward-looking statements we may make. Although we believe that our plans, intentions and expectations reflected in or suggested by the forward-looking statements we make in this Annual Report are reasonable, we can give no assurance that these plans, intentions or expectations will be achieved or occur, and actual results could differ materially and adversely from those anticipated or implied in the forward-looking statements. Given these risks and uncertainties, investors should not place undue reliance on forward-looking statements as a prediction of actual results.

All forward-looking statements, expressed or implied, included in this Annual Report are expressly qualified in their entirety by this cautionary statement and speak only as of the date of this Annual Report. This cautionary statement should also be considered in connection with any subsequent written or oral forward-looking statements that we or persons acting on our behalf may issue.

Except as otherwise required by applicable law, we disclaim any duty to update any forward-looking statements, all of which are expressly qualified by the statements in this section, to reflect events or circumstances after the date of this Annual Report.

PART I

Item 1. Business

Ramaco Resources, Inc. is a Delaware corporation formed in October 2016. Our Class A and Class B common stock is are listed on the NASDAQ Global Select Market under the symbol symbols "METC". and "METCB," respectively. Our 9.00% Senior Notes due 2026 (the "Senior Notes") are listed on the NASDAQ Global Select Market under the symbol "METCL". Our principal corporate offices are located in Lexington, Kentucky. As used herein, "Ramaco Resources," "Ramaco," "the Company," "we," "us," or "our," and similar terms include Ramaco Resources, Inc. and its subsidiaries, unless the context indicates otherwise.

General

We are an operator and developer of high-quality, low-cost metallurgical coal in southern West Virginia southwestern Virginia, and southwestern Pennsylvania. Virginia. We are a pure play metallurgical coal company with 62 million 59 million reserve tons and 1,156 million 1,119 million measured and indicated resource tons of high-quality metallurgical coal. We believe our advantaged reserve geology provides us with higher productivities productivity and industry leading industry-leading lower cash costs.

Our development portfolio primarily includes the following properties: Elk Creek, Berwind, Knox Creek, and RAM Mine. Maben. We believe each of these properties possesses geologic and logistical advantages that make our coal among the lowest delivered-cost U.S. metallurgical coal to our domestic target customer base, North American blast furnace steel mills and coke plants, as well as international metallurgical coal consumers. In addition, the Company completed acquisitions of Ramaco Coal and Maben Coal in the second and third quarter of 2022, respectively. With the Ramaco Coal acquisition, we We also control mineral deposits near Sheridan, Wyoming along with facilities that house research as part of the Company's initiatives regarding the potential recovery of rare earth elements as well as the potential commercialization of coal-to-carbon-based products and development activities. With the Maben Coal acquisition, we have obtained control of additional coal deposits in Wyoming County and Raleigh County, West Virginia. materials.

Our operations include six active mines at our Elk Creek mining complex (the "Elk Creek Complex"), three active mines at our Berwind mining complex (the "Berwind Complex"), two active mines at our Knox Creek mining complex (the "Knox Creek Complex"), and one active mine at our Maben mining complex (the "Maben Complex").

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Development of this complex the Elk Creek Complex commenced in 2016 and included the construction of a preparation plant and rail load-out facilities. The Elk Creek property consists of approximately 20,200 acres of controlled mineral rights and contains

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approximately 16 seams that we have targeted for production. The Company commenced expansion Expansion of the Elk Creek preparation plant occurred during 2022 and 2023 in order to increase production in future periods. production.

Development of our the Berwind mining complex (the "Berwind Complex") Complex began in late-2017. late 2017. In 2020, we suspended development at the Berwind Complex due to lower pricing and demand largely caused by the COVID-19 outbreak. In early-2021, as pricing and demand improved, Berwind development was restarted. We successfully reached the thicker Pocahontas No. 4 seam in late 2021. The Berwind property consists of approximately 62,500 acres of controlled mineral rights, including the December 2021 acquisition of "Amonate Assets" from subsidiaries of Coronado Global Resources Inc. ("Coronado") as described under "Our Projects – Berwind" below. in 2021. The Amonate Assets include a processing plant located in our Berwind Complex, saving us transportation costs to our Knox Creek plant 26 miles away. The Berwind Complex experienced an ignition event during in 2022 that resulted in idling mining operations for one of the active mines. Production restarted for the idle mine in the first quarter of 2023.

Our Knox Creek facility Complex includes a preparation plant and 74,400 64,050 acres of controlled mineral rights that we expect to develop in the future. The Knox Creek preparation plant processes processed some coal from our Berwind Complex (until the newly acquired plant at the Berwind Complex is fully up and running) in 2023 as well as coal mined from the rights acquired in the Maben Coal transaction, discussed below, and coal purchased from third parties.

Our RAM Mine property is located in southwestern Pennsylvania, consists of approximately 1,567 acres of controlled mineral rights, and is scheduled for initial production after a mining permit is issued and market conditions warrant development.

The Ramaco Coal acquisition in 2022 provides the Company with 16,000 acres of controlled mineral rights that we expect to develop in the future, including possible rare earth elements, as well as a research and pilot facility related to the production of advanced carbon products and materials from coal.

The Maben Coal acquisition in 2022 provides the Company with 28,000 leased acres of controlled mineral rights, which includes coal deposits that may be mined currently by surface and high wall mining methods as well as developed in the future through deep mining.

Our RAM Mine property is located in southwestern Pennsylvania. Following years of delays, the Pennsylvania Department of Environmental Protection issued a denial of the RAM Mine permit. While the Company believes that the RAM permit was denied incorrectly and capriciously, we will not appeal the denial of the permit and will instead focus on our other core properties and monetize these assets at the appropriate time.

Our Brook Mine property consists of approximately 16,000 acres of controlled mineral rights and a research and development facility that were acquired as part of the purchase of Ramaco Coal in 2022. The mine is currently undergoing mineral analysis and core drilling assessment to assess the potential concentrations of rare earth elements.

As of December 31, 2022 December 31, 2023, our estimated aggregate annual production capacity is approximately 2.7 million just under four million clean tons of coal. We plan to complete development of our existing properties and increase annual production over the next few years to approximately 6.5 million seven million clean tons of metallurgical coal annually, subject to market conditions, permitting, and additional capital deployment. We may also acquire additional reserves or infrastructure that contribute to our focus on advantaged geology and lower costs.

Metallurgical Coal Industry

Metallurgical coal, is also known as "met coal " or "coking coal," and is a key component of the blast furnace steelmaking process. process and, therefore, demand for such coal is highly correlated with conditions in the steel industry. The metallurgical coal global market has grown steadily in recent years and is expected to continue to do so over the next few years.

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United States metallurgical coal mines are primarily located in the Appalachian area of the eastern U.S. Imported metallurgical coal has historically been uneconomic due to transportation costs and availability of domestic supply. Metallurgical coal is transported to domestic customers by truck, rail, barge and vessel. Metallurgical coal contracts in North America are typically 12-month, calendar year contracts where both prices and volumes are fixed. These contracts are normally negotiated and settled entered into during the third and fourth quarters of the preceding calendar year.

U.S. metallurgical coal supply in excess of what can be consumed in North America is also exported to the seaborne market and sold to buyers in Europe, South America, Africa, India and Asia. The U.S. is the second largest global supplier to the seaborne metallurgical coal market behind Australia. U.S. metallurgical coal exports are primarily sold to buyers in the Atlantic Basin market (customers in Europe, Brazil and Africa), and serve as swing supply to buyers in the Pacific Basin (customers in India, South Korea,

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Japan and China). U.S. metallurgical coal exports compete with Australian metallurgical coals that are generally produced at a lower cost but are geographically disadvantaged to the Atlantic Basin. Conversely, Australian production has a much shorter logistical route to Pacific Basin customers. Any

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supply shortfall out of Australia, or increase in global demand beyond Australia's capacity, has historically been serviced by U.S. and Canadian metallurgical coal producers.

Export metallurgical coal pricing is determined utilizing a series of indices from a number of independent sources and is adjusted for coal quality. Contracted export volumes have terms that vary in duration from spot cargoes to one year, rarely exceeding one year. In some cases, indices are used to calculate pricing at the point that the coal changes hands. In other cases, an average value of indices over time may be utilized. While the term "benchmark" is still utilized, it too is determined based on index values, typically for the preceding three months.

Metallurgical coals are generally classified as high, medium or low-volatile ("vol"). Volatiles are products, other than water, that are released as gas or vapor when coal is converted to coke. Carbon is the primary element which that remains when the volatiles are released.

Our Strategy

Our business strategy is to increase stockholder value through sustained earnings growth, cash flow generation and dividends by:

Developing and Operating Our Metallurgical Coal Properties. We have 62 million 59 million reserve tons and 1,156 million 1,119 million measured and indicated resource tons of high-quality metallurgical coal reserves and resources, respectively, with attractive quality characteristics across high-volatility and low-volatility segments. This geologically advantaged resource and reserve base allows for flexible capital spending in challenging market conditions.

We plan to complete development of our existing properties and increase annual production over the next few years to approximately 6.5 million seven million clean tons of metallurgical coal, subject to market conditions, permitting, and additional capital deployment. We may also acquire additional reserves or infrastructure that contribute to our focus on advantaged geology and lower costs.

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Being a Low-Cost U.S. Producer of Metallurgical Coal. Our reserve base presents advantaged geologic characteristics such as relatively thick coal seams at the deep mines, a low effective mining ratio at the surface mines, and desirable metallurgical coal quality. These characteristics contribute to a production profile that has a cash cost of production that is significantly below most U.S. metallurgical coal producers.

Maintaining a Conservative Capital Structure and Prudently Managing the Business for the Long Term. We are committed to maintaining a conservative capital structure with a reasonable amount of debt that will afford us the financial flexibility to execute our business strategies on an ongoing basis.

Enhancing Coal Purchase Opportunities. Depending on market conditions, we purchase coal from other independent producers. Purchased coal is complementary from a blending standpoint with our produced coals or it may also be sold as an independent product.

Demonstrating Excellence in Safety and Environmental Stewardship. We are committed to complying with both regulatory and our own high standards for environmental and employee health and safety requirements. We believe that business excellence is achieved through the pursuit of safer and more productive work practices.

Advancing our Initiatives in Rare Earth Elements and Advanced Carbon Products. We are also focused on critical mineral rare earth development as well as the potential commercialization of coal-to-carbon-based products and materials. These initiatives provide additional growth opportunities and upside potential in future periods.

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Our Projects

Our properties are primarily located in southern West Virginia, southwestern Virginia, southwestern Pennsylvania, and northeastern Wyoming. The following map shows the location of our mining complexes and projects, excluding our property properties located in Pennsylvania and Wyoming:

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Graphic

Elk Creek Mining Complex

Our Elk Creek Complex in southern West Virginia began production in late December 2016. The Elk Creek property consists of approximately 20,200 acres of controlled mineral rights and contains 16 seams that we believe are economically mineable. Nearly all our seams contain high-quality, high-volatile metallurgical coal accessible at or above drainage. Additionally, almost all of this coal is high-fluidity, which is an important factor for high-volatile metallurgical coal.

We control the majority of the coal and related mining rights within the existing permitted areas and our current mine plans, as well as the surface for our surface facilities, through lease agreements with McDonald Land Company. Company among others. We estimate that the Elk Creek Complex contains reserves capable of yielding approximately 30 million 28 million

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tons of clean saleable metallurgical coal as well as measured and indicated metallurgical coal resource tons of 215 million. We expect many of the coal resources will be converted to reserves when further drilling and exploration is completed on the property. We estimate that the mine life for the Elk Creek Complex is over 20 years.

We currently market most of the coal produced from the Elk Creek Complex as a blended high-volatile A/B product. When segregated, a portion of our coal can be sold as a high-volatile A product for a premium. Our market for Elk Creek production is principally North American coke and steel producers. We also market our coal to European, South American, Asian and African customers, and occasionally to coal traders and brokers for use in filling orders for their blended products. Additionally, we seek to market a portion of our coal in the specialty coal markets that value low ash content.

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We process our Elk Creek coal production through a 700 raw ton-per-hour the preparation plant. The plant located on-site at the complex, which has a heavy-media vessel, large-diameter (48") heavy-media cyclone, dual-stage spiral concentrators, froth flotation, horizontal vibratory and screen bowl centrifuges. Our rail load-out facilities at Elk Creek are capable of loading 4,000 tons per hour and a full 150-car unit train in under four hours. The load-out facility is served by the CSX railroad. We railroad; however, we also have the ability to develop on controlled property a rail-loading facility on the Norfolk Southern railroad, which would facilitate dual rail service. We have not yet committed the capital for the development of a Norfolk Southern rail facility.

The combined refuse capacity at the active disposal areas is expected to provide approximately 11 over 20 years of disposal life for our operations with additional refuse areas being permitted. We completed construction of a full complement of plate presses during 2020 to allow for dewatering of material which then was being pumped as slurry to our impoundment. This equipment allows us to process all waste material for placement in areas designed for combined refuse disposal and maximize the life for disposal of fine waste rock in the pool of the impoundment.

A large portion of our controlled reserves are permitted through existing, issued permits. We currently have three planned permits, and permitted mines within the Elk Creek Complex and one permitted inactive mine. We are we continue actively pursuing multiple new permits.

On January 3, 2020, we entered into a mineral lease with the McDonald Land Company for coal reserves which, in many cases, are located immediately adjacent to our Elk Creek Complex. This leased property became available after the former base lease with another party was terminated. The prior lessee, who controlled the property since 1978, did not produce commercial amounts of coal from the property during their possession of the lease. While it is unusual to have a metallurgical reserve in this part of Central Appalachia remain idle for such an extended period of time, the configuration and location of the tracts lend themselves to be mined and processed far more efficiently from our Elk Creek property. The McDonald reserves have the same geologic advantages and low costs that are being experienced in our Elk Creek mines.

During 2022, we began work on a throughput upgrade at our Elk Creek Preparation plant. We expect this The upgrade, will raise the nameplate processing capacity to 1,150 raw tons per hour and which was completed in 2023, increased our annual processing capacity from for this complex to approximately three million tons per year. We expect that this upgrade will be completed in the second quarter of 2023. In order to meet this utilize the increased capacity, we also began development work on additional low-cost, high- volatile underground and surface mines at Elk Creek. These mines Creek, which began production during the second quarter of 2022 and are expected to reach full levels of productivity during 2023. 2022.

Berwind Mining Complex

Our Berwind Complex is located on the border of West Virginia and Virginia and is well-positioned to fill the anticipated market for low-volatile coals. The Berwind property consists of approximately 62,500 acres of controlled mineral rights, including the Amonate acquisition. We estimate that the Berwind Complex contains reserves capable of yielding approximately 23 million tons of clean saleable metallurgical coal as well as measured and indicated metallurgical coal resource tons of 629 million. We estimate that the mine life for the Berwind Complex is over 20 years. We view Berwind as the second flagship complex for Ramaco.

Development of our Berwind Complex began in late-2017 late 2017 in the thinner Pocahontas No. 3 seam and has since sloped up to current mining in the thicker Pocahontas No. 4 seam. In 2020, we suspended development at the Berwind Complex due to lower pricing and demand largely caused by the economic effects of COVID-19. In early 2021, as pricing and demand improved, Berwind development resumed, and we successfully reached the Pocahontas No. 4 seam

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in late 2021. The Berwind Complex experienced an ignition event during the third quarter of 2022 that resulted in idling mining operations for one of the active mines. Production restarted for the idle mine in the first quarter of 2023.

We have the necessary permits for the Berwind Complex for our current and budgeted operations. A permit for our Squire Jim seam room-and-pillar underground mine was issued during in 2020 and contains a large area of Squire Jim seam coal deposits. The Squire Jim seam of coal is the lowest known coal seam on the geologic column in this region, and due to the depth of cover has never been significantly explored. At this point, we do not anticipate activating this mining permit.

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In December 2021, we acquired the Amonate Assets from Coronado, pursuant to an asset purchase agreement. The acquisition included a mine complex located in McDowell County, West Virginia and Tazewell County, Virginia adjacent and contiguous to the Company's existing Berwind Complex. The assets primarily consist of high quality, high-quality, low and mid-volatile metallurgical coal reserves and resources, much of which will be mined from the Company's Berwind Complex. Also purchased were several additional permitted mines and an idled 1.3 million ton per annum capacity coal preparation plant with a rail loading facility.

We began mine development on the Amonate Assets shortly after the acquisition. Production acquisition, and production began in the first quarter of 2022. The preparation plant and rail loading facility were refurbished during in 2022 and began operation in the fourth quarter of 2022. Rail service is provided by Norfolk Southern.

Knox Creek Mining Complex

The Knox Creek Complex consists of approximately 74,400 64,050 acres of controlled mineral rights as well as a 750 tons per hour preparation plant, and a coal-loading facility, along with and a refuse impoundment. Rail service is provided by Norfolk Southern.

The Tiller Mine slope face-up and shafts were idled before our acquisition of the property. We have The Company has spent limited amounts of capital to review the feasibility of a high-vol A metallurgical deep mine in the Jawbone seam of coal. This seam is located slightly above the Tiller Seam and would be accessed via a short slope from within the existing Tiller seam mine. Jawbone coal could flow through the same portal and slope as the idle Tiller mine. Production is expected to resume once warranted by market conditions. We estimate that the Knox Complex contains reserves capable of yielding approximately 8 million tons of clean saleable metallurgical coal as well as measured and indicated metallurgical coal resource tons of 275 million. We estimate that the mine life for the Knox Creek Complex is approximately 15 years.

From time to time, we process coal purchased from other independent producers at the Knox Creek preparation plant and load-out facilities. We may have also process processed and load loaded coal from our Berwind Complex at this facility until such time that the Berwind plant is fully up and running. facility.

In the fourth quarter of 2019, we acquired multiple permits from various affiliates of Omega Highwall Mining, LLC. These permits are in close proximity to our Knox Creek preparation plant and loadout infrastructure and provide immediate access to two separate mining areas in Southwestern Virginia. One is a deep mine permit in the Jawbone Seam, a geologically advantaged metallurgical coal reserve and resource. The second is a metallurgical surface mine in the Tiller seam that is mined via surface and highwall mining methods.

In August 2021, we began production at this new surface mine known as the Big Creek surface mine. We added a highwall miner in the fourth quarter of 2021. The mine reached full production during 2023.

RAM Mine

Our RAM Mine property is located in southwestern Following years of delays, the Pennsylvania consists Department of approximately 1,567 acres Environmental Protection issued a denial of controlled mineral. Production of high-vol coal from the Pittsburgh seam is planned from a single continuous-miner room-and-pillar underground operation. The Pittsburgh seam, in close proximity to Pittsburgh area coke plants, has historically been a key feedstock for these coke plants. Operation of our RAM Mine coal reserve may require access to a newly constructed preparation plant and loading facility, third party processing, or direct shipment of raw coal product. Upon commencement of

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mining, we anticipate that the mine will produce at an annualized rate of between 300 and 500 thousand tons with an estimated 10-year mining life.

We expect that coal from the RAM Mine coal reserve permit in southwest Pennsylvania. While the Company believes that the RAM permit was denied incorrectly and capriciously, we will be transported to not appeal the denial of the permit and will instead focus on our customers by highway trucks, rail cars or by barge on river systems. In addition to close proximity to river barge facilities, our RAM Mine operations are also near Norfolk Southern rail access.

Our RAM Mine property initial production is subject to a final mining permit being issued other core properties and market conditions warrant development. monetize these assets at the appropriate time.

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Maben Complex

The Maben property is located in southern West Virginia and consists of approximately 28,000 acres of controlled mineral rights acquired from the purchase of Maben Coal in the third quarter of 2022. As part of the transaction, we assumed existing mining permits issued by the West Virginia Department of Environmental Protection, which authorize authorizes mining by both surface and highwall mining methods as well as by underground methods. The property also has issued permits covering an existing haul road as well as an active refuse disposal area together with a preparation plant and unit train loadout, neither of which had been constructed as of the closing date. In early 2024, the Company completed the purchase of an existing coal preparation plant, which will be relocated to the Company's Maben Complex.

The Maben property contains various areas of high-quality low-vol metallurgical coal in the Sewell, Beckley, Pocahontas 3, Pocahontas 4, and Pocahontas 6 seams of coal. The Company expects that coal contained in the Sewell seam will be mined by surface and high-wall mining methods. Initial production is expected to begin began in the second quarter of 2023, reaching an annualized production rate of approximately 250,000 tons of low-volatile coal. The Company will consider deep mine development of coal contained in Beckley, Pocahontas 3, 4, and 46 seams at a future point. While Although the Company intends to utilize currently utilizes the Knox Creek Berwind preparation plant, in the near term, such development would likely require the construction of a new preparation plant and loadout as mentioned above. above, which is under way.

Brook Mine

The property is located in northeastern Wyoming, near Sheridan, and consists of approximately 16,000 acres of controlled mineral rights and a research and development facility that were acquired as part of the purchase of Ramaco Coal in the second quarter of during 2022. The property includes a thermal coal deposit and permit as well as occurrences of rare earth elements. The mine is currently undergoing mineral analysis and core drilling assessment to assess the potential concentrations of rare earth elements. This property is being used to support the Company's possible expansion into the manufacture and commercialization of advanced carbon products and materials from coal. The Company refers to this potentially

Three drillhole programs involving a total of 123 new business line as "CORE" (Carbon Ore-Rare Earth), signifying its focus on carbon ore and core drillholes specifically targeting rare earth elements. elements (REEs) have been completed within the current Brook Mine permit area. So far, the results of these drilling programs indicate elevated levels of REEs, along with significant concentrations of other critical elements such as Yttrium, Gallium, and Germanium. Work is ongoing to evaluate the potential exploitation of these minerals within the current Brook Mine permit area.

Customers and Contracts

Coal prices differ substantially by region and are impacted by many factors including the overall economy, demand for steel, demand for electricity, location, market, quality and type of coal, mine operation costs and the cost of customer alternatives. The major factors influencing our business are the global economy and demand for steel.

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We market the bulk of our production to North American integrated steel mills and coke plants, as well as international customers primarily in Europe, South America, Asia and Africa. Additionally, we market limited amounts of our production to various premium-priced specialty markets, such as foundry cokemakers, manufacturers of activated carbon products, and specialty metals producers.

Coal quality and volumes are stipulated in coal sales agreements, and, in many cases, the annual pricing and volumes are fixed. Our contracts with customers typically require us to deliver coal with minimum specifications or qualities. Variances from these specifications or qualities are settled by means of employing price adjustments.

Generally, the Company's domestic sales contracts have terms of about one year and the pricing is typically fixed. Export sales have spot or term contracts, and pricing can be either fixed or derived against index-based pricing mechanisms.

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We sold 2.5 million 3.5 million tons of coal during 2022. 2023. Of this, 58% 33% was sold to North American markets and 42% 67% was sold into export markets, excluding Canada. Principally, our export market sales were made to Europe. During 2022, 2023, sales to two three customers accounted for approximately 38% 41% of total revenue. No other customer accounted for 10% or more of our total revenue during 2022. 2023. If a major customer decided to stop purchasing coal or significantly reduced its purchases from us, revenue could decline and our operating results and financial condition could be adversely affected.

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Trade Names, Trademarks and Patents

We do not have any registered trademarks or trade names for our traditional products and services or subsidiaries, and nor do we do not believe that any trademark or trade name is material to our traditional metallurgical coal business. The names of the seams in which we have coal reserves, and attributes thereof, are widely recognized in the metallurgical coal market. Trademarks However, trademarks related to CORE, the Company's potentially new our advanced carbon products business line, could become material depending on future developments.

In connection with CORE, our advanced carbon products business, the Company holds 53 61 intellectual property patents and pending patents related to the conversion of low-cost carbon ore into higher value higher-value carbon products as well as exclusive licensing agreements, all of which have a remaining duration of 15-20 14-20 years.

Competition

Our principal domestic competitors include Alpha Metallurgical Resources, Inc., Blackhawk Mining, LLC, Coronado Global Resources Inc., Arch Resources, Inc., Peabody Energy Corporation and Warrior Met Coal, Inc. We also compete in international markets directly with domestic companies and with companies that produce coal from one or more foreign countries, such as Australia, Canada, and Colombia. Many of these coal producers are larger than we are and have greater financial resources and larger reserve bases than we do.

Suppliers

Supplies used in our business include petroleum-based fuels, explosives, tires, conveyance structure, ventilation supplies, lubricants and other raw materials as well as spare parts and other consumables used in the mining process. We use third-party suppliers for a significant portion of our equipment rebuilds and repairs, drilling services and construction. We believe adequate substitute suppliers and contractors are

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available, and we are not dependent on any one supplier or contractor. We continually seek to develop relationships with suppliers and contractors that focus on reducing our costs while improving quality and service.

Environmental, Health and Safety and Other Regulatory Matters

Our operations are subject to numerous federal, state, and local environmental, health and safety laws and regulations, such as those relating to permitting and licensing matters, employee health and safety, reclamation and restoration of mining properties, water discharges, air emissions, plant and wildlife protection, the storage, treatment and disposal of certain materials (including solid and hazardous wastes), remediation of contaminants, contaminated sites, surface subsidence from underground mining and the effects of mining on surface water and groundwater conditions.

Compliance with these laws and regulations may be costly and time-consuming, delay the commencement, continuation or expansion of exploration or production at our facilities, and depress demand for our products by imposing more stringent requirements and limits on our customers' operations. Moreover, these laws are constantly evolving, and the trend has been for increasingly complex and stringent regulation over time. New legislative or administrative proposals, or judicial interpretations of existing laws and regulations related to the protection of the environment could result in substantially increased capital, operating and compliance costs.

Due in part to these extensive and comprehensive regulatory requirements and ever-changing interpretations of these requirements, violations of these laws can occur from time to time in our industry and also in our operations. Expenditures relating to environmental compliance are a major cost consideration for our operations and safety and

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compliance is a significant factor in mine design, both to meet regulatory requirements and to minimize long-term environmental liabilities.

The following is a summary of the various federal and state environmental and similar regulations that have a material impact on our business:

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Surface Mining Control and Reclamation Act. The Surface Mining Control and Reclamation Act of 1977 (the "SMCRA") establishes comprehensive operational, reclamation and closure standards for our mining operations and requires that such standards be met during the course of and following completion of mining activities. The SMCRA also stipulates compliance with many other major environmental statutes, including the Clean Air Act (the "CAA"), the Clean Water Act (the "CWA"), the Endangered Species Act (the "ESA"), the Resource Conservation and Recovery Act (the "RCRA") and the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (the "CERCLA"). Permits for all mining operations must be obtained from the United States Office of Surface Mining Reclamation and Enforcement (the "OSMRE") or, where state regulatory agencies have adopted federally approved state programs under SMCRA, the appropriate state regulatory authority. Our operations are located in West Virginia Virginia, and Pennsylvania, Virginia, which have achieved primary jurisdiction for enforcement of SMCRA through approved state programs.

The SMCRA imposes a complex set of requirements covering all facets of coal mining. SMCRA regulations govern, among other things, coal prospecting, mine plan development, topsoil or growth medium removal and replacement, disposal of excess spoil and coal refuse, protection of the hydrologic balance, and suitable post mining land uses.

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From time to time, the OSMRE will also update its mining regulations under the SMCRA. For example, the OSMRE has previously sought to impose stricter stream protection requirements by requiring more extension pre-mining and baseline data for coal mining operations. The rule was disapproved by Congress pursuant to the Congressional Review Act. However, whether Congress will enact future legislation to require a new stream protection rule remains uncertain. The existing rules, or other new SMCRA regulations, could result in additional material costs, obligations and restrictions upon our operations.

Abandoned Mine Lands Fund. The SMCRA also imposes a reclamation fee on all current mining operations, the proceeds of which are deposited in the Abandoned Mine Reclamation Fund (the "AML Fund"), which is used to restore unreclaimed and abandoned mine lands mined before 1977. The adjusted fees proposed in the Interim Final Rule per ton for October 1, 2021 through September 30, 2034 are (i) 22.4 cents per ton for surface-mined anthracite, bituminous, and subbituminous coal if the value per ton is $2.24 per ton or more, (ii) 9.6 cents per ton for underground-mined anthracite, bituminous, and subbituminous coal if the value per ton is $0.96 per ton, and (iii) 6.4 cents per ton for surface- and underground-mined lignite coal if the value per ton is $3.20 per ton or more. . The Interim Final Rule took effect in August 2022. Estimates of our total reclamation and mine-closing liabilities are based upon permit requirements and our experience related to similar activities. If these accruals are insufficient or our liability in a particular year is greater than currently anticipated, our future operating results could be adversely affected.

Mining Permits and Approvals. Numerous governmental permits and approvals are required for mining operations. We are required to prepare and present to federal, state, and local authorities data detailing the effect or impact that any proposed exploration project for production of coal may have upon the environment, the public and our employees. The permitting rules are complex and continuously updated, and may be subject to discretionary interpretations by regulators. Further, the laws, rules, and regulations that govern our mining operations authorize substantial fines and penalties, including revocation or suspension of mining permits under some circumstances. Monetary sanctions and, in certain circumstances, even criminal sanctions may be imposed for failure to comply with these laws. Compliance with required permits and associated regulations may have a material adverse impact on our operations, earnings, or financial condition.

Applications for permits and permit renewals associated with our mining operations are also subject to public comment and potential legal challenges from third parties seeking to prevent a permit from being issued, or to overturn the applicable agency's grant of the permit. Should our permitting efforts become subject to such challenges, the permits may not be issued in a timely fashion, may impose requirements which restrict our ability to conduct our mining

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operations or to do so profitably, or may not be issued at all. Any delays, denials, or revocation of these or other similar permits we need to operate could reduce our production and materially adversely impact our cash flow and results of our operations.

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In order to obtain mining permits and approvals from state regulatory authorities, mine operators must also submit a reclamation plan for restoring the mined property to its prior condition, productive use or other permitted condition. The conditions of certain permits also require that we obtain surface owner surface-owner consent if the surface estate has been split from the mineral estate. This requires us to negotiate with third parties for surface access that overlies coal we acquired or intend to acquire. These negotiations can be costly and time-consuming, lasting years in some instances, which can create additional delays in the permitting process. If we cannot successfully negotiate for land access, we could be denied a permit to mine coal we already own.

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Finally, we typically submit necessary mining permit applications several months, or even years, before we anticipate mining a new area. However, we cannot control the pace at which the government issues permits needed for new or ongoing operations. For example, the process of obtaining CWA permits can be particularly time-consuming and subject to delays and denials. The Environmental Protection Agency (the "EPA") also has the authority to veto permits issued by the U.S. Army Corps. of Engineers (the "Corps") under the CWA's Section 404 program that prohibits the discharge of dredged or fill material into regulated waters without a permit. Even after we obtain the permits that we need to operate, many of the permits must be periodically renewed, or may require modification. There is some risk that not all existing permits will be approved for renewal, or that existing permits will be approved for renewal only upon terms that restrict or limit our operations in ways that may be material.

Financial Assurance. Federal and state laws require a mine operator to secure the performance of its reclamation and lease obligations under the SMCRA through the use of surety bonds or other approved forms of financial security for payment of certain long-term obligations, including mine closure or reclamation costs. The changes in the market for coal used to generate electricity in recent years have led to bankruptcies involving prominent coal producers. Several of these companies relied on self-bonding to guarantee their responsibilities under the SMCRA permits including for reclamation. In response to these bankruptcies, the OSMRE issued a policy advisory in August 2016 to state agencies that was intended to discourage authorized states from approving self-bonding arrangements (the "Policy Advisory"). Although the Policy Advisory was rescinded in October 2017, certain states, including Virginia, had previously announced that they would no longer accept self-bonding to secure reclamation obligations under the state mining laws. Additionally, in March 2018, the Government Accounting Office recommended that Congress consider amending the SMCRA to eliminate the availability of self-bonding to guarantee responsibilities under SMCRA permits. Individually and collectively, these and future revised various financial assurance requirements may increase the amount of financial assurance needed and limit the types of acceptable instruments, straining the capacity of the surety markets to meet demand. This may delay the timing for and increase the costs of obtaining the required financial assurance.

We use surety bonds, trusts and letters of credit to provide financial assurance for certain transactions and business activities. Federal and state laws require us to obtain surety bonds to secure payment of certain long-term obligations including mine closure or reclamation costs and other miscellaneous obligations. The bonds are renewable on a yearly basis. Surety bond rates have increased in recent years and the market terms of such bonds have generally become less favorable. Sureties typically require coal producers to post collateral, often having a value equal to 40% or more of the face amount of the bond. As a result, we may be required to provide collateral, letters of credit or other assurances of payment in order to obtain the necessary types and amounts of financial assurance. Under our surety bonding program, we are not currently required to post any letters of credit or other collateral to secure the surety bonds; obtaining letters of credit in lieu of surety bonds could result in a significant cost increase. Moreover, the need to obtain letters of credit may also reduce amounts that we can borrow under any senior secured credit facility for other purposes. If, in the future, we are unable to secure surety bonds for these obligations and are forced to secure letters of credit indefinitely or obtain some other form of financial assurance at too high of a cost, our profitability may be negatively affected.

We intend to maintain a credit profile that precludes the need to post collateral for our surety bonds. Nonetheless, our surety has the right to demand additional collateral at its discretion.

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Some international customers require new suppliers to post performance guarantees during the initial stages of qualifying to become a long-term supplier. To date we have not had to provide a performance guarantee, but it is possible that such a guarantee could be required in the future.

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Mine Safety and Health. The Federal Mine Safety and Health Act of 1977, as amended (the "MINE Act") and the Mine Improvement and New Emergency Response Act of 2006 (the "MINER Act"), and regulations issued under these federal statutes, impose stringent health and safety standards on mining operations. The regulations that have been adopted under the Mine Act and the MINER Act are comprehensive and affect numerous aspects of mining operations, including training of mine personnel, mining procedures, roof control, ventilation, blasting, use and maintenance of mining equipment, dust and noise control, communications, emergency response procedures, and other matters. The Mine Safety and Health Administration (the "MSHA") regularly inspects mines to ensure compliance with regulations promulgated under the Mine Act and MINER Act.

Pennsylvania, West Virginia, and Virginia all have similar programs for mine safety and health regulation and enforcement. The various requirements mandated by federal and state statutes, rules, and regulations place restrictions on our methods of operation and result in fees and civil penalties for violations of such requirements or criminal liability for the knowing violation of such standards, significantly impacting operating costs and productivity.

The regulations enacted under the Mine Act and MINER Act as well as under similar state acts are routinely expanded or made more stringent, raising compliance costs and increasing potential liability. Our compliance with current or future mine health and safety regulations could increase our mining costs. At this time, it is not possible to predict the full effect that new or proposed statutes, regulations and policies will have on our operating costs, but any expansion of existing regulations, or making such regulations more stringent, may have a negative impact on the profitability of our operations. If we were to be found in violation of mine safety and health regulations, we could face penalties or restrictions that may materially and adversely impact our operations, financial results and liquidity.

In addition, government inspectors have the authority to issue orders to shut down our operations based on safety considerations under certain circumstances, such as imminent dangers, accidents, failures to abate violations, and unwarrantable failures to comply with mandatory safety standards. If an incident were to occur at one of our operations, it could be shut down for an extended period of time, and our reputation with prospective customers could be materially damaged. Moreover, if one of our operations is issued a notice of pattern of violations, then MSHA can issue an order withdrawing the miners from the area affected by any enforcement action during each subsequent significant and substantial ("S&S") citation until the S&S citation or order is abated.

Workers' Compensation and Occupational Disease. We are insured for workers' compensation benefits for work related injuries that occur within our United States operations. We retain insurance coverage for all of our subsidiaries and are insured for the statutory limits. Workers' compensation liabilities, including those related to claims incurred but not reported, are recorded principally using annual valuations based on discounted future expected payments using historical data of the operating subsidiary or combined insurance industry data when historical data is limited. State workers' compensation acts typically provide for an exception to an employer's immunity from civil lawsuits for workplace injuries in the case of intentional torts. However, West Virginia's workers' compensation act provides a much broader exception to workers' compensation immunity. The exception allows an injured employee to recover against his or her employer where he or she can show damages caused by an unsafe working condition of which the employer was aware that was a violation of a statute, regulation, rule or consensus industry standard. These types of lawsuits are not uncommon and could have a significant impact on our operating costs.

In addition, we obtained from a third-party insurer a workers' compensation insurance policy, which includes coverage for medical and disability benefits for occupational disease under the Federal Coal Mine Health and Safety Act of 1969 and the Mine Act. Under the Black Lung Benefits Revenue Act of 1977 and the Black Lung Benefits Reform Act of 1977, as amended in 1981, each coal mine operator must pay federal black lung benefits to claimants who are current and former employees and also make payments to a trust fund for the payment of benefits and medical expenses to claimants who last worked in the coal industry prior to January 1, 1970.

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The Patient Protection and Affordable Care Act of 2010 includes significant changes to the federal black lung program including an automatic survivor benefit paid upon the death of a miner with an awarded black lung claim and the establishment of a rebuttable presumption

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with regard to pneumoconiosis among miners with 15 or more years of coal mine employment that are totally disabled by a respiratory condition. These changes could have a material impact

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on our costs expended in association with the federal black lung program. In addition to possibly incurring liability under federal statutes, we may also be liable under state laws for black lung claims.

Clean Air Act. The CAA and comparable state laws that regulate air emissions affect coal mining operations both directly and indirectly. Direct impacts on coal mining and processing operations include CAA permitting requirements and emission control requirements relating to air pollutants, including particulate matter such as fugitive dust. The CAA indirectly impacts coal mining operations by extensively regulating the emissions of particulate matter, sulfur dioxide, nitrogen oxides, mercury and other compounds emitted by coal-fired power plants. In addition to the greenhouse gas ("GHG") issues discussed below, the air emissions programs that may materially and adversely affect our operations, financial results, liquidity, and demand for our coal, directly or indirectly, include, but are not limited to, the following:

- *Cross-State Air Pollution Rule.* In July 2011, the EPA finalized the Cross-State Air Pollution Rule (the "CSAPR"), a cap-and-trade program that requires 28 states in the Midwest and eastern seaboard of the U.S. to reduce power plant emissions that cross state lines and contribute to ozone and/or fine particle pollution in other states. In May 2017, September 2016, the EPA finalized a rule that further limited summertime (May-September) nitrogen oxide emissions from power plants in 22 states in the eastern United States beginning in the CSAPR May 2017 (the "CSAPR Update Rule. Rule"). For states to meet these requirements, a number of coal-fired electric generating units will likely need to be retired, rather than retrofitted with the necessary emission control technologies, reducing demand for thermal coal. Moreover, in September 2019, the United States Court of Appeals for the District of Columbia Circuit ("D.C. Circuit") remanded the CSAPR Update Rule to the EPA on the grounds that it failed to timely require upwind states to control or eliminate their contribution to ozone and/or fine particulate matter in downwind states, as required under the CAA. In October 2020, the EPA proposed a Revised CSAPR Update Rule in response to the D.C. Circuit's ruling, which was finalized in April 2021. The final rule resolves 21 states' outstanding interstate pollution transport obligations and would require additional emissions reductions of nitrogen oxides from power plants in 12 states. Imposition of stricter deadlines for controlling downwind contribution could accelerate unit retirements or the need to implement emission control strategies. Any reduction in the amount of coal consumed by electric power generators as a result of these limitations could decrease demand for thermal coal.

- *Acid Rain*. Title IV of the CAA requires reductions of sulfur dioxide emissions by electric utilities and applies to all coal-fired power plants generating greater than 25 megawatts of power. Affected power plants have sought to reduce sulfur dioxide emissions by switching to lower sulfur fuels, installing pollution control devices, reducing electricity generating levels or purchasing or trading sulfur dioxide emission allowances. These reductions could impact our customers in the electric generation industry. These requirements are not supplanted by the CSAPR.

- *NAAQS for Criterion Pollutants.* The CAA requires the EPA to set standards, referred to as National Ambient Air Quality Standards ("NAAQS"), for six common air pollutants: carbon monoxide, nitrogen dioxide, lead, ozone, particulate matter ("PM") and sulfur dioxide. Areas that are not in compliance (referred to as "non-attainment areas") with these standards must take steps to reduce emissions levels. The EPA has adopted NAAQS for carbon monoxide, nitrogen dioxide, lead, sulfur dioxide, particulate matter PM and ground-level ozone. The CAA further requires the EPA to periodically review and revise the NAAQS, resulting in the trend of more stringent standards over time. In February 2024, for example, the EPA published a final rule that revised the primary annual $PM_{2.5}$ standard by lowering the level from 12.0 µg/m3 to 9.0 µg/m3. States with non-attainment areas must adopt a state implementation plan that demonstrates compliance with the existing or new air quality standards. These plans could require significant additional emissions control expenditures at coal-fired power plants. New rules and standards may also impose additional emissions control requirements on our customers in the electric generation, steelmaking, and coke industries. Because

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coal mining operations emit particulate matter and sulfur dioxide, our mining operations could be affected when the new standards are implemented by the states.

- *Mercury and Hazardous Air Pollutants*. The EPA has established emission standards for mercury and other metal, metals, fine particulates, and acid gases from coal- and oil-fired power plants through the Mercury and Air Toxics Standards ("MATS") rule. Like CSAPR, MATS and other similar future regulations could

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accelerate the retirement of a significant number of coal-fired power plants. Such retirements would likely adversely impact our business.

Global Climate Change. Climate change continues to attract considerable public and scientific attention. There is widespread concern about the contributions of human activity to such changes, especially through the emission of GHGs. Numerous reports from scientific and governmental bodies such as the United Nations Intergovernmental Panel on Climate Change have expressed heightened concerns about the impacts of human activity, especially fossil fuel combustion, on the global climate. There are three primary sources of GHGs associated with the coal industry. First, the end use of our coal by our customers in electricity generation, coke plants, and steelmaking is a source of GHGs. Second, combustion of fuel by equipment used in coal production and to transport our coal to our customers is a source of GHGs. Third, coal mining itself can release methane, which is considered to be a more potent GHG than carbon dioxide, directly into the atmosphere. These emissions from coal consumption, transportation and production are subject to pending and proposed regulation as part of initiatives to address global climate change.

As a result, numerous proposals have been made and are likely to continue to be made at the international, national, regional, state and local levels of government to monitor and limit emissions of GHGs. Collectively, these initiatives could result in higher electric costs to our customers or lower the demand for coal used in electric or steel generation, which could in turn adversely impact our business.

At present, we are principally focused on metallurgical coal production, which is not used in connection with the production of power generation. However, we may seek to sell greater amounts of our coal into the power-generation market in the future. The market for our coal may be adversely impacted if comprehensive legislation or regulations focusing on GHG emission reductions are adopted, or if our customers are unable to obtain financing for their operations.

At the international level, in April 2016, the United States joined the international community at the 21st Conference of the Parties of the United Nations Framework Convention on Climate Change in Paris, France, which resulted in an agreement intended to nationally determine their contributions and set GHG emission reduction goals every five years beginning in 2020. In November 2019, plans were formally announced for the U.S. to withdraw from the Paris Agreement with an effective exit date in November 2020. In February 2021, the current administration announced reentry of the U.S. into the Paris Agreement along with a new "nationally determined contribution" for U.S. GHG emissions that would achieve emissions reductions of at least 50% relative to 2005 levels by 2030. In addition, shortly after taking office in January 2021, President Biden issued a series of executive orders designed to address climate change. In November 2021, the 26th Conference of the Parties to the United Nations Framework on Climate Change concluded with the finalization of the Glasgow Climate Pact, which aims to cut global methane pollution at least 30% by 2030 relative to 2020 levels, including "all feasible reductions" in the energy sector. Forty-six countries signed onto a Global Coal to Clean Energy Transition Statement, committing to transition away from unabated coal power generation by about 2030 for "major economies" and a global transition by roughly 2040. Most recently, at the 27th conference of parties ("COP27"), President Biden announced the EPA's proposed standards to reduce methane emissions from existing oil and gas sources, and agreed, in conjunction with the European Union and a number of other partner countries, to develop standards for monitoring and reporting methane emissions to help create a market for low methane-intensity natural gas. Various state and local governments have also publicly committed to furthering the goals of the Paris Agreement. International commitments, reentry into the Paris Agreement and President Biden's executive orders may result in the development of additional regulations or changes to existing regulations. regulations that may impact our business.

The $1 trillion legislative infrastructure package passed by Congress in November 2021 includes a number of climate-focused spending initiatives targeted at climate resilience, enhanced response and preparation for extreme

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weather events, and clean energy and transportation investments. In August 2022, President Biden signed the Inflation Reduction Act of 2022 into law. The Inflation Reduction Act of 2022 also law provides significant funding and incentives for research and development of low-carbon energy production methods, carbon capture, and other programs directed at addressing climate change. The Inflation Reduction Act of 2022 also provides significant funding for research and development of low-carbon energy production methods, carbon capture, and other programs directed at addressing climate change.

Furthermore, the EPA has determined that emissions of GHGs present an endangerment to public health and the environment, because emissions of GHGs are, according to the EPA, contributing to the warming of the earth's atmosphere and other climatic changes. Based on these findings, the EPA, over time, has attempted to restrict emissions of GHGs under existing provisions of the CAA. For example, in August 2015, the EPA finalized the

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Clean Power Plan (the "CPP") to cut carbon emissions from existing power plants, which did not formally go into effect because the U.S. Supreme Court stayed its implementation in February 2016. In July 2019, the EPA adopted the Affordable Clean Energy Rule (the "ACE Rule") that repealed and replaced the CPP. The ACE Rule required states to set appropriate GHG emission standards for power plants within their jurisdiction based upon the application of "candidate" heat rate improvement measures. The In January 2021, the D.C. Circuit repealed vacated the ACE Rule in January 2021, and remanded it to the agency for further proceedings. In February 2021, the EPA issued a memorandum stating the agency's position that neither the Clean Power Plan nor the ACE Rule are in effect, and future regulation of carbon dioxide emissions from existing power generation facilities remains uncertain. In May 2023, the EPA proposed revised new source performance standards for GHG emissions from new and reconstructed power plants that undertake a large modification. The outcome finalization of this litigation, rule and any future rules or future GHG emission standards may encourage a shift away from coal-fired power generation, adversely impacting the market for our product. The Inflation Reduction Act of 2022 also provides significant funding for research and development of low-carbon energy production methods, carbon capture, and other programs directed at addressing climate change.

Additionally, on March 21, 2022 March 6, 2024, the SEC issued a proposed rule regarding the enhancement and standardization of mandatory climate-related disclosures. The proposed rule would adopted final rules to require registrants to include disclose certain climate-related disclosures information in their registration statements and periodic reports, including, but not limited annual reports. The final rules will require the Company to disclose, among other things, material climate-related risks, information about the registrant's governance our board of directors' ("Board") oversight of climate-related risks, and relevant risk management processes; management's role in managing material climate-related risks, that are reasonably likely to have a material impact on the registrant's business, results of operations, or financial condition and their actual and likely climate-related impacts on the registrant's business strategy, model, and outlook; climate-related targets, goals and transition plan (if any); certain climate-related financial statement metrics in a note to their audited financial statements; Scope 1 and Scope 2 GHG emissions; greenhouse gas emissions. Compliance with these rules will be phased in over time based on our filing status as well as the content of the disclosure and Scope 3 GHG emissions and intensity, if material, or if the registrant has set a GHG emissions reduction target, goal or plan that includes Scope 3 GHG emissions. assurance requirements. Although the proposed rule's ultimate date Company is in the process of effectiveness and evaluating the final form and substance of these requirements is not yet known and the ultimate scope and impact on our business is uncertain, new rules, compliance with the proposed rule, if finalized, may result in increased legal, accounting, and financial compliance other compliance-related costs, make some activities more difficult, time-consuming and costly, and as well as place strain on our personnel, systems, and resources.

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At the state level, several states, including Pennsylvania and Virginia, have already adopted measures requiring GHG emissions to be reduced within state or regional boundaries, including cap-and-trade programs and the imposition of renewable energy portfolio standards. Various states and regions have also adopted GHG initiatives, and certain governmental bodies have imposed, or are considering the imposition of, fees or taxes based on the emission of GHGs by certain facilities. A number of states have also enacted legislative mandates requiring electricity suppliers to use renewable energy sources to generate a certain percentage of power. Furthermore, many state and local leaders have intensified or stated their intent to intensify efforts to support international climate commitments and treaties.

The extent of future regulation of GHG emissions may inhibit utilities from investing in the building of new coal-fired plants to replace older plants or investing in the upgrading of existing coal-fired plants. Any reduction in the amount of coal consumed by electric power generators as a result of actual or potential regulation of GHG emissions could decrease demand for thermal coal, thereby reducing our revenue and adversely affecting our business and results of operations. We or our prospective customers may also have to invest in carbon dioxide capture and storage technologies in order to burn coal and comply with future GHG emission standards.

Finally, there have been attempts to encourage the reduction of coalbed methane emissions because methane has a greater GHG effect than carbon dioxide and can give rise to safety concerns. For example, the EPA has established the Coalbed Methane Outreach Program in an effort to mitigate methane emissions from underground coal mines through voluntary initiatives and outreach in partnership with the coal industry. If new laws or regulations were introduced to reduce coalbed methane emissions, those rules could adversely affect our costs of operations by requiring installation of air pollution controls, higher taxes, or costs incurred to purchase credits that permit us to continue operations.

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Clean Water Act. The CWA and corresponding state laws and regulations affect coal mining operations by restricting the discharge of pollutants, including dredged or fill materials, into waters of the United States. Likewise, permits are required under the CWA to construct impoundments, fills or other structure in areas that are designated as waters of the United States. For example, prior to placing fill material in waters of the United States, such as with the construction of a valley fill, coal mining companies are required to obtain a permit from the Corps under Section 404 of

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the CWA. The permit can be either a Nationwide Permit ("NWP"), normally NWP 21, 49 or 50 for coal mining activities, or a more complicated individual permit. NWPs are designed to allow for an expedited permitting process, while individual permits involve a longer and more detailed review process. The EPA has the authority to veto permits issued by the Corps under the CWA's Section 404 program that prohibits the discharge of dredged or fill material into regulated waters without a permit. Additionally, recent court decisions, regulatory actions and proposed legislation have created uncertainty over CWA jurisdiction and permitting requirements, such as (1) an April 2020 decision further defining the scope of the CWA, wherein the U.S. Supreme Court held that, in certain cases, discharges from a point source to groundwater could fall within the scope of the CWA and require a permit. permit and (2) a May 2023 decision further defining the scope of the CWA, wherein the U.S. Supreme Court held that discharges from a point source to a wetland could fall within the scope of the CWA and require a permit if the adjacent body of water is a relatively permanent body of water connected to traditional interstate navigable waters and the wetland has a continuous surface connection with that water.

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Prior to discharging any pollutants into waters of the United States, coal mining companies must obtain a National Pollutant Discharge Elimination System ("NPDES") permit from the appropriate state or federal permitting authority. NPDES permits include effluent limitations for discharged pollutants and other terms and conditions, including required monitoring of discharges. Failure to comply with the CWA or NPDES permits can lead to the imposition of significant penalties, litigation, compliance costs and delays in coal production. Potential changes in state and federally recommended water quality standards may result in the issuance or modification of permits with new or more stringent effluent limits or terms and conditions. For instance, waters that designated by states have designated as impaired (i.e., as not meeting present current water quality standards) are subject to Total Maximum Daily Load ("TMDL") regulations, which may lead to the adoption of more stringent discharge standards for our coal mines and could require more costly treatment. Likewise, the water quality of certain receiving streams requires an anti-degradation review before approving any discharge permits. TMDL regulations and anti-degradation policies may increase the cost, time and difficulty associated with obtaining and complying with NPDES permits. In addition, in certain circumstances private citizens may challenge alleged violations of NPDES permit limits in court. Recently, certain citizen groups have filed lawsuits alleging ongoing discharges of pollutants, including selenium and conductance, from valley fills located at certain mining sites in some of the regions where we operate. In West Virginia, several of these cases have been successful for the challengers. While it is difficult to predict the outcome of any potential or future suits, such litigation could result in increased compliance costs following the completion of mining at our operations.

Finally, in June 2015, the EPA and the Corps published a new definition of "waters of the United States" ("WOTUS") that would have expanded areas requiring NPDES or Corps Section 404 permits. This definition never took effect as it was replaced by the Navigable Waters Protection Rule (the "NWPR") in December 2019. A coalition of states and cities, environmental groups and agricultural groups challenged the NWPR, which was vacated by the U.S. District Court for the District of Arizona in August 2021. The In December 2022, the EPA and Corps announced the final "Revised Definition of 'Waters of the United States'" rule. This rule is undergoing not currently operative in certain states and for certain parties due to ongoing litigation. In August 2023, the EPA and Corps issued a rulemaking process final rule to redefine amend the definition "Revised Definition of WOTUS, which could be impacted by 'Waters of the United States'" rule in response to the U.S. Supreme Court's upcoming May 2023 decision in the case of *Sackett v. EPA Environmental Protection Agency*, a case regarding. In the proper test in determining whether wetlands qualify as WOTUS. A final jurisdictions and for the parties where the January 2023 rule known as "Rule 1" was announced by is enjoined, the EPA and the Corps in December 2022. The EPA and Corps are expected to propose a second rule, known as "Rule 2," further refining Rule 1 by November 2023 interpreting "waters of the United States" consistent with the U.S. Supreme Court's decision in *Sackett* and issue a final rule by July 2024. the pre-2015 regulatory regime. To the extent a new rule or further litigation expands the scope of the CWA's jurisdiction, the CWA permits we need may not be issued, may not be issued in a timely fashion, or may be issued with new requirements which restrict our ability to conduct mining operations or to do so profitably.

Resource Conservation and Recovery Act. The RCRA and corresponding state laws establish standards for the management of solid and hazardous wastes generated at our various facilities. Besides affecting current waste disposal practices, the RCRA also addresses the environmental effects of certain past hazardous waste treatment, storage and

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disposal practices. In addition, the RCRA requires certain of our facilities to evaluate and respond to any past release, or threatened release, of a hazardous substance that may pose a risk to human health or the environment.

The RCRA may affect coal mining operations by establishing requirements for the proper management, handling, transportation and disposal of solid and hazardous wastes. For example, the EPA regulates coal ash as a solid waste under Subtitle D of the RCRA through its coal combustion residuals ("CCR") rule. This rule establishes limits for the location of new sites and requires closure of sites that fail to meet prescribed engineering standards, regular inspections of impoundments, and immediate remediation and closure of unlined ponds that are polluting ground water. As initially promulgated, the rule exempted closed coal ash impoundments located at inactive facilities and allowed for the continued operation of unlined or clay-lined ponds that were not polluting groundwater. In January 2022, the EPA announced several actions with respect to the CCR rule, including reiterating that surface impoundments cannot be

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closed with coal ash in contact with groundwater (in connection with the proposed denial of closure deadline extensions due to failure of a permittee to demonstrate compliance with coal combustion residuals rules – the EPA took final action to deny the request in November 2022) and establishing a federal permitting scheme for the disposal of coal ash and establishing regulations for legacy coal ash surface impoundments. Additionally, in December 2016, Congress passed the Water Infrastructure Improvements for the Nation Act, which provided for the establishment of state and EPA permit programs for the control of coal combustion residuals CCR and authorizes states to incorporate the EPA's final rule for coal combustion residuals CCR or develop other criteria that are at least as protective as the final rule. These In May 2023, the EPA published proposed changes to the CCR rule for legacy CCR surface impoundments and a notice of data availability related to the proposed rule in November 2023. The finalization of this proposal, the current requirements of the CCR rules, as well as any future changes in the management of coal combustion residuals, CCR, could increase our customers' operating costs and potentially reduce their ability or need to purchase coal. In addition, contamination caused by the past disposal of coal combustion residuals, CCR, including coal ash, could lead to material liability for our customers under the RCRA or other federal or state laws and potentially further reduce the demand for coal.

Currently, certain coal mine wastes, such as earth and rock covering a mineral deposit (commonly referred to as overburden) and coal cleaning wastes, are exempted from hazardous waste management under the RCRA. Any change or reclassification of this exemption could significantly increase our coal mining costs.

Comprehensive Environmental Response, Compensation and Liability Act. CERCLA and similar state laws affect coal mining operations by, among other things, imposing cleanup requirements for threatened or actual releases of hazardous substances into the environment. Under CERCLA and similar state laws, joint and several liability may be imposed on hazardous substance generators, site owners, transporters, lessees and others regardless of fault or the legality of the original disposal activity. Although the EPA excludes most wastes generated by coal mining and processing operations from the primary hazardous waste laws, such wastes can, in certain circumstances, constitute hazardous substances for the purposes of CERCLA. In addition, the disposal, release or spilling of some products used by coal companies in operations, such as chemicals listed as hazardous substances under CERCLA, could trigger the liability provisions of CERCLA or similar state laws. Thus, we The EPA periodically evaluates the CERCLA list of hazardous substances. In September 2022, the EPA proposed to designate two per- and polyfluoroalkyl substances ("PFAS"), including their salts and structural isomers, as hazardous substances under CERCLA. This proposed rule, if finalized, may result in increased costs to cleanup properties at which the listed PFAS were released.

We may be subject to liability under CERCLA and similar state laws for coal mines that we currently own, lease or operate or that we or our predecessors have previously owned, leased or operated, and sites to which we or our predecessors sent hazardous substances. These liabilities could be significant and materially and adversely impact our financial results and liquidity.

Endangered Species and Bald and Golden Eagle Protection Acts. The ESA and similar state legislation protect species designated as threatened, endangered or other special status. The U.S. Fish and Wildlife Service (the "USFWS") works closely with the OSMRE and state regulatory agencies to ensure that species subject to the ESA are protected from mining-related impacts. Several species indigenous to the areas in which we operate area are protected under the ESA. Other species in the vicinity of our operations may have their listing status reviewed in the future and could also become protected under the ESA. In addition, the USFWS has identified bald eagle habitats in some of the counties where we operate. The Bald and Golden Eagle Protection Act prohibits taking certain actions that would harm bald or golden eagles without obtaining a permit from the USFWS. Compliance with the requirements of the ESA and the Bald and Golden Eagle Protection Act could have the effect of prohibiting or delaying us from obtaining mining permits. These requirements may also include restrictions on timber harvesting, road building and other mining or agricultural activities in areas containing the affected species or their habitats. There is also increasing interest in nature-related matters

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beyond protected species, such as general biodiversity, which may similarly require us or our customers to incur costs or take measures which may adversely impact our business or operations.

Use of Explosives. Our surface mining operations are subject to numerous regulations relating to blasting activities. Due to these regulations, we will incur costs to design and implement blast schedules and to conduct pre-blast surveys and blast monitoring. In addition, the storage of explosives is subject to various regulatory requirements. For example, the Department of Homeland Security requires facilities in possession of chemicals of interest (including ammonium nitrate at certain threshold levels) to complete a screening review. Our mines are low risk, Tier 4 facilities which are not subject to additional security plans. The adoption of future, more stringent standards related to the use of explosives could materially adversely impact our cost or ability to conduct our mining operations.

National Environmental Policy Act. The National Environmental Policy Act (the "NEPA") requires federal agencies, including the Department of Interior, to evaluate major agency actions that have the potential to significantly impact the environment, such as issuing a permit or other approval. In the course of such evaluations, an agency will

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typically prepare an environmental assessment to determine the potential direct, indirect and cumulative impacts of a proposed project. Where the activities in question have significant impacts to the environment, the agency must prepare an environmental impact statement. Compliance with the NEPA can be time-consuming and may result in the imposition of mitigation measures that could affect the amount of coal that we are able to produce from mines on federal lands, and may require public comment. Furthermore, whether agencies have complied with the NEPA is subject to protest, appeal or litigation, which can delay or halt projects. The NEPA review process, including potential disputes regarding the level of evaluation required for climate change impacts, may extend the time and/or increase the costs and difficulty of obtaining necessary governmental approvals, and may lead to litigation regarding the adequacy of the NEPA analysis, which could delay or potentially preclude the issuance of approvals or grant of leases.

On July 16, 2020, the Council on Environmental Quality ("CEQ") revised NEPA's implementing regulations to make the NEPA process more efficient, effective, and timely. The rule required federal agencies to develop procedures consistent with the new rule within one year of the rule's effective date (which was extended to two years in June 2021). These regulations are subject to ongoing litigation in several federal district courts, and in October 2021, CEQ issued a notice of proposed rulemaking to amend the NEPA regulatory changes adopted in 2020 in two phases. Phase I of CEQ's proposed rulemaking process was finalized on April 20, 2022, and generally restored provisions that were in effect prior to 2020. It is anticipated that Phase II of the proposed rulemaking will propose was published by CEQ in July 2023. Phase II proposes further revisions in an attempt to ensure the NEPA process "provides for efficient and effective environmental reviews," and meets environmental, environmental justice, and climate change objectives. These rules could create additional delays and costs in the NEPA review process or in our operations, or even an inability to obtain necessary federal approvals for our operations due to the increased risk of legal challenges from environmental groups seeking additional analysis of climate impacts.

Other Environmental Laws. We are required to comply with numerous other federal, state, and local environmental laws and regulations in addition to those previously discussed. These additional laws include but are not limited to the Safe Drinking Water Act, the Toxic Substances Control Act, and the Emergency Planning and Community Right-to-Know Act. Act and similar state laws. Each of these laws can impact permitting or planned operations and can result in additional costs or operational delays.

Seasonality

Our primary business is not materially impacted by seasonal fluctuations. Demand for metallurgical coal is generally more heavily influenced by other factors such as the general economy, interest rates and commodity prices.

Cybersecurity Risk Management

Like most companies, we have become increasingly dependent upon digital technologies, including information systems, infrastructure and cloud applications and services, to operate our businesses, process and record financial and operating data, communicate with our business partners, analyze mine and mining information, estimate quantities of coal reserves, and perform other activities related to our

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business. Inherent in the use of these technologies is the risk of cyber intrusions, denial of service attacks, and other potential cyber misconduct. The Company has taken a balanced approach to help minimize cyber risk exposure, which includes the development of an incident response team, performing due diligence on third parties, and conducting response team exercises and system-wide cybersecurity testing.

Human Capital Resources

We believe our employees are a competitive advantage. We seek to foster a culture that supports diversity, equity and inclusion, and strive to provide a safe, healthy and rewarding work environment with opportunities for growth. We had 725 811 employees as of December 31, 2022 December 31, 2023, including our named executive officers, and nearly all of our employees are full-time employees. None of our employees are covered by collective bargaining agreements, and we

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have not experienced any strikes or work stoppages related to labor relation issues. We believe we have good relations with our employees. Our human capital resources objectives include, as applicable, identifying, recruiting, training, retaining, incentivizing and integrating our existing and additional employees. We also depend on experienced

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contractors and third-party consultants to conduct some of our day-to-day activities. We plan to continue to use the services of many of these contractors and consultants.

Safety Philosophy. We have a comprehensive health and safety program based on the core belief that all accidents and occupational illnesses are preventable. We believe that:

- Business excellence is achieved through the pursuit of safer and more productive work practices.
- Any task that cannot be performed safely should not be performed.
- Working safely is a requirement of our employees.
- Controlling the work environment is important, but human behavior within the work environment is paramount.
- Safety starts with individual decision-making—all employees must assume a share of responsibility for acts within their control that pose a risk of injury to themselves or fellow workers.
- All levels of the organization must be proactive in implementing safety processes that promote a safe and healthy work environment.
- Consequently, we are committed to providing a safe work environment; providing our employees with proper training and equipment; and implementing safety and health rules, policies and programs that foster safety excellence.

Our safety program includes a focus on the following:

- *Hiring the Right Workers*. Our hiring program includes significant pre-employment screening and reference checks.
- *Safety Incentives*. We have a compensation system that encourages and rewards excellent safety performance.
- *Communication*. We conduct regular safety meetings with the frequent involvement of senior management to reinforce the “tone at the top.”
- *Drug and Alcohol Testing*. We require pre-employment drug screening as well as regular random drug testing that exceeds regulatory requirements.

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- *Continuous Improvement Programs*. We track key safety performance metrics, including accident rates, violation types and frequencies. We have specific targets in these areas, and we measure performance against these targets. Specific action plans are implemented for targeted improvement in areas where performance falls below our expectations.
- *Training*. Our training program includes comprehensive new employee orientation and training, annual refresher training and task training components. These training modules are designed to reinforce our high safety expectations. Work rules and procedures are a key element of this training.
- *Accident Investigation*. We have a structured accident investigation procedure that identifies root causes of accidents as well as actions necessary to prevent reoccurrence. We focus on near misses and close calls as a means of attempting to prevent more serious accidents from occurring.
- *Safety Audits*. We conduct periodic safety audits that include workplace examinations, including observation of workers at work, as well as safety program reviews. Both internal and external resources are utilized to conduct these audits.
- *Employee Performance Improvement*. A key element of our safety program is the recognition that safe work practices are a requirement of employment. We identify employee performance which is below expectations and develop specific action plans for improvement.
- *Employee Involvement*. The key to excellent safety is employee involvement and engagement. We foster direct employee involvement in a number of ways including audit participation, accident investigations, as training resources and through solicitation of ideas in small group meetings and through anonymous workplace observation suggestion boxes.

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- *Positive Reinforcement*. Establishing safety as a core belief is paramount to our safety performance. As a result, we look for opportunities to celebrate accomplishments and to build pride in our operational safety and performance.

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Jumpstart Our Business Startups Act (the “JOBS Act”)

We ceased being an emerging growth company on December 31, 2022, which was the last day of the fiscal year following the fifth anniversary of our initial public offering. An auditor’s attestation on management’s assessment of the effectiveness of our system of internal control over financial reporting pursuant to Section 404(b) of the Sarbanes-Oxley Act of 2002 (the “Sarbanes-Oxley Act”) is included in this report.

Available Information

Our investor relations website is ir.ramacoresources.com and we encourage investors to use it as a way of easily finding information about us. We promptly make available on this website, free of charge, the reports that we file or furnish with the Securities and Exchange Commission (“SEC”), corporate governance information (including our Code of Conduct and Ethics) and press releases. Our filings with the SEC are also available to the public from commercial document retrieval services and at the SEC’s website at www.sec.gov.

Item 1A. Risk Factors

Our business involves certain risks and uncertainties. The following is a description of significant risks that might cause our future financial condition or results of operations to differ materially from those expected. In addition to the risks and uncertainties described below, we may face other risks and uncertainties, some of which may be unknown to us and some of which we may deem immaterial. If one or more of these risks or uncertainties occur, our business, financial condition or results of operations may be materially and adversely affected. A summary of our risk factors is as follows:

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Risks Related to Our Business

- Our properties have not yet been fully developed into producing coal mines and, if we experience any development delays or cost increases or are unable to complete the construction of our facilities, our business, financial condition and results of operations could be adversely affected.
- We have customer concentration, so the loss of, or significant reduction in, purchases by our largest coal customers could adversely affect our business, financial condition, results of operations and cash flows.
- Our customer base is highly dependent on the steel industry.
- Deterioration in the global economic conditions, a worldwide financial downturn or negative credit market conditions could have a material adverse effect on our business, financial condition, results of operations, cash flows and ability to pay dividends.
- Our operations may be disrupted, and its our financial results may be adversely affected, by global outbreaks of contagious diseases, including COVID-19.
- We do not enter into long-term sales contracts for our coal and as a result we are exposed to fluctuations in market pricing.
- We face uncertainties in estimating our economically recoverable coal reserves, and inaccuracies in our estimates could result in lower than expected lower-than-expected revenues, higher than expected costs and decreased profitability.
- A substantial or extended decline in the prices we receive for our coal could adversely affect our business, results of operations, financial condition, cash flows and ability to pay dividends to our stockholders.
- Changes in the global economic environment, inflation, rising interest rates, recessions or prolonged periods of slow economic growth, and global instability and actual and threatened geopolitical conflict, could have an adverse effect on our industry and business, as well as those of our customers and suppliers.
- Increased competition or a loss of our competitive position could adversely affect sales of, or prices for, our coal, which could impair our profitability.

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- The availability and reliability of transportation facilities and fluctuations in transportation costs could affect the demand for our coal or impair our ability to supply coal to prospective customers.

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- Any significant downtime of our major pieces of mining equipment, including any preparation plants, could impair our ability to supply coal to prospective customers and materially and adversely affect our results of operations.
- Our ability to collect payments from customers could be impaired if their creditworthiness declines or if they fail to honor their contracts with us.
- If we are unable to obtain needed capital or financing on satisfactory terms, we may have to curtail our operations and delay our construction and growth plans, which may materially adversely affect our business, financial condition, results of operations, cash flows and ability to pay dividends to our stockholders.
- Our operations could be adversely affected if we are unable to obtain required financial assurance, or if the costs of financial assurance increase materially.
- Defects in title or loss of any leasehold interests in our properties could limit our ability to conduct mining operations on these properties or result in significant unanticipated costs.
- Substantially all of our mining properties are leased from our affiliates and conflicts of interest may arise in the future as a result.
- We may face restricted access to international markets in the future.
- Our lessees could satisfy obligations to their customers with minerals from properties other than ours, depriving us of the ability to receive amounts in excess of minimum royalty payments.
- Technology development involves significant time and expense and can be uncertain.

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Risks Related to Environmental, Health, Safety and Other Regulations

- The current U.S. administration and Congress could enact legislative and regulatory measures that could adversely affect our mining operations or cost structure or our customers' ability to use coal, which could have a material adverse effect on our financial condition and results of operations.
- Current and future government laws, regulations and other legal requirements relating to protection of the environment and natural resources may increase our costs of doing business and may restrict our coal operations.
- Our operations may impact the environment or cause exposure to hazardous substances, and our properties may have environmental contamination, which could expose us to significant costs and liabilities.
- We must obtain, maintain, and renew governmental permits and approvals for mining operations, which can be a costly and time-consuming process and result in restrictions on our operations.
- We and our significant stockholders are subject to the Applicant Violator System.
- Our mines are subject to stringent federal and state safety regulations that increase our cost of doing business at active operations and may place restrictions on our methods of operation. In addition, government inspectors in certain circumstances may have the ability to order our operations to be shut down based on safety considerations.
- We have reclamation, mine closing, and related environmental obligations under the SMCRA. If the assumptions underlying our accruals are inaccurate, we could be required to expend greater amounts than anticipated.

Risks Related to Our Company

- Our ability to pay dividends may be limited by the amount of cash we generate from operations following the payment of fees and expenses, by restrictions in of any future debt instruments and by additional factors unrelated to our profitability.
- Your percentage of ownership in us may be diluted in the future.
- Certain of our directors have significant duties with, and spend significant time serving, entities that may compete with us in seeking acquisitions and business opportunities and, accordingly, may have conflicts of interest in allocating time or pursuing business opportunities.

Risks Related to Our Class B Common Stock Structure

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- Holders of Class B common stock are common stockholders of the Company and, therefore, are subject to risks associated with an investment in the Company as a whole, even if the holder does not own shares of Class A common stock.
- Our Board's ability to reattribute businesses, assets, and expenses between the Class A common stock and Class B common stock may make it difficult to assess the future prospects of a class of common stock based on past performance.
- Dividends on our Class B common stock are discretionary and may fluctuate materially quarter to quarter. We cannot guarantee that we will be able to pay dividends in the future or what the actual dividends will be for any future periods.
- The market value of the Class B common stock could be adversely affected by events involving the other assets and businesses of the Company.
- Our new tracking stock capital structure could create conflicts of interest, and our Board may make decisions that could adversely affect only the holders of one class of our common stock.

Risks Related to Our Business

Our properties have not yet been fully developed into producing coal mines and, if we experience any development delays or cost increases or are unable to complete the construction of our facilities, our business, financial condition and results of operations could be adversely affected.

We have not completed development plans for all of our coal properties, and do not expect to have full annual production from all of our properties until market conditions permit us to resume and complete these development plans. We expect to incur significant capital expenditures until we have completed the development of our properties. In addition, the development of our properties involves numerous regulatory, environmental, political and legal uncertainties that are beyond our control and that may cause delays in, or increase the costs associated with, their completion. Accordingly, we may not be able to complete the development of the properties on schedule, at the budgeted

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cost or at all, and any delays beyond the expected development periods or increased costs above those expected to be incurred could have a material adverse effect on our business, financial condition, results of operations, cash flows and ability to pay dividends to our stockholders.

If we are unable to complete or are substantially delayed in completing the development of any of our properties, our business, financial condition, results of operations cash flows and ability to pay dividends to our stockholders could be adversely affected.

We have customer concentration, so the loss of, or significant reduction in, purchases by our largest coal customers could adversely affect our business, financial condition, results of operations and cash flows.

We are exposed to risks associated with an increasingly concentrated customer base both domestically and globally.

There are inherent risks whenever a significant percentage of total revenues are concentrated with a limited number of customers. Revenues from our largest customers may fluctuate from time to time based on numerous factors, including market conditions, which may be outside of our control. If any of our largest customers experience declining revenues due to market, economic or competitive conditions, we could be pressured to reduce the prices that we charge for our coal, which could have an adverse effect on our margins, profitability, cash flows and financial position. If any customers were to significantly reduce their purchases of coal from us, including by failing to buy and pay for coal they committed to purchase in sales contracts, our business, financial condition, results of operations, cash flows and ability to pay dividends to our stockholders could be adversely affected.

See Item 8 of Part II, “Financial Statements and Supplementary Data—Note 2—Summary of Significant Accounting Policies—Concentrations” for additional information.

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Our customer base is highly dependent on the steel industry.

Substantially all of the metallurgical coal that we produce is sold to steel producers. Therefore, demand for our metallurgical coal is highly correlated to the steel industry. The steel industry’s demand for metallurgical coal is affected by a number of factors including the cyclical nature of that industry’s business, technological developments in the steel-making process and the availability of substitutes for steel such as aluminum, composites and plastics. A significant reduction in the demand for steel products would reduce the demand for metallurgical coal, which would have a material adverse effect on our business, financial condition, cash flows and results of operations. Similarly, if less expensive ingredients could be used in substitution for metallurgical coal in the integrated steel mill process, the demand for metallurgical coal would materially decrease, which would also materially adversely affect demand for our metallurgical coal. Our export customers, excluding Canada, include foreign steel producers who may be affected by the tariffs to the extent their production is imported into the U.S. Retaliatory threats by foreign nations to these tariffs may limit international trade and adversely impact global economic conditions.

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Deterioration in the global economic conditions in any of the industries in which prospective customers operate, a worldwide financial downturn or negative credit market conditions could have a material adverse effect on our business, financial condition,

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results of operations, cash flows and ability to pay dividends to our stockholders.

Economic conditions in the industries in which most of our prospective customers operate, such as steelmaking and electric power generation, substantially deteriorated in recent years and reduced the demand for coal. A deterioration of economic conditions in our prospective customers' industries could cause a decline in demand for and production of metallurgical coal. Renewed or continued weakness in the economic conditions of any of the industries served by prospective customers could have a material adverse effect on our business, financial condition, results of operations, cash flows and ability to pay dividends to our stockholders.

Our operations may be disrupted, and its our financial results may be adversely affected, by global outbreaks of contagious diseases, including COVID-19.

Global outbreaks of contagious diseases, including the December 2019 outbreak of a strain of coronavirus ("COVID-19"), have the potential to significantly and adversely impact our operations and business. On March 11, 2020, the World Health Organization recognized COVID-19 as a global pandemic. Pandemics or disease outbreaks such as the COVID-19 outbreak may have a variety of adverse effects on our business, including by depressing commodity prices and the market value of our securities and limiting the ability of our management to meet with potential financing sources. Like other coal companies, our business has been was adversely affected by the COVID-19 pandemic and measures being that were taken to mitigate its impact. The pandemic has resulted in widespread adverse impacts on our employees, customers, suppliers and other parties with whom we have business relations. The spread of COVID-19 has had and continues to have, a negative impact on the financial markets, which may impact our ability to obtain additional financing. A prolonged downturn in the financial markets could have an adverse effect on our business, results of operations and ability to raise capital.

We cannot predict the full impact that future global outbreaks of contagious diseases, including COVID-19, will have on our business, cash flows, liquidity, financial condition and results of operations at this time, due to numerous uncertainties. The ultimate impacts will depend on future developments, including, among others, the consequences of governmental and other measures designed to slow the spread of such diseases, the development of effective treatments, the duration of the outbreaks, actions taken by governmental authorities, customers, suppliers and other third parties, workforce availability, and the timing and extent to which normal economic and operating conditions resume.

We do not enter into long-term sales contracts for our coal and as a result we are exposed to fluctuations in market pricing.

Sales commitments in the metallurgical coal market are typically not long-term in nature and are generally no longer than one year in duration. Most metallurgical coal transactions in the U.S. are done on a calendar year basis, where both prices and volumes are fixed in the third and fourth quarter for the following calendar year. Globally the market is evolving to shorter term pricing. Some annual contracts have shifted to quarterly contracts and most volumes

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are being sold on an indexed basis, where prices are determined by averaging the leading spot indexes reported in the market and adjusting for quality. As a result, we are subject to fluctuations in market pricing. We are not protected from oversupply or market conditions where we cannot sell our coal at economic prices. Metallurgical coal has been an extremely volatile commodity over the past ten years and prices are likely to be volatile in the future. There can be no assurances we will be able to mitigate such conditions as they arise. Any sustained failure to be able to market our coal during such periods would have a material adverse effect on our business, financial condition, results of operations, cash flows and ability to pay dividends to our stockholders.

The failure to access coal preparation facilities may have a material adverse effect on our ability to produce coal for our prospective customers and to meet quality specifications.

The costs of establishing the infrastructure necessary to enable us to continue to ramp up our mining operations will be significant. We have constructed preparation and loading facilities at our Elk Creek Complex and have recently undertaken expansion projects to increase the rates of processing and preparation. Our Berwind Complex will remain

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under development until we reach our full targeted annual coal production in the Pocahontas No. 4 seam, including a return to full production capacity in our Berwind No. 1 mine that was impacted by the ignition event during 2022. Our preparation and loading facility at Berwind is in the start-up phase, and we expect full capacity at that location later in 2023. production. Some of the Berwind coal will continue to be washed at our active Knox Creek plant until our Berwind plant is fully up and running. At We also endeavor to purchase, relocate, and reassemble preparation plant assets at our RAM Mine, we may require access to either newly constructed preparation and loading facilities or arrangements with third parties to process and load our coal. Alternatively, we might mine the coal in a manner that allows us to ship the coal direct without washing. We will analyze whether to expend capital to construct preparation facilities or enter into third-party processing arrangements. Maben complex for future use. Our failure to provide the necessary preparation, processing and loading facilities for our projects would have a material adverse effect on our operations.

The risks associated with the construction and operation of mines, processing plants and related infrastructure include:

- the potential lack of availability or cost of skilled and unskilled labor, equipment and principal supplies needed for construction of facilities;
- the need to obtain necessary environmental and other governmental approvals and permits and the timing of the receipt of those approvals and permits;
- industrial accidents;
- geologic mine failures, surface facility construction failures or mining, coal processing or transport equipment failures;
- structural failure of an impoundment or refuse area;
- natural phenomena such as inclement weather conditions, floods, droughts, rockslides and seismic activity;
- unusual or unexpected geological and coal quality conditions;
- potential opposition from non-governmental organizations, environmental groups or other activists, which may delay or prevent development activities; and
- restrictions or regulations imposed by governmental or regulatory authorities.

The costs, timing and complexities of developing our projects may be greater than anticipated. Cost estimates may increase significantly as more detailed engineering work is completed on a project. It is common in mining operations to experience unexpected costs, problems and delays during construction, development and mine start-up.

Product alternatives or other technologies may reduce demand for our products.

Substantially all of our coal production is comprised of metallurgical coal, which commands a significant price premium over the majority of other forms of coal because of its use in blast furnaces for steel production. Metallurgical coal has specific physical and chemical properties, which are necessary for efficient blast furnace operation. Steel producers are continually investigating alternative steel production technologies with a view to reducing production costs. The steel industry has increased utilization of electric arc furnaces or pulverized coal injection processes, which reduce or eliminate the use of furnace coke, an intermediate product produced from metallurgical coal and, in turn, generally decreases the demand for metallurgical coal. Many alternative technologies are designed to use lower quality coals or other sources of carbon instead of higher cost high-quality metallurgical coal. While conventional blast furnace technology has been the most economic large-scale steel production technology for a number of years, and emergent technologies typically take many years to commercialize, there can be no assurance that over the longer term

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competitive technologies not reliant on metallurgical coal would not emerge, which could reduce the demand and price premiums for metallurgical coal.

Moreover, we may produce and market other coal products, such as thermal coal, which are also subject to alternative competition. Alternative technologies are continually being investigated and developed in order to reduce production costs or minimize environmental or social impact. In particular, alternatives with lower carbon footprints than our products are currently being researched and developed, as our customers are subject to increasing market and/or regulatory pressure to reduce their impacts on climate change. Further, the development and use of emerging technologies in the generation, transmission, storage and consumption of energy, including renewable energy, battery storage, and energy efficiency technologies, may increase the availability of alternative energy sources or lower demand

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for coal, resulting in lower prices and revenues. If competitive technologies emerge that use other materials in place of or otherwise eliminate the need for our products, demand and price for our products might fall.

We face uncertainties in estimating our economically recoverable coal reserves, and inaccuracies in our estimates could result in lower than expected lower-than-expected revenues, higher than expected costs and decreased profitability.

Coal is economically recoverable when the price at which coal can be sold exceeds the costs and expenses of mining and selling the coal. Any forecasts of our future performance are based on, among other things, estimates of our recoverable coal reserves. We base our reserve information on geologic data, coal ownership information and current and proposed mine plans. There are numerous uncertainties inherent in estimating quantities and qualities of coal and costs to mine recoverable reserves, including many factors beyond our control. As a result, estimates of economically recoverable coal reserves are by their nature uncertain. Some of the factors and assumptions that can impact economically recoverable coal reserve estimates include:

- geologic and mining conditions;
- historical production from the area compared with production from other producing areas;
- the assumed effects of environmental and other regulations and taxes by governmental agencies;
- our ability to obtain, maintain and renew all required permits;
- future improvements in mining technology;
- assumptions related to future prices; and
- future operating costs, including the cost of materials, and capital expenditures.

Each of the factors that impacts reserve estimation may vary considerably from the assumptions used in estimating the reserves. For these reasons, estimates of coal reserves may vary substantially. Actual production, revenues and expenditures with respect to our future coal reserves may vary from estimates, and these variances may be material. As a result, our estimates may not accurately reflect our actual future coal reserves.

Our inability to acquire additional coal reserves that are economically recoverable may have a material adverse effect on our future profitability.

Our profitability depends substantially on our ability to mine, in a cost-effective manner, coal reserves that possess the quality characteristics that prospective customers desire. Because our reserves will decline as we mine our coal, our future profitability depends upon our ability to acquire additional coal reserves that are economically recoverable to replace the reserves we will produce. If we fail to acquire or develop sufficient additional reserves over the long term to replace the reserves depleted by our production, our existing reserves could eventually be exhausted.

We are dependent on contractors for the successful completion of the development of our properties.

We regularly use contractors in the development of our mines and intend to use contractors if and when we construct facilities at the RAM Mine. mines. Timely and cost-effective completion of the development of our properties, including necessary facilities and infrastructure,

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in compliance with agreed specifications is central to our business strategy and is highly dependent on the performance of our contractors under the agreements with them.

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Although some agreements may provide for liquidated damages, if the contractor fails to perform in the manner required with respect to certain of its obligations, the events that trigger a requirement to pay liquidated damages may delay or impair the operation of our properties, and any liquidated damages that we receive may not be sufficient to cover the damages that we suffer as a result of any such delay or impairment. Further, we may have disagreements with our contractors about different elements of the construction process, which could lead to the assertion of rights and remedies under their contracts and increase the costs associated with development of the properties or result in a contractor's unwillingness to perform further work. If any contractor is unable or unwilling to perform according to the negotiated terms and timetable of its respective agreement for any reason or terminates its agreement, we would be required to engage a substitute contractor. This would likely result in significant project delays and increased costs, which could have a material adverse effect on our business, financial condition, results of operations, cash flows and ability to pay dividends to our stockholders.

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Prices for coal are volatile and can fluctuate widely based upon a number of factors beyond our control, including oversupply relative to the demand available for our coal and weather. A substantial or extended decline in the prices we receive for our coal could adversely affect our business, results of operations, financial condition, cash flows and ability to pay dividends to our stockholders.

Our financial results are significantly affected by the prices we receive for our coal and depend, in part, on the margins that we earn on sales of our coal. Our margins will reflect the price we receive for our coal over our cost of producing and transporting our coal. Prices and quantities under U.S. domestic metallurgical coal sales contracts are generally based on expectations of the next year's coal prices at the time the contract is entered into, renewed, extended or re-opened. Pricing in the global seaborne market is moving towards shorter term pricing models, typically using indexes. The expectation of future prices for coal depends upon many factors beyond our control, including the following:

- the market price for coal;
- overall domestic and global economic conditions, including the supply of and demand for domestic and foreign coal, coke and steel;
- the consumption pattern of industrial consumers, electricity generators and residential users;
- weather conditions in our markets that affect the demand for thermal coal or that affect the ability to produce metallurgical coal;
- competition from other coal suppliers;
- technological advances affecting energy consumption;
- the costs, availability and capacity of transportation infrastructure;
- the impact of domestic and foreign governmental laws and regulations, including environmental and climate change regulations and regulations affecting the coal mining industry, and delays in the receipt of, failure to receive, failure to maintain or revocation of necessary governmental permits; and

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- increased utilization by the steel industry of electric arc furnaces or pulverized coal injection processes, which reduce or eliminate the use of furnace coke, an intermediate product produced from metallurgical coal, and generally decrease the demand for metallurgical coal.

Metallurgical coal has been is an extremely volatile commodity over the past 10 years. commodity. There are no assurances that supplies will remain low, that demand will not decrease or that overcapacity may resume, which could cause declines in the prices of and demand for coal, which could have a material adverse effect on our business, financial condition, results of operations and cash flows.

Changes in the global economic environment, inflation, rising interest rates, recessions or prolonged periods of slow economic growth, and global instability and actual and threatened geopolitical conflict, could have an adverse effect on our industry and business, as well as those of our customers and suppliers.

Overall economic conditions in the U.S. and globally, including adverse factors such as inflation, rising interest rates, supply chain disruptions and the impacts of the war in Ukraine, significantly impact our business. Periods of economic downturn or continued uncertainty could result in difficulty increasing or maintaining our level of sales or

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profitability and we may experience an adverse effect on our business, results of operations, financial condition and cash flows.

Our operations are subject to economic conditions, including credit and capital market conditions, inflation, prevailing interest rates, and political factors, which if changed could negatively affect our results of operations, cash flows and liquidity. Political factors include, but are not limited to, changes to tax laws and regulations resulting in increased income tax liability, increased regulation, such as carbon emissions limitations or trading mechanisms, limitations on exports of energy and raw materials, and trade remedies. Actions taken by the U.S. government could affect our results of operations, cash flows and liquidity.

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The ongoing war in Ukraine has had a broad range of adverse impacts on global economic conditions, some of which have had and are likely to continue to have adverse impacts on our business, including increased raw material and energy costs, softer customer demand and lower steel prices.

Additionally, we are also exposed to risks associated with the business success and creditworthiness of our suppliers and customers. If our customers or suppliers are negatively impacted by a slowdown in economic markets, we may face the reduction, delay or cancellation of customer orders, delays or interruptions of the supply of raw materials, and increased risk of insolvency and other credit related issues of customers or suppliers, which could delay payments from customers, result in increased customer defaults and cause our suppliers to delay filling, or to be unable to fill, our needs at all or on a timely or cost-effective basis. The occurrence of any of these events may adversely affect our business, results of operations, financial condition and cash flows.

Increased competition or a loss of our competitive position could adversely affect sales of, or prices for, our coal, which could impair our profitability. In addition, foreign currency fluctuations could adversely affect the competitiveness of our coal abroad.

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We compete with other producers primarily on the basis of coal quality, delivered costs to the customer and reliability of supply. We compete primarily with U.S. coal producers and with some Canadian coal producers for sales of metallurgical coal to domestic steel producers and, to a lesser extent, thermal coal to electric power generators. We also compete with both domestic and foreign coal producers for sales of metallurgical coal in international markets. Certain of these coal producers may have greater financial resources and larger reserve bases than we do. We sell coal to the seaborne metallurgical coal market, which is significantly affected by international demand and competition.

We cannot assure you that competition from other producers will not adversely affect us in the future. The coal industry has experienced significant consolidation in recent years, including consolidation among some of our major competitors. We cannot assure you that the result of current or further consolidation in the coal industry, or the reorganization through bankruptcy of competitors with large legacy liabilities, will not adversely affect us. A number of our competitors have idled production over the last several years in light of lower metallurgical coal prices. A stabilization or increase in coal prices could encourage existing producers to expand capacity or could encourage new producers to enter the market.

In addition, we face competition from foreign producers that sell their coal in the export market. Potential changes to international trade agreements, trade concessions, foreign currency fluctuations or other political and economic arrangements may benefit coal producers operating in countries other than the United States. Additionally, North American steel producers face competition from foreign steel producers, which could adversely impact the financial condition and business of our prospective customers. We cannot assure you that we will be able to compete on the basis of price or other factors with companies that in the future may benefit from favorable foreign trade policies or other arrangements. Coal is sold internationally in U.S. dollars and, as a result, general economic conditions in foreign markets and changes in foreign currency exchange rates may provide our foreign competitors with a competitive advantage. If our competitors' currencies decline against the U.S. dollar or against our prospective foreign customers' local currencies, those competitors may be able to offer lower prices for coal to prospective customers. Furthermore, if the currencies of our prospective overseas customers were to significantly decline in value in comparison to the U.S. dollar, those prospective customers may seek decreased prices for the coal we sell to them. Consequently, currency

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fluctuations could adversely affect the competitiveness of our coal in international markets, which could have a material adverse effect on our business, financial condition, results of operations and cash flows.

Our business involves many hazards and operating risks, some of which may not be fully covered by insurance. The occurrence of a significant accident or other event that is not fully insured could adversely affect our business, results of operations, financial condition and cash flows, and ability to pay dividends to our stockholders.

Our mining operations, including our preparation and transportation infrastructure, are subject to many hazards and operating risks. Underground mining and related processing activities present inherent risks of injury to persons and damage to property and equipment. Our mines are subject to a number of operating risks that could disrupt operations, decrease production and increase the cost of mining for varying lengths of time, thereby adversely affecting our

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operating results. In addition, if coal production declines, we may not be able to produce sufficient amounts of coal to deliver under future sales contracts. Our inability to satisfy contractual obligations could result in prospective customers initiating claims against us. The operating risks

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that may have a significant impact on our future coal operations include:

- variations in thickness of seams of coal;
- adverse geologic conditions, including amounts of rock and other natural materials intruding into the coal seam, that could affect the stability of the roof and the side walls of the mine;
- environmental hazards;
- mining and processing equipment failures, structural failures and unexpected maintenance problems;
- fires or explosions, including as a result of methane, coal, coal dust or other explosive materials, or other accidents;
- unexpected mine accidents, including rock-falls and explosions caused by the ignition of metallurgical coal dust, natural gas or other explosive sources at our mine sites or fires caused by the spontaneous combustion of metallurgical coal or similar mining accidents;
- inclement or hazardous weather conditions and natural disasters or other force majeure events;
- seismic activities, ground failures, rock bursts or structural cave-ins or slides;
- delays in moving our mining equipment;
- railroad delays or derailments;
- security breaches or terroristic acts; and
- other hazards or occurrences that could also result in personal injury and loss of life, pollution and suspension of operations.

Any of these risks could adversely affect our ability to conduct operations or result in substantial loss to us as a result of claims for:

- personal injury or loss of life;
- damage to and destruction of property, natural resources and equipment, including our coal properties and our coal production or transportation facilities;
- pollution, contamination and other environmental damage to our properties or the properties of others;
- potential legal liability and monetary losses;
- regulatory investigations, actions and penalties;
- suspension of our operations; and
- repair and remediation costs.

Although we maintain insurance for a number of risks and hazards, we may not be insured or fully insured, and we may not be able to recover under our insurance policies, against the losses or liabilities that could arise from a significant accident in our future coal operations. We may elect not to obtain insurance for any or all of these risks if we believe that the cost of available insurance is excessive relative to the risks presented. In addition, pollution, contamination and environmental risks generally are not fully insurable. Moreover, a significant mine accident or regulatory infraction could potentially cause a mine shutdown. For example, on July 10, 2022, we discovered that a material methane ignition at our Berwind mining complex had occurred. See "*Management's Discussion and Analysis of Financial Condition and Results of Operations—Methane Ignition at Berwind Mine*" for additional information. The

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occurrence of an event that is not fully covered by insurance could have a material adverse effect on our business, financial condition, results of operations, cash flows and ability to pay dividends to our stockholders.

In addition, if any of the foregoing changes, conditions or events occurs and is not determined to be a force majeure event, any resulting failure on our part to deliver coal to the purchaser under contract could result in economic penalties, suspension or cancellation of shipments or ultimately termination of the agreement, any of which could have a material adverse effect on our business, financial condition, results of operations, cash flows and ability to pay dividends to our stockholders.

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Our operations are located in a single geographic region, making us vulnerable to risks associated with operating in a single geographic area, including adverse impacts of weaker conditions associated with climate change.

Currently, all of our active operations are conducted in a single geographic region in the eastern United States in the Appalachian basin. The geographic concentration of our operations may disproportionately expose us to disruptions in our operations if the region experiences severe weather, transportation capacity constraints, constraints on the availability of required equipment, facilities, personnel or services, significant governmental regulation, natural disasters, pandemics (such as COVID-19) or interruption of transportation or other events that impact the region in which we operate or its surrounding areas. If any of these factors were to impact the region in which we operate more than other coal producing regions, our business, financial condition, results of operations and cash flows will be adversely affected relative to other mining companies that have a more geographically diversified asset portfolio.

In addition, weather conditions associated with climate change, such as increased frequency and severity of storms, droughts and floods and other severe weather events, may impact our operations, personnel, physical assets, supply chain, distribution chain, access to raw materials such as water and the cost or availability of insurance. If any such effects were to occur in areas where we or our customers operate, they could have an adverse effect on our business, financial condition and cash flows. Our ability to mitigate the adverse physical impacts of climate change depends in part upon our disaster preparedness and response and business continuity planning.

The availability and reliability of transportation facilities and fluctuations in transportation costs could affect the demand for our coal or impair our ability to supply coal to prospective customers.

Transportation logistics play an important role in allowing us to supply coal to prospective customers. Any significant delays, interruptions, or other limitations on the ability to transport our coal, including those similar to the rail-related constraints we experienced in 2022, could negatively affect our operations. Delays and interruptions of rail services because of accidents, failure to complete construction of rail infrastructure, infrastructure damage, lack of rail or port capacity, weather-related problems, governmental regulation, terrorism, strikes, lock-outs, lockouts, third-party actions or other events could impair our ability to supply coal to customers and adversely affect our profitability. In addition, transportation costs represent a significant portion of the delivered cost of coal and, as a result, the cost of delivery is a critical factor in a customer's purchasing decision. Increases in transportation costs, including increases resulting from emission control requirements and fluctuations in the price of locomotive diesel fuel and demurrage, could make our coal less competitive, which could have a material adverse effect on our business, financial condition, results of operations, cash flows and ability to pay dividends to our stockholders.

Any significant downtime of our major pieces of mining equipment, including any preparation plants, could impair our ability to supply coal to prospective customers and materially and adversely affect our results of operations.

We depend on several major pieces of mining equipment to produce and transport our coal, including, but not limited to, underground continuous mining units and coal conveying systems, surface mining equipment such as highwall miners, front-end loaders and coal overburden haul trucks, preparation plants and related facilities, conveyors and transloading facilities. If any of these pieces of equipment or facilities suffered major damage or were destroyed by fire, abnormal wear, flooding, incorrect operation or otherwise, we may be unable to replace or repair them in a timely manner or at a reasonable cost, which would impact our ability to produce and transport coal and materially and adversely affect our business, results of operations, financial condition and cash flows. Moreover, the MSHA and other regulatory agencies sometimes make changes with regards to requirements for pieces of equipment. Such changes could

cause delays if manufacturers and suppliers are unable to make the required changes in compliance with mandated deadlines.

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If either our preparation plants, or train loadout facilities, or those of a third party processing or loading our coal, suffer extended downtime, including from major damage, or is destroyed, our ability to process and deliver coal to prospective customers would be materially impacted, which would materially adversely affect our business, results of operations, financial condition, cash flows and ability to pay dividends to our stockholders. For example, in late-2018, we experienced a partial structural failure at one of the raw coal storage silos that feeds our Elk Creek plant in West Virginia, which idled our Elk Creek preparation plant for approximately one month.

Table We also experienced a methane ignition at the Berwind No. 1 mine in the third quarter of Contents2022, which required the mine to be idled until production was restarted in the first quarter of 2023.

If customers do not enter into, extend or honor contracts with us, our profitability could be adversely affected.

Coal mined from our operations is subject to testing by prospective customers for its ability to meet various specifications and to work satisfactorily in their ovens and other facilities prior to entering into contracts for purchase (which are typically short-term orders having terms of one year or less). If we are unable to successfully test our coals or enter into new contracts for the sale of our coal, our ability to achieve profitability would be materially adversely affected. Once we enter into contracts, if a substantial portion of our sales contracts are modified or terminated and we are unable to replace the contracts (or if new contracts are priced at lower levels), our results of operations would be adversely affected, perhaps materially. In addition, if customers refuse to accept shipments of our coal for which they have a contractual obligation, our revenues could be substantially affected and we may have to reduce production at our mines until the customer's contractual obligations are honored. This, in turn, could have a material adverse effect on the payments we receive which could affect our business, financial condition, cash flows and ability to pay dividends to our stockholders.

Certain provisions in typical long-term sales contracts provide limited protection during adverse economic conditions, which may eventually result in economic penalties to us or permit the customer to terminate the contract. Furthermore, our ability to collect payments from prospective customers could be impaired if their creditworthiness declines or if they fail to honor their contracts with us.

We do not expect to enter into significant long-term sales contracts, but if we do, price adjustment, "price reopener" and other similar provisions typical in long-term sales contracts may reduce protection from short-term coal price volatility traditionally provided by such contracts. Price reopener provisions may be included in our future sales contracts. These price reopener provisions may automatically set a new price based on prevailing market price or, in some instances, require the parties to agree on a new price, sometimes within a specified range of prices. Any adjustment or renegotiations leading to a significantly lower contract price could adversely affect our profitability. Some annual metallurgical coal contracts have shifted to quarterly contracts and many include prices determined by averaging the leading spot indexes reported in the market, exposing us further to risks related to pricing volatility.

Our ability to receive payment for coal sold and delivered depends on the continued solvency and creditworthiness of prospective customers. The number of domestic steel producers is small, and they compete globally for steel production. If their business or creditworthiness suffers, we may bear an increased risk with respect to payment default. Competition with other coal suppliers could force us to extend credit to customers and on terms that could increase the risk we bear with respect to payment default. We could also enter into agreements to supply coal to energy trading and brokering customers under which a customer sells coal to end-users. If the creditworthiness of any prospective energy trading and brokering customer declines, we may not be able to collect payment for all coal sold and delivered to or on behalf of this customer.

In addition, if customers refuse to accept shipments of our coal that they have a contractual obligation to purchase, our revenues will decrease, and we may have to reduce production at our mines until prospective customers' contractual obligations are honored. Our inability to collect payment from counterparties to our sales contracts may materially adversely affect our business, financial condition, results of operations, cash flows and ability to pay dividends to our stockholders.

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We may be unsuccessful in integrating the operations of any future acquisitions, including acquisitions involving new lines of business, with our existing operations, and in realizing all or any part of the anticipated benefits of any such acquisitions.

From time to time, we may evaluate and acquire assets and businesses that we believe complement our existing assets and business, such as the mineral lease with the McDonald Land Company for coal reserves adjacent to our Elk Creek mine complex near Logan, West Virginia. The assets and businesses we acquire may be dissimilar from our initial lines of business. Acquisitions may require substantial capital or the incurrence of substantial indebtedness. Our capitalization and results of operations may change significantly as a result of future acquisitions. We may also add new lines of business to our existing operations.

Further, unexpected costs and challenges may arise whenever businesses with different operations or management are combined, and we may experience unanticipated delays in realizing the benefits of an acquisition. Entry into certain lines of business may subject us to new laws and regulations with which we are not familiar and may lead to increased litigation and regulatory risk. Also, following an acquisition, we may discover previously unknown liabilities associated with the acquired business or assets for which we have no recourse under applicable indemnification provisions. If an acquired business or new line of business generates insufficient revenue or if we are unable to efficiently manage our expanded operations, our results of operations may be materially adversely affected.

To maintain and grow our business, we will be required to make substantial capital expenditures. If we are unable to obtain needed capital or financing on satisfactory terms, we may have to curtail our operations and delay our construction and growth plans, which may materially adversely affect our business, results of operations, financial condition and cash flows, and ability to pay dividends to our stockholders.

In order to maintain and grow our business, we will need to make substantial capital expenditures associated with our mines and the construction of coal preparation facilities which have not yet been constructed. Constructing, maintaining, repairing and expanding mines and infrastructure, including coal preparation and loading facilities, is capital intensive. Specifically, the exploration, permitting and development of coal reserves, and the maintenance of machinery, equipment and facilities, and compliance with applicable laws and regulations require substantial capital expenditures. While we funded a significant amount of the capital expenditures needed to build out our mining and preparation infrastructure at our Elk Creek property with cash on hand, we must continue to invest capital to maintain or to increase our production and to develop any future acquired properties. Decisions to increase our production levels could also affect our capital needs. We cannot assure you that we will be able to maintain our production levels or generate sufficient cash flow, or that we will have access to sufficient financing to continue our production, exploration, permitting and development activities, and we may be required to defer all or a portion of our capital expenditures.

If we do not make sufficient or effective capital expenditures, we will be unable to develop and grow our business. To fund our projected capital expenditures, we will be required to use cash from our operations, incur debt or issue additional common stock or other equity securities. Using cash from our operations will reduce cash available for maintaining or increasing our operating activities and paying dividends to our stockholders. Our ability to obtain bank financing or our ability to access the capital markets for future equity or debt offerings may be limited by our financial condition at the time of any such financing or offering and the covenants in our future debt agreements, as well as by general economic conditions, contingencies and uncertainties that are beyond our control, such as the COVID-19 pandemic.

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In addition, incurring debt may significantly increase our interest expense and financial leverage, and issuing additional equity securities may result in significant stockholder dilution.

We may not be able to obtain equipment, parts and supplies in a timely manner, in sufficient quantities or at reasonable costs to support our coal mining and transportation operations.

Coal mining consumes large quantities of commodities including steel, copper, rubber products and liquid fuels and requires the use of capital equipment. Some commodities, such as steel, are needed to comply with roof control

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plans required by regulation. The prices we pay for commodities and capital equipment are strongly impacted by the global market. A rapid or significant increase in the costs of commodities or capital equipment we use in our operations could impact our mining operations costs because we may have a limited ability to negotiate lower prices and, in some cases, may not have a ready substitute.

We use equipment in our coal mining and transportation operations such as continuous mining units, conveyors, shuttle cars, rail cars, locomotives, and roof bolters. We procure this equipment from a concentrated group of suppliers, and obtaining this equipment often involves long lead times. Occasionally, demand for such equipment by mining companies can be high and some types of equipment may be in short supply. Delays in receiving or shortages of this equipment, as well as the raw materials used in the manufacturing of supplies and mining equipment, which, in some cases, do not have ready substitutes, or the cancellation of any future supply contracts under which we obtain equipment

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and other consumables, could limit our ability to obtain these supplies or equipment. In addition, if any of our suppliers experiences an adverse event, or decides to no longer do business with us, we may be unable to obtain sufficient equipment and raw materials in a timely manner or at a reasonable price to allow us to meet our production goals and our revenues may be adversely impacted. We use considerable quantities of steel in the mining process. If the price of steel or other materials increases substantially or if the value of the U.S. dollar declines relative to foreign currencies with respect to certain imported supplies or other products, our operating expenses could increase. Any of the foregoing events could materially and adversely impact our business, financial condition, results of operations, cash flows and ability to pay dividends to our stockholders.

We experienced rail-related constraints in 2022, which led to higher coal inventory levels at December 31, 2022.

We are a holding company, and we depend on the ability of our subsidiaries to distribute funds to us in order to satisfy our financial obligations and to make dividend payments.

We are a holding company, and our subsidiaries conduct all of our operations and own all of our operating assets. We have no significant assets other than the equity interests in our subsidiaries. As a result, our ability to pay our obligations and to make dividend payments, depends entirely on our subsidiaries and their ability to distribute funds to us. The ability of a subsidiary to make these distributions could be affected by a claim or other action by a third-party, including a creditor, or by the law of their respective jurisdictions of formation which regulates the payment of dividends. If we are unable to obtain funds from our subsidiaries, we may not be able to declare or pay dividends.

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Our operations could be adversely affected if we are unable to obtain required financial assurance, or if the costs of financial assurance increase materially.

Federal and state laws require financial assurance to secure our permit obligations including to reclaim lands used for mining, to pay federal and state workers' compensation and black lung benefits, and to satisfy other miscellaneous obligations. The changes in the market for coal used to generate electricity in recent years have led to bankruptcies involving prominent coal producers. Several of these companies relied on self-bonding to guarantee their responsibilities under the SMCRA permits including for reclamation. In response to these bankruptcies, the OSMRE issued a Policy Advisory in August 2016 to state agencies that was intended to discourage authorized states from approving self-bonding arrangements. Although the Policy Advisory was rescinded in October 2017, certain states, including Virginia, had previously announced that it would no longer accept self-bonding to secure reclamation obligations under the state mining laws. Individually and collectively, these and future revised financial assurance requirements may lead to increased demand for other forms of financial assurance, which may strain capacity for those instruments and increase our costs of obtaining and maintaining the amounts of financial assurance needed for our operations, which may delay the timing for and increase the costs of obtaining this financial assurance.

We use surety bonds, trusts and letters of credit to provide financial assurance for certain transactions and business activities. If, in the future, we are unable to secure surety bonds for these obligations and are forced to secure letters of credit indefinitely or obtain some other form of financial assurance at too high of a cost, we may not be able to obtain permits and production on our properties could be adversely affected. This could have a material adverse effect on our business, financial condition, cash flows and ability to pay dividends to our stockholders.

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Our mines are located in areas containing oil and natural gas operations, which may require us to coordinate our operations with those of oil and natural gas drillers.

Our coal reserves are in areas containing developed or undeveloped oil and natural gas deposits and reservoirs, including the Marcellus Shale in Pennsylvania, and our Virginia reserves are currently the subject of substantial oil and natural gas exploration and production activities, including by horizontal drilling. If we have received a permit for our mining activities, then, while we will have to coordinate our mining with such oil and natural gas drillers, our mining activities are expected to have priority over any oil and natural gas drillers with respect to the land covered by our permit. For reserves outside of our permits, we expect to engage in discussions with drilling companies on potential areas on which they can drill that may have a minimal effect on our mine plan. Depending on priority of interests, our operations may have to avoid existing oil and gas wells or expend sums to plug oil and gas wells.

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If a well is in the path of our mining for coal on land that has not yet been permitted for our mining activities, we may not be able to mine through the well unless we purchase it. The cost of purchasing a producing horizontal or vertical well could be substantial. Horizontal wells with multiple laterals extending from the well pad may access larger oil and natural gas reserves than a vertical well, which would typically result in a higher cost to acquire. The cost associated with purchasing oil and natural gas wells that are in the path of our coal mining activities

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may make mining through those wells uneconomical, thereby effectively causing a loss of significant portions of our coal reserves, which could materially and adversely affect our business, financial condition, results of operations, cash flows and ability to pay dividends to our stockholders.

Defects in title or loss of any leasehold interests in our properties could limit our ability to conduct mining operations on these properties or result in significant unanticipated costs.

We conduct a significant part of our mining operations on properties that we lease. A title defect or the loss of any lease upon expiration of its term, upon a default or otherwise, could adversely affect our ability to mine the associated reserves and/or process the coal we mine. Title to most of our owned or leased properties and mineral rights is not usually verified until we make a commitment to develop a property, which may not occur until after we have obtained necessary permits and completed exploration of the property. In some cases, we rely on title information or representations and warranties provided by our lessors or grantors. Our right to mine some of our reserves may be adversely affected if defects in title or boundaries exist or if a lease expires. Any challenge to our title or leasehold interests could delay the exploration and development of the property and could ultimately result in the loss of some or all of our interest in the property and, accordingly, require us to reduce our estimated coal reserves. Mining operations from time to time may rely on an expired lease that we are unable to renew. If we were to be in default with respect to leases for properties on which we have mining operations, we may have to close down or significantly alter the sequence of such mining operations, which may adversely affect our future coal production and future revenues. If we mine on property that we do not own or lease, we could incur liability for such mining.

In any such case, the investigation and resolution of title issues would divert management's time from our business and our results of operations could be adversely affected. Additionally, if we lose any leasehold interests relating to any preparation plants, we may need to find an alternative location to process our coal and load it for delivery to customers, which could result in significant unanticipated costs.

In order to obtain leases or mining contracts to conduct our mining operations on property where these defects exist, we may in the future have to incur unanticipated costs. In addition, we may not be able to successfully negotiate new leases or mining contracts for properties containing additional reserves or maintain our leasehold interests in properties where we have not commenced mining operations during the term of the lease. Some leases have minimum production requirements. Failure to meet those requirements could result in losses of prepaid royalties and, in some rare cases, could result in a loss of the lease itself.

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While none of our employees who conduct mining operations are currently members of unions, our business could be adversely affected by union activities.

We are not subject to any collective bargaining or union agreement with respect to properties we currently control. However, it is possible that future employees, or those of our contract miners, who conduct mining operations may join or seek recognition to form a labor union or may be required to become labor agreement signatories. If some or all of the employees who conduct mining operations were to become unionized, it could adversely affect productivity, increase labor costs and increase the risk of work stoppages at our mines. If a work stoppage were to occur, it could interfere with operations and have a material adverse effect on our business, financial condition, results of operations, cash flows and our ability to pay dividends to our stockholders.

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A shortage of skilled labor in the mining industry could pose a risk to achieving improved labor productivity, which could adversely affect our profitability.

Efficient coal mining using modern techniques and equipment requires skilled laborers, preferably with at least a year of experience and proficiency in multiple mining tasks. The demand for skilled employees sometimes causes a significant constriction of the labor supply resulting in higher labor costs. When met coal producers compete for skilled miners, recruiting challenges can occur and employee turnover rates can increase, which negatively affect operating efficiency and costs. In the event there is a shortage of experienced labor, it could have an adverse impact on our labor productivity and our ability to expand production in the event there is an increase in the demand for our coal.

We may face restricted access to international markets in the future.

Access to international markets may be subject to ongoing interruptions and trade barriers due to policies and tariffs of individual countries, and the actions of certain interest groups to restrict the import or export of certain commodities. There can be no assurance that our access to these markets will not be restricted in the future. An inability for U.S. metallurgical coal suppliers to access international markets would likely result in an oversupply of metallurgical coal in the domestic market, resulting in a decrease in prices, which could have a material adverse effect on our business, financial condition, cash flows and ability to pay dividends to our stockholders.

We and our significant stockholders are subject to the Applicant Violator System.

Under the SMCRA and its state law counterparts, all coal mining applications must include mandatory "ownership and control" information, which generally includes listing the names of our officers and directors, and our principal stockholders owning 10 percent or more of our voting shares, among others. Ownership and control reporting requirements are designed to allow regulatory review of any entities or persons deemed to have ownership or control of a coal mine, and bars the granting of a coal mining permit to any such entity or person (including any "owner and controller") who has had a mining permit revoked or suspended, or a bond or similar security forfeited within the five-year period preceding a permit application or application for a permit revision. Regulatory agencies also block the issuance of permits to an applicant who, or whose owner and controller, has permit violations outstanding that have not been timely abated.

A federal database, known as the Applicant Violator System, is maintained for this purpose. Certain relationships are presumed to constitute ownership or control, including the following: being an officer or director of an entity; being the operator of the coal mining operation; having the ability to commit the financial or real property assets or working resources of the permittee or operator; based on the instruments of ownership or the voting securities of a corporate entity, owning of record 10% or more of the mining operator, among others. This presumption, in most cases, can be rebutted where the person or entity can demonstrate that it in fact does not or did not have authority directly or indirectly to determine the manner in which the relevant coal mining operation is conducted. An ownership and control notice must be filed by us each time an entity obtains a 10% or greater interest in us. If we have unabated violations of the SMCRA or its state law counterparts, have a coal mining permit suspended or revoked, or forfeit a reclamation bond, we and our "owners and controllers," as discussed above, may be prohibited from obtaining new coal mining permits, or amendments to existing permits, until such violations of law are corrected. This is known as being "permit-blocked." Additionally, Yorktown and Mr. Atkins are each currently deemed an "owner or controller" of a number of other mining

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companies; as such, we could be permit-blocked based upon the violations of or permit-blocked status of an "owner or controller" of us. This could adversely affect production from our properties.

We may be subject to additional limitations on our ability to conduct mining operations due to federal jurisdiction.

We may conduct some underground mining activities on properties that are within the designated boundary of federally protected lands or national forests where the above-mentioned restrictions within the meaning of the SMCRA could apply. Federal court decisions could pose a

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potential restriction on underground mining within 100 feet of a public road as well as other restrictions. If these SMCRA restrictions ultimately apply to underground mining, considerable uncertainty would exist about the nature and extent of this restriction. While it could remain possible to obtain permits for underground mining operations in these areas even where this 100-foot restriction was applied, the time and expense

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of that permitting process would be likely to increase significantly, and the restrictions placed on the mining of those properties could adversely affect our costs.

Our lessees could satisfy obligations to their customers with minerals from properties other than ours, depriving us of the ability to receive amounts in excess of minimum royalty payments.

Mineral supply contracts generally do not require operators to satisfy their obligations to their customers with resources mined from specific locations. Several factors may influence a lessee's decision to supply its customers with minerals mined from properties we do not own or lease, including the royalty rates under the lessee's lease with us, mining conditions, mine operating costs, cost and availability of transportation, and customer specifications. In addition, lessees move on and off of our properties over the course of any given year in accordance with their mine plans. If a lessee satisfies its obligations to its customers with minerals from properties we do not own or lease, production on our properties will decrease, and we will receive lower royalty revenues.

A lessee may incorrectly report royalty revenues, which might not be identified by our lessee audit process or our mine inspection process or, if identified, might be identified in a subsequent period.

We depend on our lessees to correctly report production and royalty revenues on a monthly basis. Our regular lessee audits and mine inspections may not discover any irregularities in these reports or, if we do discover errors, we might not identify them in the reporting period in which they occurred. Any undiscovered reporting errors could result in a loss of royalty revenues and errors identified in subsequent periods could lead to accounting disputes as well as disputes with our lessees.

Because of the unique difficulties and uncertainties inherent in technology development, we face a risk of not being able to capitalize on our license or ownership of intellectual property.

Potential investors should be aware of the difficulties normally encountered by companies developing new technology and the high rate of failure of such enterprises. The likelihood of our successful ability to commercialize intellectual property we own or license must be considered in light of the problems, expenses, difficulties, complications and delays encountered in connection with the development of new technology with limited personnel and financial means. These potential problems include, but are not limited to, unanticipated technical problems that extend the time and cost of product development or unanticipated problems with the operation of the technology.

Technology development involves significant time and expense and can be uncertain.

The development of technology associated with our licensed or owned intellectual property will be costly, complex and time-consuming. Any investment into technology development and commercialization often involves a long wait until a return, if any, is achieved on such investment. We plan to make investments in research and development relating to our owned and licensed intellectual property and technology. Investments in new technology and processes are inherently speculative.

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Successful technical development of technologies associated with intellectual property does not guarantee successful commercialization.

We may successfully complete the technical development of technologies associated with our owned or licensed intellectual property, but we may still fail to commercialize that technology at scale or at a cost attractive to the target industries. Our success will depend largely on our ability to prove the capabilities and cost-effectiveness of the developed technology. Upon demonstration, the technology may not have the capabilities they were designed to have or that we believed they would have, or they may be more expensive than anticipated. Furthermore, even if we do successfully demonstrate the technology's capabilities, potential customers may be more comfortable doing business with a larger, more established, more proven company than us. Moreover, competing technologies may prevent us from gaining wide market acceptance of the technology. Significant revenue from new technology investments may not be achieved for a number of years, if at all.

If we fail to protect our intellectual property rights, we could lose our ability to compete in the market.

Our intellectual property and proprietary rights are important to our ability to remain competitive and for the success of our products and our business. Our intellectual property rights may be challenged, invalidated or circumvented by third parties. We may not be able to prevent the unauthorized disclosure or use of our technical knowledge or other trade secrets by employees or competitors. Furthermore, our competitors may independently develop technologies and products that are substantially equivalent or superior to our technologies and/or products, which could result in decreased revenues. Moreover, the laws of foreign countries may not protect our intellectual property rights to the same extent as the laws of the United States. Litigation may be necessary to enforce our intellectual property rights which could result in substantial costs to us and substantial diversion of management attention. If we do not adequately protect our intellectual property, our competitors could use it to enhance their products. Our inability to adequately protect our intellectual property rights could adversely affect our business and financial condition, and the value of our brand and other intangible assets.

Other companies may claim that we infringe their intellectual property, which could materially increase our costs and harm our ability to generate future revenue and profit.

We do not believe that we infringe the proprietary rights of any third party, but claims of infringement are becoming increasingly common, and third parties may assert infringement claims against us. It may be difficult or impossible to identify, prior to receipt of notice from a third party, the trade secrets, patent position or other intellectual property rights of a third party, either in the United States or in foreign jurisdictions. Any such assertion may result in litigation or may require us to obtain a license for the intellectual property rights of third parties. If we are required to obtain licenses to use any third-party technology, we would have to pay royalties, which may significantly reduce any profit on our products. In addition, any such litigation could be expensive and disruptive to our ability to generate revenue or enter into new market opportunities. If any of our products were found to infringe other parties' proprietary rights and we are unable to come to terms regarding a license with such parties, we may be forced to modify our products to make them non-infringing or to cease production of such products altogether.

Risks Related to Environmental, Health, Safety and Other Regulations

The current U.S. administration and Congress could enact legislative and regulatory measures that could adversely affect our mining operations or cost structure or our customers' ability to use coal, which could have a material adverse effect on our financial condition and results of operations.

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In February 2021, the current administration announced reentry of the U.S. into the Paris Agreement along with a new "nationally determined contribution" for U.S. GHG emissions that would achieve emissions reductions of at least 50% relative to 2005 levels by 2030. The U.S. participated in the U.N. Framework Convention on Climate Change 26th Conference of the Parties ("COP26") held in Glasgow, Scotland in November 2021, advancing a Global Methane Pledge along with the European Union, which aims to cut global methane pollution at least 30% by 2030 relative to 2020 levels, including "all feasible reductions" in the energy sector. Since its formal launch at COP26, over 100 countries representing almost 70% of global GDP have signed. Most recently, at the 27th conference of parties ("COP27"),

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President Biden announced the EPA's proposed standards to reduce methane emissions from existing oil and gas sources, and agreed, in conjunction with the European Union and a number of other partner countries, to develop standards for monitoring and reporting methane emissions to help create a market for low methane-intensity natural gas. Various state and local governments have also publicly committed to furthering the goals of the Paris Agreement. The $1 trillion legislative infrastructure package passed by Congress in November 2021 includes a number of climate-focused spending initiatives targeted at climate resilience, enhanced response and preparation for extreme weather events, and clean energy and transportation investments. In August 2022, President Biden signed the Inflation Reduction Act of 2022 into law. The Inflation Reduction Act provides significant funding and incentives for research and development of low-carbon energy production methods, carbon capture, and other programs directed at addressing climate change. In addition, the Biden Administration has taken measures to unwind a number of regulatory rollbacks enacted or proposed by the Trump administration, including, among others, the ACE Rule, the NWPR, and the proposed NEPA overhaul. In addition, the Biden administration rolled back certain changes to the CCR made by the Trump administration. In January 2022, the EPA announced several actions with respect to the coal combustion residuals rules, including reiterating that

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surface impoundments cannot be closed with coal ash in contact with groundwater (in connection with the proposed denial of closure deadline extensions due to failure of a permittee to demonstrate compliance with coal combustion residuals rules – the EPA took final action to deny the request in November 2022) and establishing a federal permitting scheme for the disposal of coal ash and establish regulations for legacy coal ash surface impoundments. New, more stringent legislation or regulations related to the protection of the environment, health and safety or the reduction of greenhouse gas emissions, as well as changes in the interpretation and enforcement of such laws and regulations, may require us or our customers to change operations significantly or incur increased costs, which may adversely affect our mining operations, cost structure or our customers' ability to use coal. Such changes could have a material adverse effect on our financial condition and results of operations.

Laws and regulations restricting or encouraging the reduction of greenhouse gas emissions as well as uncertainty concerning such regulations and increasing public attention toward climate change could adversely impact the market for coal, increase our operating costs, and reduce the value of our coal assets and our stock price.

Climate change continues to attract considerable public and scientific attention. There is widespread concern about the contributions of human activity to such changes, especially through the emission of GHGs. Numerous reports, such as Sixth Assessment Report of the Intergovernmental Panel on Climate Change, have further raised concern about the impacts of fossil fuel combustion on global climate issues. There are three primary sources of GHGs associated with the coal industry. First, the end use of our coal by our customers in electricity generation, coke plants, and steelmaking is a source of GHGs. Second, combustion of fuel by equipment used in coal production and to transport our coal to our customers is a source of GHGs. Third, coal mining itself can release methane, which is considered to be a more

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potent GHG than carbon dioxide, directly into the atmosphere. These emissions from coal consumption, transportation and production are subject to pending and proposed regulation as part of initiatives to address global climate change.

As a result, numerous proposals have been adopted, made and are likely to continue to be made at the international, national, regional, state and local levels of government to monitor and limit emissions of GHGs, including alternative energy requirements, measures promoting renewable energy development, and energy conservation and emissions reductions measures, among others. Collectively, these initiatives could result in higher electricity costs to our customers or lower the demand for coal used in electric or steel generation, which could in turn adversely impact our business. Such initiatives, as well as increasing public attention to climate change more generally, could also result in direct regulation of the GHGs produced by our operations or increase the potential for governmental investigations or litigation. See "Business—Environmental and Other Regulatory Matters—Global Climate Change."

At present, we are principally focused on metallurgical coal production, which is not used in connection with the production of power generation. However, we may seek to sell greater amounts of our coal into the power-generation market in the future. The market for our coal may be adversely impacted if comprehensive legislation or regulations focusing on GHG emission reductions are adopted, or if our customers are unable to obtain financing for their operations. The extent of future regulation of GHG emissions may inhibit utilities from investing in the building of new coal-fired plants to replace older plants or investing in the upgrading of existing coal-fired plants. Any reduction in the amount of coal consumed by electric power generators as a result of actual or potential regulation of GHG emissions, including any reductions resulting from power plants ceasing operations or switching to fuels that produce fewer GHG

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emissions, could decrease demand for our coal, thereby reducing our revenues and materially and adversely affecting our business and results of operations. We or prospective customers may also have to invest in carbon dioxide capture and storage technologies in order to burn coal and comply with future GHG emission standards, and new legislation, regulations or international agreements in the future could otherwise result in increased costs to operate and maintain our or our customers' facilities, capital expenditures to install other emission controls at our or our customers' facilities, and costs to administer and manage any potential climate-related reporting or greenhouse gas emissions trading or tax programs. These costs and capital expenditures could be material and could increase the cost of and reduce demand for our products. Relatedly, to the extent others use or develop new technological advances in coal production in response to market or regulatory pressures to reduce their impact on the environment, we may be placed at a competitive disadvantage or may be forced by competitive pressures to implement new technologies at substantial costs. We may not be able to respond to these competitive pressures or implement new technologies on a timely basis or at an acceptable cost. If one or more of the technologies we use now or in the future were to become obsolete, our business, financial

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condition or results of operations could be materially and adversely affected. See also "—Product alternatives or other technologies may reduce demand for our products."

Current and future laws, regulations and other legal requirements relating to protection of the environment and natural resources may increase our costs of doing business and may restrict our coal operations.

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We and our potential customers are subject to stringent and complex laws, regulations and other legal requirements enacted by federal, state and local authorities relating to occupational health and safety and protection of the environment and natural resources. These include those legal requirements that govern discharges or emissions of materials into the environment, the management and disposal of substances and wastes, including hazardous wastes, the cleanup of contaminated sites, threatened and endangered plant and wildlife protection, reclamation and restoration of mining properties after mining is completed, mitigation and restoration of streams or other waters, the protection of drinking water, assessment of the environmental impacts of mining, monitoring and reporting requirements, the installation of various safety equipment in our mines, remediation of impacts of surface subsidence from underground mining, and work practices related to employee health and safety. See “Business—Environmental and Other Regulatory Matters.” Examples include laws and regulations relating to:

- occupational health and safety;
- emissions to air and discharges to water;
- plant and wildlife protection, including endangered species protections;
- the reclamation and restoration of properties after mining or other activity has been completed;
- limitations on land use;
- mine permitting and licensing requirements;
- the storage, treatment and disposal of wastes;
- air quality standards;
- water pollution;
- protection of human health, plant-life and wildlife, including endangered and threatened species, and biodiversity;
- protection of wetlands;
- the discharge of materials into the environment;
- remediation of contaminated soil, surface and groundwater; and
- the effects of operations on surface water and groundwater quality and availability.

Complying with these environmental and employee health and safety requirements, including the terms of our permits, has had, and will continue to have, a significant effect on our costs of operations. In addition, there is the possibility that we could incur substantial costs as a result of violations of environmental laws, judicial interpretations of or rulings on environmental laws or permits, or in connection with the investigation and remediation of environmental contamination. For example, the EPA and several of the states where we operate have, or intend to, propose revised recommended aquatic life criteria for discharges of selenium regulated under the CWA, which may be more stringent than current criteria. The comment period for the EPA’s draft Selenium Technical Support Materials, intended to provide implementation support for states for the recommend selenium aquatic life criterion for freshwater ended on January 3, 2022.

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January 3, 2022. Any additional laws, regulations and other legal requirements enacted or adopted by federal, state and local authorities, or new interpretations of existing legal requirements by regulatory bodies relating to the protection of the environment, including those related to discharges of selenium, could further affect our costs or limit our operations. See “Business—Environmental and Other Regulatory Matters.”

Our operations may impact the environment or cause exposure to hazardous substances, and our properties may have environmental contamination, which could expose us to significant costs and liabilities.

Our operations currently use hazardous materials and generate limited quantities of hazardous wastes from time to time. Drainage flowing from or caused by mining activities can be acidic with elevated levels of dissolved metals, a condition referred to as “acid mine drainage,” or may include other pollutants requiring treatment. We could become subject to claims for toxic torts, natural resource damages and other damages as well as for the investigation and clean-

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up clean-up of soil, surface water, groundwater, and other media. Such claims may arise, for example, out of conditions at sites that we currently own or operate, as well as at sites that we previously owned or operated, or may acquire. Our liability for such claims may be joint and several, so that we may be held responsible for more than our share of the contamination or other damages, or for the entire share.

We maintain coal refuse areas and slurry impoundments as necessary. Such areas and impoundments are subject to extensive regulation. Structural failure of a slurry impoundment or coal refuse area could result in extensive damage to the environment and natural resources, such as bodies of water that the coal slurry reaches, as well as liability for related personal injuries and property damages, and injuries to wildlife. If an impoundment were to fail, we could be subject to claims for the resulting environmental contamination and associated liability, as well as for fines and penalties. Our coal refuse areas and slurry impoundments are designed, constructed, and inspected by our company and by regulatory authorities according to stringent environmental and safety standards.

We must obtain, maintain, and renew governmental permits and approvals for mining operations, which can be a costly and time-consuming process and result in restrictions on our operations.

Numerous governmental permits and approvals are required for mining operations. Our operations are principally regulated under permits issued pursuant to the SMCRA and the federal CWA. State and federal regulatory authorities exercise considerable discretion in the timing and scope of permit issuance. Requirements imposed by these authorities may be costly and time consuming and may result in delays in the commencement or continuation of exploration or production operations. In addition, we may be required to prepare and present to permitting or other regulatory authorities data pertaining to the effect or impact that proposed exploration for or production of coal might have on the environment.

Our coal production is dependent upon our ability to obtain various federal and state permits and approvals to mine our coal reserves. The permitting rules, and the interpretations of these rules, are complex, change frequently, and are often subject to discretionary interpretations by regulators, all of which may make compliance more difficult or impractical, and which may possibly preclude the continuance of ongoing mine development or operations or the development of future mining operations. The pace with which the government issues permits needed for new operations and for ongoing operations to continue mining, particularly CWA permits, can be time-consuming and subject to delays and denials. These delays or denials of environmental permits needed for mining could reduce our production and materially adversely impact our cash flow and results of operations.

Prior to discharging any pollutants to waters of the United States, coal mining companies must obtain a NPDES permit from the appropriate state or federal permitting authority. NPDES permits include effluent limitations for discharged pollutants and other terms and conditions, including required monitoring of discharges. Changes and proposed changes in state and federally recommended water quality standards may result in the issuance or modification of permits with new or more stringent effluent limits or terms and conditions. See “Business—Environmental and Other Regulatory Matters—Clean Water Act.”

Further, the public has certain statutory rights to comment on and submit objections to requested permits and environmental impact statements prepared in connection with applicable regulatory processes, and otherwise engage in

the permitting process, including bringing citizens’ claims to challenge the issuance or renewal of permits, the validity of environmental impact statements or performance of mining activities. As a result of challenges like these, the permits we need may not be issued or renewed in a timely fashion or issued or renewed at all, or permits issued or renewed may not be maintained, may be challenged or may be conditioned in a manner that may restrict our ability to efficiently and economically conduct our mining activities, any of which would materially reduce our production, cash flow, and profitability.

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Permitting rules may also require, under certain circumstances, that we obtain surface owner surface-owner consent if the surface estate has been severed from the mineral estate. This could require us to negotiate with third parties for surface access that overlies coal we acquired or intend to acquire. These negotiations can be costly and time-consuming, lasting years in some instances, which can create additional delays in the permitting process. If we cannot successfully negotiate for land access, we could be denied a permit to mine coal we already own.

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Federal or state regulatory agencies have the authority to order certain of our mines to be temporarily or permanently closed under certain circumstances, which could materially and adversely affect our ability to meet our customers' demands.

Federal or state regulatory agencies have the authority, under certain circumstances following significant health and safety incidents, such as fatalities, to order a mine to be temporarily or permanently closed. If this occurred, we may be required to incur capital expenditures to re-open the mine. In the event that these agencies order the closing of our mines, our coal sales contracts generally permit us to issue force majeure notices which suspend our obligations to deliver coal under these contracts. However, our customers may challenge our issuances of force majeure notices. If these challenges are successful, we may have to purchase coal from third-party sources, if it is available, to fulfill these obligations, incur capital expenditures to re-open the mines and/or negotiate settlements with the customers, which may include price reductions, the reduction of commitments, the extension of time for delivery or the termination of customers' contracts. Any of these actions could have a material adverse effect on our business and results of operations.

Our customers are subject to extensive existing and future laws, regulations and other legal requirements relating to protection of the environment, which could negatively impact our business and the market for our products.

Coal contains impurities, including sulfur, mercury, chlorine and other elements or compounds, many of which are released into the air when coal is burned. Complying with regulations to address these emissions can be costly for our customers. For example, in order to meet the CAA limits for sulfur dioxide emissions from electric power plants, coal users must install costly pollution control devices, use sulfur dioxide emission allowances (some of which they may purchase), or switch to other fuels. More costly and stringent environmental regulations could adversely impact the operations of our customers, which could in turn adversely impact our business. A number of coal-fired power plants, particularly smaller and older plants, already have retired or announced that they will retire rather than retrofit to meet the obligations of these rules.

In addition, considerable uncertainty is associated with new air emissions initiatives that may require significant emissions control expenditures for many coal-fired power plants. As a result, some of our prospective customers may switch to other fuels that generate fewer of these emissions or may install more effective pollution control equipment that reduces the need for low-sulfur coal. Any further switching of fuel sources away from coal, closure of existing coal-fired power plants, or reduced construction of new coal-fired power plants could have a material adverse effect on demand for, and prices received for, our coal. In addition, our coke plant and steelmaking customers may face increased operational costs as a result of higher electric costs. See "Business—Environmental and Other Regulatory Matters."

Apart from actual and potential regulation of air emissions and solid wastes from coal-fired plants, state and federal mandates for increased use of electricity from renewable energy sources could have an impact on the market for our coal. Many states, including Pennsylvania and Virginia, have enacted legislative mandates requiring electricity suppliers to use renewable energy sources to generate a certain percentage of power. Possible advances in technologies and incentives, such as under the Inflation Reduction Act of 2022, to enhance the economics of renewable energy sources could make these sources more competitive with coal. Any reductions in the amount of coal consumed by electric power generators as a result of current or new standards for the emission of impurities, or current or new

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incentives to switch to renewable fuels or renewable energy sources could reduce the demand for our coal, thereby reducing our revenues and adversely affecting our business, cash flows, results of operations and our ability to pay dividends to our stockholders.

Negative sentiment with regard to our business or our industry as well as activism, consumer preferences, and initiatives aimed at limiting climate change or a reduction of air pollutants could interfere with our business activities, operations and ability to access capital sources, result in reduced demand for our products, and negatively impact our stock price.

Public perception of our industry's contribution to climate change or detractions from the transition to a lower-carbon economy has generated negative sentiment toward our industry and could result in reputational harm to our business, lower demand for our products, and increased demand for alternatives to our products. Numerous activist groups are devoting resources to anti-coal activities to minimize or eliminate the production of or use of coal as a source

of electricity generation, domestically and internationally. Participants in the coal mining industry are frequently targeted by activist groups that openly attempt to disrupt the industry. For example, Greenpeace International filed a letter with the SEC alleging that one coal mining company's filings relating to a proposed public offering of securities may contain incomplete and misleading disclosures regarding the risks of investing in the coal market. On another occasion, the Sierra Club sent a letter to the SEC stating that it believed a coal mining company may be giving potential investors false impressions regarding risks to its business. Other groups have objected to our RAM No. 1 mine permit application in Pennsylvania. It is possible that we could continue to be the target of similar actions in the future, including when we attempt to grow our business through acquisitions or commence new mining operations. Activist groups have also brought lawsuits challenging the issuance of individual coal leases, historical and pending regulatory approvals, permits and processes that are necessary to conduct coal mining operations or to operate coal-fueled power plants. Negative public perception could cause the permits we require to conduct our operations to be withheld, delayed or burdened by requirements that restrict our ability to profitably conduct our business. Litigation risks are also increasing, as a number of government entities and private individuals have sought to bring suit against fossil fuel companies, alleging, among other things, that such companies created public nuisances by producing fuels that contributed to climate change or alleging that the companies have been aware of the adverse effects of climate change for some time but failed to adequately disclose such impacts to their investors or customers. Private individuals or public entities may also seek to enforce laws and regulations against us and could allege personal injury, property damages or other liabilities in relation to climate change or other ESG matters. An unfavorable ruling in any such case could have an adverse impact on our financial condition. Any such activism could therefore materially and adversely impact our ability to operate our business or raise capital.

In addition, there have also been efforts in recent years to influence the investment community, including investment advisors, sovereign wealth funds, public pension funds, universities and other groups, promoting the divestment of fossil fuel equities; encouraging the consideration of environmental, social and governance ("ESG") practices and ESG ratings of companies in a manner that may negatively affect coal companies, including increased negative investor sentiment, divestment of securities issued by coal companies and the diversion of investment to other industries; and also pressuring lenders to limit funding to companies engaged in the extraction of fossil fuel reserves. For example, certain financial institutions, including banks and insurance companies, have taken actions to limit available financing, insurance and other services to entities that produce or use fossil fuels. Several large investment banks have adopted climate change guidelines for lenders. The guidelines require the evaluation of carbon risks in the financing of electric power generation plants, which may make it more difficult for utilities to obtain financing for coal-fired plants. The impact of such efforts and developments may adversely affect the demand for and price of securities issued by us, adversely impact our access to the capital and financial markets, increase the cost of borrowing, cause a decline in our credit rating, increase the cost or reduce the availability of third-party insurance, increase our retention of risk through self-insurance, and limit

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our flexibility and ability to conduct business development activities. Further, in California, legislation was signed into law in September 2015 to require the state's pension funds to divest investments in companies that generate 50% or more of their revenue from coal mining by July 2017. Additionally, Maine passed a law in June 2021 requiring the state pension system to divest holdings in coal, petroleum, natural gas and related products by 2026, and the New York State Common Retirement Fund has and is continuing to divest from coal assets. These efforts and developments, as well as concerted conservation and efficiency efforts, could also cause coal prices and sales of our coal to materially decline and could cause our costs to increase.

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Other activist campaigns have urged companies to cease financing coal-driven businesses. A number of investors and asset managers have enacted such policies as a result, including by beginning to exit investments that present high sustainability-related risks, such as thermal coal producers. The impact of such efforts may adversely affect the demand for and price of securities issued by us and impact our access to the capital and financial markets. In addition, several well-funded non-governmental organizations have explicitly undertaken campaigns to minimize or eliminate mining and the use of coal as a source of electricity generation. The net effect of these developments is to make it more costly and difficult to maintain our business and to continue to depress the market for coal.

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Our mines are subject to stringent federal and state safety regulations that increase our cost of doing business at active operations and may place restrictions on our methods of operation. In addition, government inspectors in certain circumstances may have the ability to order our operations to be shut down based on safety considerations.

The MINE Act and MINER Act, and regulations issued under these federal statutes, impose stringent health and safety standards on mining operations. The regulations that have been adopted under the MINE Act and the MINER Act are comprehensive and affect numerous aspects of mining operations, including training of mine personnel, mining procedures, roof control, ventilation, blasting, use and maintenance of mining equipment, dust and noise control, communications, emergency response procedures, and other matters. MSHA regularly inspects mines to ensure compliance with regulations promulgated under the MINE Act and MINER Act. In addition, Pennsylvania, West Virginia, and Virginia all have similar programs for mine safety and health regulation and enforcement.

The various requirements mandated by federal and state statutes, rules, and regulations may place restrictions on our methods of operation and potentially result in fees and civil penalties for violations of such requirements or criminal liability for the knowing violation of such standards, significantly impacting operating costs and productivity. In addition, government inspectors have the authority to issue orders to shut down our operations based on safety considerations under certain circumstances, such as imminent dangers, accidents, failures to abate violations, and unwarrantable failures to comply with mandatory safety standards. See "Business—Environmental and Other Regulatory Matters—Mine Safety and Health."

The regulations enacted under the MINE Act and MINER Act as well as under similar state acts are routinely expanded, raising compliance costs and increasing potential liability. These existing and other future mine safety rules could potentially result in or require significant expenditures, as well as additional safety training and planning, enhanced safety equipment, more frequent mine inspections, stricter enforcement practices and enhanced reporting requirements. At this time, it is not possible to predict the full effect that new or proposed

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statutes, regulations and policies will have on our operating costs, but any expansion of existing regulations, or making such regulations more stringent may have a negative impact on the profitability of our operations. If we were to be found in violation of mine safety and health regulations, we could face penalties or restrictions that may materially and adversely impact our operations, financial results and liquidity.

We must also compensate employees for work-related injuries. State workers' compensation acts typically provide for an exception to an employer's immunity from civil lawsuits for workplace injuries in the case of intentional torts. In such situations, an injured worker would be able to bring suit against his or her employer for damages in excess of workers' compensation benefits. In addition, West Virginia's workers' compensation act provides a much broader exception to workers' compensation immunity, allowing an injured employee to recover against his or her employer if he or she can show damages caused by an unsafe working condition of which the employer was aware and that was a violation of a statute, regulation, rule or consensus industry standard. These types of lawsuits are not uncommon and could have a significant effect on our operating costs.

We have obtained from a third-party insurer a workers' compensation insurance policy, which includes coverage for medical and disability benefits for black lung disease under the Federal Coal Mine Health and Safety Act of 1969 and the MINE Act. We perform periodic evaluations of our black lung liability, using assumptions regarding rates of successful claims, discount factors, benefit increases and mortality rates, among others. Of note, the Patient Protection and Affordable Care Act of 2010 significantly amended the black lung provisions of the MINE Act by reenacting two provisions, which had been eliminated in 1981. Under the amendments, a miner with at least fifteen years of

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underground coal mine employment (or surface mine employment with similar dust exposure) who can prove that he suffers from a totally disabling respiratory condition is entitled to a rebuttable presumption that his disability is caused by black lung. The other amendment provides that the surviving spouse of a miner who was collecting federal black lung benefits at the time of his death is entitled to a continuation of those benefits. These changes could have a material impact on our costs expended in association with the federal black lung program.

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We have reclamation, mine closing, and related environmental obligations under the SMCRA. If the assumptions underlying our accruals are inaccurate, we could be required to expend greater amounts than anticipated.

The SMCRA establishes operational, reclamation and closure standards for our mining operations. The SMCRA requires that comprehensive environmental protection and reclamation standards be met during the course of and following completion of mining activities. Permits for all mining operations must be obtained from the OSMRE or, where state regulatory agencies have adopted federally approved state programs under the SMCRA, the appropriate state regulatory authority. Our operations are located in states which have achieved primary jurisdiction for enforcement of the SMCRA through approved state programs. See "Business—Environmental and Other Regulatory Matters."

In addition, the SMCRA imposes a reclamation fee on all current mining operations, the proceeds of which are deposited in the AML Fund, which is used to restore unreclaimed and abandoned mine lands mined before 1977. The current per ton fee is $0.224 per ton for surface mined coal and $0.096 per ton for underground mined coal. These fees are currently scheduled to be in effect until September 30, 2034, and on November 15, 2021, the Infrastructure Investment and Jobs Act ("IIJA"), which included the Abandoned Mine Land Reclamation Amendments of 2021, extended OSMRE's statutory authority to collect reclamation fees for an additional 13 years and to reduce the fee rates.

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We accrue for the costs of current mine disturbance and of final mine closure, including the cost of treating mine water discharge where necessary. The amounts recorded are dependent upon a number of variables, including the estimated future closure costs, estimated proven reserves, assumptions involving profit margins, inflation rates, and the assumed credit-adjusted risk-free interest rates. If these accruals are insufficient or our liability in a particular year is greater than currently anticipated, our future operating results could be adversely affected. We are also required to post bonds for the cost of a coal mine as a condition of our mining activities.

Risks Related to Our Company

Our ability to pay dividends on our Class A common stock and our Class B common stock may be limited by the amount of cash we generate from operations following the payment of fees and expenses, by restrictions in debt instruments and by additional factors unrelated to our profitability.

We have paid quarterly dividends in the past and may pay additional special and regular quarterly dividends in the future. Our ability to pay dividends is subject to the discretion of our board of directors and the requirements of applicable law. The timing and amount of dividends declared will depend on, among other things: (a) our earnings, earnings outlook, financial condition, production, processing and shipping levels, financial condition, cash flow, cash requirements and our outlook on current and future market conditions, (b) our liquidity, including our ability to obtain debt and equity financing on acceptable terms, (c) restrictive covenants in our Credit and Security Agreement (the "Credit Agreement") with KeyBank National Association, as the administrative agent, and other lenders party thereto, and any future debt instruments and (d) provisions of applicable law governing the payment of dividends.

The metallurgical coal industry is highly volatile, and we cannot predict with certainty the amount of cash, if any, that will be available for distribution as dividends in any period. Also, there may be a high degree of variability from period to period in the amount of cash, if any, that is available for the payment of dividends. The amount of cash we generate from operations and the actual amount of cash we will have available for dividends will vary based upon, among other things:

- risks related to the impact of the COVID-19 global pandemic, such as the scope and duration of the outbreak, the health and safety of our employees, government actions and restrictive measures

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implemented in response, delays and cancellations of customer sales, supply chain disruptions and other impacts to the business, or our ability to execute our business continuity plans;
- the development of our properties into producing coal mines;
- the ability to begin generating significant revenues and operating cash flows;
- the market price for coal;
- overall domestic and global economic conditions, including the supply of and demand for domestic and foreign coal, coke and steel;
- unexpected operational events or geological conditions;

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- cost overruns;

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- our ability to enter into agreements governing the sale of coal, which are generally short-term in nature and subject to fluctuations in market pricing;
- the level of our operating costs;
- prevailing global and regional economic and political conditions;
- changes in interest rates;
- the impact of domestic and foreign governmental laws and regulations, including environmental and climate change regulations and regulations affecting the coal mining industry;
- delays in the receipt of, failure to receive, failure to maintain or revocation of necessary governmental permits;
- modification or revocation of our dividend policy by our board of directors; and
- the amount of any cash reserves established by our board of directors.

The amount of cash we generate from our operations may differ materially from our net income or loss for the period, which will be affected by non-cash items. We may incur other expenses or liabilities that could reduce or eliminate the cash available for distribution as dividends.

In addition, financing agreements may prohibit the payment of dividends if an event of default has occurred and is continuing or would occur as a result of the payment of such dividends.

In addition, Section 170 of the Delaware General Corporation Law (the "DGCL") allows our board of directors to declare and pay dividends on the shares of our Class A common stock and Class B common stock either (i) out of our surplus, as defined in and computed in accordance with the DGCL or (ii) in case there shall be no such surplus, out of our net profits for the fiscal year in which the dividend is declared and/or the preceding fiscal year. We may not have sufficient surplus or net profits in the future to pay dividends, and our subsidiaries may not have sufficient funds, surplus or net profits to make distributions to us. As a result of these and the other factors mentioned above, we can give no assurance that dividends will be paid in the future.

As of December 31, 2022, we ceased being an emerging growth company and, as a result, we have incurred and expect to continue to incur significant additional legal and financial compliance costs by complying with increased disclosure and governance requirements.

As of December 31, 2022, as a result of our market capitalization as of June 30, 2022, we became an accelerated filer and ceased being an emerging growth company. Therefore, we are subject to certain requirements that apply to other public companies but did not previously apply to us due to our status as an emerging growth company. These requirements include:

- the provisions of Section 404 requiring that our independent registered public accounting firm provide an attestation report on the effectiveness of our internal control over financial reporting;

- the requirement to provide detailed compensation discussion and analysis in proxy statements and reports filed under the Exchange Act; and

- the "say on pay" provisions (requiring a non-binding stockholder vote to approve compensation of certain executive officers) and the "say on golden parachute" provisions (requiring a non-binding stockholder vote

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to approve golden parachute arrangements for certain executive officers in connection with mergers and certain other business combinations) of the Dodd-Frank Wall Street Reform and Consumer Protection Act, or the Dodd-Frank Act.

We have already incurred significant additional legal and financial compliance costs in connection with our loss of emerging growth company status. We expect that our compliance with these additional requirements, including the provisions of Section 404, will continue to substantially increase our legal and financial compliance costs and make some activities more time consuming and costly.

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Your percentage of ownership in us may be diluted in the future.

Your percentage of ownership in us may be diluted because of equity issuances for acquisitions, capital market transactions or otherwise, including, without limitation, equity awards that we may be granting to our directors, officers and employees. Such issuances may have a dilutive effect on our earnings per share, which could adversely affect the market price of our Class A common stock and Class B common stock.

It is anticipated that the compensation committee of the board of directors of the Company will grant additional equity awards to Company employees and directors, from time to time, under the Company's compensation and employee benefit plans. These additional awards will have a dilutive effect on the Company's earnings per share, which could adversely affect the market price of the Company's Class A common stock and Class B common stock.

In addition, our Charter authorizes us to issue, without the approval of our stockholders, one or more classes or series of preferred stock having such designation, powers, preferences and relative, participating, optional and other special rights, including preferences over our common stock with respect to dividends and distributions, as our board of directors generally may determine. The terms of one or more classes or series of preferred stock could dilute the voting power or reduce the value of our Class A common stock and Class B common stock. For example, we could grant the holders of preferred stock the right to elect some number of our directors in all events or on the happening of specified events or to veto specified transactions. Similarly, the repurchase or redemption rights or liquidation preferences we could assign to holders of preferred stock could affect the residual value of our Class A common stock and Class B common stock.

Certain of our directors have significant duties with, and spend significant time serving, entities that may compete with us in seeking acquisitions and business opportunities and, accordingly, may have conflicts of interest in allocating time or pursuing business opportunities.

Certain of our directors hold positions of responsibility with other entities (including Yorktown-affiliated entities) that are in the business of identifying and acquiring coal reserves. The existing positions held by these directors may give rise to fiduciary or other duties that are in conflict with the duties they owe to us. These directors may become aware of business opportunities that may be appropriate for presentation to us as well as to the other entities with which they are or may become affiliated. Due to these existing and potential future affiliations, they may present potential business opportunities to other entities prior to presenting them to us, which could cause additional conflicts of interest. They may also decide that certain opportunities are more appropriate for other entities with which they are affiliated, and as a result, they may elect not to present those opportunities to us. These conflicts may not be resolved in our favor.

Our Charter and bylaws, as well as Delaware law, contain provisions that could discourage acquisition bids or merger proposals, which may adversely affect the market price of our Class A common stock and Class B common stock.

Our Charter authorizes our board of directors to issue preferred stock without stockholder approval. If our board of directors elects to issue preferred stock, it could be more difficult for a third-party to acquire us. In addition, some provisions of our Charter and bylaws could make it more difficult for a third-party to acquire control of us, even if the change of control would be beneficial to our stockholders, including:

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- limitations on the removal of directors;
- limitations on the ability of our stockholders to call special meetings;
- establishing advance notice provisions for stockholder proposals and nominations for elections to the board of directors to be acted upon at meetings of stockholders;
- providing that the board of directors is expressly authorized to adopt, or to alter or repeal our bylaws; and
- establishing advance notice and certain information requirements for nominations for election to our board of directors or for proposing matters that can be acted upon by stockholders at stockholder meetings.

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Our Charter designates the Court of Chancery of the State of Delaware as the sole and exclusive forum for certain types of actions and proceedings that may be initiated by our stockholders, which could limit our stockholders' ability to obtain a favorable judicial forum for disputes with us or our directors, officers, employees or agents.

Our Charter provides that, unless we consent in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware will, to the fullest extent permitted by applicable law, be the sole and exclusive forum for (i) any derivative action or proceeding brought on our behalf, (ii) any action asserting a claim of breach of a fiduciary duty owed by any of our directors, officers, employees or agents to us or our stockholders, (iii) any action asserting a claim arising pursuant to any provision of the DGCL, our Charter or our bylaws, or (iv) any action asserting a claim against us that is governed by the internal affairs doctrine, in each such case subject to such Court of Chancery having personal jurisdiction over the indispensable parties named as defendants therein. This exclusive forum provision does not apply to a cause of action brought under federal or state securities laws. Any person or entity purchasing or otherwise acquiring any interest in shares of our capital stock will be deemed to have notice of, and consented to, the provisions of our Charter described in the preceding sentence. This choice of forum provision may limit a stockholder's ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our directors, officers, employees or agents, which may discourage such lawsuits against us and such persons. Alternatively, if a court were to find these provisions of our Charter inapplicable to, or unenforceable in respect of, one or more of the specified types of actions or proceedings, we may incur additional costs associated with resolving such matters in other jurisdictions, which could adversely affect our business, financial condition or results of operations.

If we fail to maintain an effective system of internal controls, such failure could cause investors to lose confidence in our reported financial information, which could harm our business and We have a material adverse effect on the price of our common stock.

As described in our Annual Report on Form 10-K for the year ended December 31, 2021, management identified a material weakness in our internal controls over financial reporting. Our systems and procedures for internal control over financial reporting and the disclosure controls related to information technology general controls them have, and may have in the areas future, material weaknesses, which may adversely affect the value of user access our common stock.

We are responsible for maintaining systems and segregation documentation necessary to evaluate the effectiveness of duties related to certain information technology systems that support the Company's financial reporting process. The Company executed a remediation plan to address the our internal control measures to improve its over financial reporting. These activities may divert management's attention from other business concerns. As described in Part II, Item 9A, "Controls and Procedures" in this Annual Report, we have determined that certain of our internal controls over financial reporting have material weaknesses. If we are unable to correct those issues in a timely fashion, or if other internal control issues arise, there could be a material adverse effect on our business, financial condition, results of operations and remediate this cash flows, and investors could lose confidence in our reported results, thus affecting our ability to finance our business. To maintain and improve our controls and procedures, we must commit significant resources, may be required to hire additional staff and will need to continue to provide effective management oversight, which could have a material weakness. adverse effect on our business, financial condition, results of operations and cash flows. The Company's efforts included modifying information technology general material weaknesses will not be considered remediated until enhanced controls over user access and implementing additional controls designed to detect issues that may arise

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over user access and segregation of duties conflicts. As of June 30, 2022, we concluded that the control modifications and additional controls related to user access to information technology systems have been satisfactorily are implemented and has operated effectively operate for a sufficient period of time. Therefore, we time and management has concluded, through testing, that the previously identified related controls are effective. We can give no assurance that the measures we take to remediate the material weakness has been remediated as of June 30, 2022. However, our remedial actions may not prevent this or similar weaknesses from occurring in the future. will be effective.

Risks Related to Our Class B Common Stock Structure

Holders of Class B common stock are common stockholders of the Company and, therefore, are subject to risks associated with an investment in the Company as a whole, even if a holder does not own shares of Class A common stock.

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We retain legal title to all of our assets and our tracking stock capitalization does not limit our legal responsibility, or that of our subsidiaries, for the liabilities included in any set of financial statement schedules. Holders of Class B common stock do not have any legal rights related to specific assets attributed to CORE and, in any liquidation, holders of Class B common stock and Class A common stock will be entitled to receive a pro rata share of our available net assets based on their respective numbers of shares.

Our Board's ability to reattribute businesses, assets and expenses between the Class A common stock and Class B common stock may make it difficult to assess the future prospects of a class of common stock based on past performance.

Our Board currently expects to attribute 100% of the costs associated with the CORE Assets to Ramaco Resources and zero such costs to CORE; however, our Board is vested with discretion to reattribute businesses, assets and liabilities that are attributed to one class of common stock to another class of common stock, without the approval of any of our stockholders. Any such reattribution made by our Board, as well as the existence, in and of itself, of the right to effect a reattribution may impact the ability of investors to assess the future prospects of the businesses and assets attributed to a class of common stock, including liquidity and capital resource needs to pay the projected dividend to holders of our Class B common stock, based on past performance. Stockholders may also have difficulty evaluating the liquidity and capital resources of the businesses and assets attributed to each class of common stock based on past performance, as our Board may use the liquidity of one class to fund the liquidity of another class and capital expenditure requirements through the use of loans and interests between classes.

We could be required to comply use assets attributed to one class of common stock to pay liabilities attributed to another class.

The assets attributed to one class are potentially subject to the liabilities attributed to another class, even if those liabilities arise from lawsuits, contracts or indebtedness that are attributed to such other class. No provision of our Second Amended and Restated Certificate of Incorporation (the "Amended Charter") prevents us from satisfying liabilities of one class with assets of another class, and our creditors will not in any way be limited by our tracking stock capitalization from proceeding against any assets they could have proceeded against if we did not have a variety tracking stock capitalization.

Dividends on our Class B common stock are discretionary and may fluctuate materially quarter to quarter. We cannot guarantee that we will be able to pay dividends in the future or what the actual dividends will be for any future periods.

Our ability to pay dividends is subject to the discretion of reporting, accounting our Board, the requirements of applicable law, any statutory or contractual restrictions on the payment of dividends, any prior rights and preferences that may be applicable to any outstanding preferred stock and commercial factors, whether or not attributable to the CORE Assets. We may lack sufficient cash to pay dividends to our Class B stockholders due to cash flow shortfalls attributable to a number of factors, many of which are beyond our control, as well as increases in corporate level general and administrative expenses, principal and interest payments on our outstanding debt, tax expenses, working capital requirements and anticipated cash needs. The timing and amount of dividends declared in future periods will depend on, among other rules things, (a) our earnings, earnings outlook, production, processing and regulations. shipping levels, financial condition, cash flow, cash requirements and our outlook on current and future market conditions, (b) our overall liquidity, (c) the restrictive covenants in the Second Amended and Restated Credit and Security Agreement and any future debt instruments that we may enter into and (d) provisions of applicable law governing the dividends. We have not established a minimum dividend payment for any class of our Common Stock, including our Class B common stock. Further our ability to pay and the amount of dividends declared in future periods may be harmed by other risk factors described herein and incorporated by reference herein. Our ability to pay dividends may fluctuate materially from quarter to quarter, and any quarterly estimate is subject to uncertainty due to the factors described above and elsewhere herein.

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The market price of the Class B common stock may not reflect the performance of CORE attributed to it, as we intend.

We cannot assure the holders of Class B common stock that the market price of the Class B common stock related to CORE will, in fact, reflect the performance of CORE attributed to it. Holders of Class B common stock are common stockholders of the Company as a whole and, as such, are subject to all risks associated with an investment in the Company and all of our businesses, assets and liabilities. As a result, we maintain a system the market price of internal control over financial reporting, but there Class B common stock may, in part, reflect events that are limitations inherent in internal control systems and significant deficiencies or material weaknesses are possible. intended to be reflected by the Class A control system can provide only reasonable, not absolute, assurance that the objectives common stock of the control system are met. Company. In addition, investors may discount the design value of Class B common stock because it is part of a control system must reflect common enterprise rather than a stand-alone entity.

The market price of the fact Class B common stock has been volatile, has fluctuated substantially, and could be affected by factors that there are resource constraints do not affect traditional common stock.

To the extent the market price of the Class B common stock tracks the performance of more focused classes of businesses and assets than our Class A common stock does, the benefit market price of controls must the Class B common stock may be appropriate relative to their costs. Furthermore, compliance with existing requirements is expensive and we may need to implement additional finance and accounting and other systems, procedures and controls to satisfy our reporting requirements. If our internal control over financial reporting is determined to be ineffective, or if we are unable to appropriately or timely remediate any such effectiveness, such failure could cause investors to lose confidence in our reported financial information, negatively affect more volatile than the market price of our existing common stock subject has been historically. The market price of the Class B common stock may be materially affected by, among other things:

- actual or anticipated fluctuations CORE's operating results;
- potential acquisition activity by the Company (regardless of the class to which it is attributed) or the companies in which we invest;
- issuances of debt or equity securities to raise capital by the Company or the companies in which we invest and the manner in which that debt or the proceeds of an equity issuance are attributed to each of the classes;
- changes in financial estimates by securities analysts regarding the Class B common stock, the Class A common stock or CORE attributable to the Class B common stock;
- the complex nature and the potential difficulties investors may have in understanding the terms of our new tracking stock, as well as concerns regarding the possible effect of certain of those terms on an investment in our stocks; and
- general market conditions.

Until an orderly trading market develops for the Class B common stock, the trading price of the Class B common stock may fluctuate significantly.

The market value of the Class B common stock could be adversely affected by events involving the other assets and businesses of the Company.

Because we are the issuer of the Class B common stock, an adverse market reaction to events relating to any of our assets and businesses, such as earnings announcements or announcements of new products or services, acquisitions or dispositions that the market does not view favorably, may cause an adverse market reaction in a particular class of common stock. This could occur even if the triggering event is not material to us as a whole. Certain events may also have a greater impact on one class than the same triggering event would have on another class due to regulatory investigations the asset composition of the affected class. In addition, the incurrence of significant indebtedness by us or any of our subsidiaries on behalf of one class, including indebtedness incurred or assumed in connection with acquisitions of or investments in businesses, could affect our credit rating and penalties, require us that of our subsidiaries and, therefore, could

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increase the borrowing costs of businesses attributable to expend significant resources to remediate our other classes or the deficiencies, impair our access to capital and otherwise materially adversely impact us. borrowing costs of the Company as a whole.

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We may not pay dividends equally or at all on our classes of common stock.

We have the right to pay dividends on the shares of Class A common stock and Class B common stock in equal or unequal amounts, and we may pay dividends on one class of common stock and not pay dividends on another class. In addition, any dividends or distributions on, or repurchases of, shares relating to a class will reduce our assets legally available to be paid as dividends on another class.

Our tracking stock capital structure could create conflicts of interest, and our Board may make decisions that could adversely affect only the holders of one class of our common stock.

Our tracking stock capital structure could give rise to occasions when the interests of holders of one class of common stock might diverge or appear to diverge from the interests of holders of another class of common stock. Our Class B common stock is not issued by a separate entity and thus holders of Class B common stock do not have the right to elect a separate board of directors. As a result, the Company's officers and directors owe fiduciary duties to the Company as a whole and all of our stockholders as opposed to only holders of a particular class of common stock. Decisions deemed to be in the best interest of the Company and all of our stockholders may not be in the best interest of a particular class of common stock when considered independently. Examples include:

- decisions as to the terms of any business relationships between classes of common stock;
- the terms of any reattributions of assets between classes of common stock;
- decisions as to the allocation of consideration among the holders of Class B common stock and Class A common stock to be received in connection with a merger involving the Company;
- decisions as to the allocation of corporate opportunities between the classes, especially where the opportunities might meet the strategic business objectives of both classes;
- decisions as to operational and financial matters that could be considered detrimental to one class but beneficial to the other;
- decisions as to the conversion of shares of Class B common stock into shares of Class A common stock;
- decisions regarding the creation of, and, if created, the subsequent increase or decrease of any interest that one class of common stock may own in the other class of common stock;
- decisions as to the internal or external financing attributable to businesses or assets attributed to any of our classes of common stock;
- decisions as to the dispositions of assets of any of our classes of common stock; and
- decisions as to the payment of dividends on any of our classes of common stock.

Our directors' or officers' equity ownership may create or appear to create conflicts of interest.

If directors or officers own disproportionate interests (in percentage or value terms) in Class A common stock or Class B common stock, that disparity could create or appear to create conflicts of interest when they are faced with decisions that could have different implications for the holders of Class A common stock or Class B common stock.

We have not adopted any specific procedures for consideration of matters involving a divergence of interests among holders of Class A common stock or Class B common stock. Rather than develop additional specific procedures in advance, our Board intends to exercise its judgment from time to time, depending on the circumstances, as to how best to:

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- obtain information regarding the divergence (or potential divergence) of interests;
- determine under what circumstances to seek the assistance of outside advisers;
- determine whether a committee of our Board should be appointed to address a specific matter and the appropriate members of that committee; and
- assess what is in the Company's best interests and the best interests of all of our stockholders.

Our Board believes the advantage of retaining flexibility in determining how to fulfill its responsibilities in any such circumstances as they may arise outweighs any perceived advantages of adopting additional specific procedures in advance.

Our Board does not expect to formally adopt any management or allocation policies with respect to the CORE Assets.

The Board does not expect to formally adopt any management or allocation policies with respect to the CORE Assets to serve as guidelines in making decisions regarding the relationship between the Company's overall business and CORE with respect to matters such as tax liabilities and benefits, loans between the two, attribution of assets, financing alternatives, corporate opportunities and similar items. Such determinations are in the sole discretion of our Board and our Board may at any time change or make exceptions to the relationship between CORE and Ramaco Resources. A decision to change, or make exceptions to, these arrangements could disadvantage one class of stockholder while advantaging the other.

Holders of a class of common stock may not have any remedies if any action by our directors or officers has an adverse effect on only that class of common stock.

Principles of applicable law and the provisions of our Amended Charter may protect decisions of our Board that have a disparate impact upon a particular class of common stock. Under applicable law, our Board has a duty to act with due care and in the best interests of all of our stockholders, regardless of the class of stock, or series, they hold. Principles of applicable law established in cases involving differing treatment of multiple classes or series of stock provide that a Board owes an equal duty to all stockholders and does not have separate or additional duties to any subset of stockholders. Judicial opinions in Delaware involving tracking stocks have established that decisions by directors or officers involving differing treatment of holders of tracking stocks may be judged under the business judgment rule. In some circumstances, our directors or officers may be required to make a decision that is viewed as adverse to the holders of a particular series of that stock. Under the principles of applicable law and the business judgment rule referred to above, the holders of Class B common stock may not be able to successfully challenge decisions that they believe have a disparate impact upon the stockholders of one of our classes if a majority of our Board is disinterested and independent with respect to the action taken, is adequately informed with respect to the action taken and acts in good faith and in the honest belief that our Board is acting in the best interest of the Company and all of our stockholders.

Stockholders will not vote on how to attribute consideration received in connection with a merger involving the Company among holders of Class A common stock and Class B common stock.

Our Amended Charter does not contain any provisions governing how consideration received in connection with a merger or consolidation involving the Company is to be to the holders of Class A common stock and Class B common stock, and none of the holders of Class A common stock and Class B common stock will have a separate class vote in the event of such a merger or consolidation. Consistent with applicable principles of applicable law, our Board will seek to divide the type and amount of consideration received in a merger or consolidation involving the Company among holders of Class A common stock and Class B common stock in a fair manner. As the different ways our Board may divide the consideration between holders of the different classes of stock might have materially different results, the consideration to be received by holders of Class B common stock in any such merger or consolidation may be materially less valuable than the consideration they would have received if they had a separate class vote on such merger or consolidation.

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We may dispose of assets of CORE without the approval of the Class B common stockholders.

Applicable law requires stockholder approval only for a sale or other disposition of all or substantially all of the assets of the Company taken as a whole, and our Amended Charter does not require a separate class vote in the case of a sale of a significant amount of assets attributed to any of our classes of common stock. As long as the assets attributed to a certain class of common stock proposed to be disposed of represent less than substantially all of our assets, we may approve sales and other dispositions of any amount of the assets of such class without any stockholder approval.

Our Board will decide, in its sole discretion, how to proceed and is not required to select the option that would result in the highest value to holders of any particular class of stock.

Holders of Class B common stock may receive less consideration upon a sale of the assets attributed to that class than if that class were a separate company.

If CORE was a separate, independent company and its shares were acquired by another person, certain costs of that sale, including corporate level taxes, might not be payable in connection with that acquisition. As a result, stockholders of a separate, independent company with the same assets might receive a greater amount of proceeds than the holders of Class B common stock would receive upon a sale of all or substantially all of the assets of CORE. In addition, we cannot assure the holders of Class B common stock that in the event of such a sale the per share consideration to be paid to holders of Class B common stock will be equal to or more than the per share value of that share of stock prior to or after the announcement of a sale of all or substantially all of the assets of CORE. Further, there is no requirement that the consideration paid be tax-free to the holders of Class B common stock. Accordingly, if we sell all or substantially all of the assets attributed to CORE, our Class B stockholders could suffer a loss in the value of their investment in our Class B common stock.

In the event of a liquidation of Ramaco Resources, holders of Class B common stock will not have a priority with respect to the assets attributed to CORE remaining for distribution to stockholders.

Under the Amended Charter, upon Ramaco Resources' liquidation, dissolution or winding up, holders of Class A common stock and Class B common stock will be entitled to receive, in respect of their shares of such stock, their proportionate interest in all of Ramaco Resources' assets, if any, remaining for distribution to holders of common stock in proportion to their respective number of shares. Hence, the assets to be distributed to a holder of either class of common stock upon a liquidation, dissolution or winding up of Ramaco Resources will have nothing to do with the value of the assets attributed to the class of common stock or to changes in the relative value of the Class B common stock over time.

Our Board may, in its sole discretion, elect to convert the Class B common stock to Class A common stock, thereby changing the nature of an investment in the Class B common stock and possibly diluting the economic interest in the Company of Class B common stock holders, which could result in a loss in value to such holders.

Our Amended Charter permits our Board, in its sole discretion, to convert all of the outstanding shares of Class B common stock into shares of Class A common stock based on an exchange ratio determined by a 20-day trailing VWAP for each class of stock. A conversion would preclude the holders of Class B common stock from retaining their investment in a security that is intended to reflect separately the performance of CORE. We cannot predict the impact on the market value of our stock of (1) our Board's ability to effect any such conversion or (2) the exercise of this conversion right by our Board. In addition, our Board may effect such a conversion at a time when the market value of our different stocks could cause the stockholders of one group to be disadvantaged.

Holders of Class A common stock and Class B common stock vote together and have limited separate voting rights.

Holders of Class A common stock and Class B common stock vote together as a single class, except in certain limited circumstances prescribed under applicable law. When holders of Class A common stock and Class B common stock vote together as a single class, holders having a majority of the votes will be in a position to control the outcome of

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the vote even if the matter involves a conflict of interest among our stockholders or has a greater impact on one class than another.

Transactions in Class B common stock by our insiders could depress the market price of those stocks.

Sales of, or hedging transactions such as collars relating to, shares of Class B common stock by any of our directors or executive officers, could cause a perception in the marketplace that the stock price of the Class B common stock has peaked or that adverse events or trends have occurred or may be occurring at the Company or with respect to the Class B common stock. This perception can result notwithstanding any personal financial motivation for these transactions. As a result, insider transactions could depress the market price for shares of the Class B common stock.

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Our capital structure, as well as the fact that CORE is not an independent company, may inhibit or prevent acquisition bids for CORE attributed to the Class B common stock and may make it difficult for a third party to acquire us, even if doing so may be beneficial to our stockholders.

If CORE were a separate independent company, any person interested in acquiring CORE without negotiating with management could seek control of that class by obtaining control of its outstanding voting stock, by means of a tender offer or a proxy contest. Although we intend Class B common stock to reflect the separate economic performance of CORE, it is not a separate entity, and a person interested in acquiring that class of common stock without negotiation with our management could obtain control of that class only by obtaining control of a majority in voting power of all of the outstanding voting shares of the Company. The existence of different classes of common stock could present complexities and in certain circumstances pose obstacles, financial and otherwise, to an acquiring person that are not present in companies that do not have a capital structure similar to ours.

Certain provisions of our Amended Charter and bylaws may discourage, delay, or prevent a change in control of the Company that a stockholder may consider favorable.

These provisions include:

- authorizing a capital structure with multiple classes of common stock: a Class A common stock and Class B common stock;
- classifying our Board with staggered three-year terms, which may lengthen the time required to gain control of our Board;
- prohibiting stockholder action by written consent, thereby requiring all stockholder actions to be taken at a meeting of the stockholders;
- limiting who may call special meetings of stockholders;
- establishing advance notice requirements for nominations of candidates for election to our Board or for proposing matters that can be acted upon by stockholders at stockholder meetings;
- requiring stockholder approval by holders of at least 66 2/3% of our aggregate voting power with respect to certain extraordinary matters, such as an amendment to our Amended Charter (excluding amendments to Section 4.1 thereof) or bylaws, and the approval by holders of at least 75% of our aggregate voting power for the removal of a director; and
- the existence of authorized and unissued stock, including “blank check” preferred stock, which could be issued by our Board to persons friendly to our then current management, thereby protecting the continuity of our management, or which could be used to dilute the stock ownership of persons seeking to obtain control of the Company.

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General Risk Factors

Changes in tax legislation could have an adverse impact on our cash tax liabilities, results of operations or financial condition.

Tax legislation enacted in 2017 reduced the U.S. corporate income tax rate from 35% to 21% and included certain other changes that resulted in a significant reduction of our income tax liability. Congress could, in the future, revise or repeal those changes or enact other tax law changes, such as the elimination of tax preferences currently available with respect to coal exploration and development and the percentage depletion allowance. For example, President Biden has proposed increasing the U.S. corporate income tax rate to 28%. We are unable to predict whether any such changes will ultimately be enacted, but any such changes could have a material impact on our cash tax liabilities, results of operations or financial condition.

Debt we incur in the future may limit our flexibility to obtain financing and to pursue other business opportunities.

Our future level of debt could have important consequences to us, including the following:

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- our ability to obtain additional financing, if necessary, for working capital, capital expenditures or other purposes may be impaired, or such financing may not be available on favorable terms;
- our funds available for operations and future business opportunities will be reduced by that portion of our cash flow required to make interest payments on our debt;
- our ability to pay dividends if an event of default occurs and is continuing or would occur as a result of paying such dividend;
- we may be more vulnerable to competitive pressures or a downturn in our business or the economy generally; and
- our flexibility in responding to changing business and economic conditions may be limited.

Our ability to service our debt will depend upon, among other things, our future financial and operating performance, which will be affected by prevailing economic conditions and financial, business, regulatory and other factors, some of which are beyond our control. If our operating results are not sufficient to service any future indebtedness, we will be forced to take actions such as reducing or delaying our business activities, investments or capital expenditures, selling assets or issuing equity. We may not be able to affect any of these actions on satisfactory terms or at all.

The terms of the indenture governing our Senior Notes and the agreements and instruments governing our other indebtedness, including the Credit Agreement, and surety bonding obligations impose restrictions that may limit our operating and financial flexibility.

The indenture governing our Senior Notes and the agreements governing our other indebtedness, including the Credit Agreement, and surety bonding obligations contain certain restrictions and covenants which restrict our ability to incur liens and/or debt or provide guarantees in respect of obligations of any other person and other restrictions, all of which could adversely affect our ability to operate our business, as well as significantly affect our liquidity, and therefore could adversely affect our results of operations.

These covenants limit, among other things, our ability to:

- incur additional indebtedness;
- pay dividends on or make distributions in respect of stock or make certain other restricted payments, such as share repurchases;
- make capital investments;
- enter into agreements that restrict distributions from certain subsidiaries;
- sell or otherwise dispose of assets;
- use for general purposes the cash received from certain allowable asset sales or disposals;

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- enter into transactions with affiliates;
- create or incur liens;
- merge, consolidate or sell all or substantially all of our assets; and
- receive dividends or other payments from subsidiaries in certain cases.

Our ability to comply with these covenants may be affected by events beyond our control and we may need to refinance existing debt in the future. A breach of any of the covenants under the indenture together with the expiration of any cure period, if applicable, could result in a default under our indenture. If any such default occurs, subject to applicable grace periods, the holders of our Senior Note may elect to declare all outstanding Senior Notes, together with accrued interest and other amounts payable thereunder, to be immediately due and payable. If the obligations under our Senior Notes were to be accelerated, our financial resources may be insufficient to repay the Senior Notes and any other indebtedness becoming due in full.

In addition, if we breach the covenants in the indenture governing the Senior Notes and do not cure such breach within the applicable time periods specified therein, we would cause an event of default under the indenture governing the Senior Notes and a cross-default to certain of our other indebtedness and the lenders or holders thereunder could accelerate their obligations. If our indebtedness is accelerated, we may not be able to repay our indebtedness or borrow sufficient funds to refinance it. Even if we are able to obtain new financing, it may not be on commercially reasonable terms or on terms that are acceptable to us. If our indebtedness is in default for any reason, our business,

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financial condition and results of operations could be materially and adversely affected. In addition, complying with these covenants may make it more difficult for us to successfully execute our business strategy and compete against companies who are not subject to such restrictions.

The number and quantity of viable financing and insurance alternatives available to us may be significantly impacted by unfavorable lending and investment policies by financial institutions and insurance companies associated with concerns about environmental impacts of coal combustion, and negative views around our efforts with respect to environmental and social matters and related governance considerations could harm the perception of our company by a significant number of investors or result in the exclusion of our securities from consideration by those investors.

Certain banks, other financing sources and insurance companies have taken actions to limit available financing and insurance coverage for the development of new coal-fueled power plants and coal producers and utilities that derive a majority of their revenue from coal, and particularly from thermal coal. This may adversely impact the future global demand for coal. Increasingly, the actions of such financial institutions and insurance companies are informed by non-standardized "sustainability" scores, ratings and benchmarking studies provided by various organizations that assess environmental, social and governance matters. Further, there have been efforts in recent years by members of the general financial and investment communities, including investment advisors, sovereign wealth funds, public pension funds, universities and other institutional investors, to divest themselves and to promote the divestment of securities issued by companies involved in the fossil fuel extraction market, or that have low ratings or scores in studies and assessments of the type noted above, including coal producers. These entities also have been pressuring lenders to limit financing available to such companies. These efforts may have adverse consequences, including, but not limited to:

- restricting our ability to access capital and financial markets in the future;
- reducing the demand and price for our equity securities;
- increasing the cost of borrowing;
- causing a decline in our credit ratings;
- reducing the availability, and/or increasing the cost of, third-party insurance;
- increasing our retention of risk through self-insurance;
- making it more difficult to obtain surety bonds, letters of credit, bank guarantees or other financing; and
- limiting our flexibility in business development activities such as mergers, acquisitions and divestitures.

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If securities or industry analysts adversely change their recommendations regarding our stock or if our operating results do not meet their expectations, our stock price could decline.

The trading market for our common stock could be influenced by the research and reports that industry or securities analysts may publish about us or our business. If one or more of these analysts cease coverage of our company or fail to publish reports on us regularly, we could lose visibility in the financial markets, which in turn could cause our stock price or trading volume to decline. Moreover, if one or more of the analysts who cover our company downgrade our stock or if our operating results do not meet their expectations, our stock price could decline.

Our ability to operate effectively could be impaired if we fail to attract and retain key personnel.

The loss of our senior executives could have a material adverse effect on our business. There may be a limited number of persons with the requisite experience and skills to serve in our senior management positions. We may not be able to locate or employ qualified executives on acceptable terms. In addition, as our business develops and expands, we believe that our future success will depend greatly on our continued ability to attract and retain highly skilled personnel with coal industry experience. We may not be able to continue to employ key personnel or attract and retain qualified personnel in the future. Our failure to retain or attract key personnel could have a material adverse effect on our ability to effectively operate our business.

We could fail to retain customers or gain new ones.

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The failure to obtain additional customers or the loss of all or a portion of the revenues attributable to any customer as a result of competition, creditworthiness, inability to negotiate extensions or replacement of contracts or otherwise, could have a material adverse effect on our business, financial condition, results of operations, cash flows and ability to pay dividends to our stockholders.

Terrorist attacks or cyber-incidents could result in information theft, data corruption, operational disruption and/or financial loss.

Like most companies, we have become increasingly dependent upon digital technologies, including information systems, infrastructure and cloud applications and services, to operate our businesses, process and record financial and operating data, communicate with our business partners, analyze mine and mining information, estimate quantities of coal reserves, as well as other activities related to our businesses. Strategic targets, such as energy-related assets, may be at greater risk of future terrorist or cyber-attacks than other targets in the United States. Deliberate attacks on, or security breaches in, our systems or infrastructure, or the systems or infrastructure of third parties, including systems that collect, organize, store or use personal data, or cloud-based applications could lead to corruption or loss of our proprietary data and potentially sensitive data, delays in production or delivery, difficulty in completing and settling transactions, challenges in maintaining our books and records, environmental damage, communication interruptions, other operational disruptions and third-party liability. Due to the nature of cyber-attacks, breaches to our or our service or equipment providers' systems could go unnoticed for a prolonged period of time. Our insurance may not protect us against such occurrences. Consequently, it is possible that any of these occurrences, or a combination of them, could have a material adverse effect on our business, reputation, financial condition, results of operations and cash flows. Further, as cyber incidents continue to evolve, we may be required to expend additional resources to continue to modify or enhance our protective measures or to investigate and remediate any vulnerability to cyber incidents.

Failure to adequately protect critical data and technology systems and the impact of data privacy regulation could materially affect us.

Information technology solution failures, network disruptions and breaches of data security could disrupt our operations by causing delays or canceling or impeding processing of transactions and reporting financial results, resulting in the unintentional disclosure of employee, royalty owner, or other third party or our confidential information, or damage to our reputation. There can be no assurance that a system failure or data security breach will not have a material adverse effect on our operations, financial condition, results of operations or cash flows. In addition, new laws and regulations governing data privacy and the unauthorized disclosure of confidential information pose increasingly

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complex compliance challenges and potentially elevate costs, and any failure to comply with these laws and regulations (or contractual provisions requiring similar compliance) could result in significant penalties and legal liability, require us to change our business practices, increase the costs and complexity of compliance, and adversely affect our business. As noted above, we are also subject to the possibility of cyber incidents or attacks, which themselves may result in a violation of these laws or may result in significant expense.

We may be subject to litigation, the disposition of which could negatively affect our profitability and cash flow in a particular period, or have a material adverse effect on our business, financial condition and results of operations

Our profitability or cash flow in a particular period could be affected by an adverse ruling in any litigation that may be filed against us in the future. In addition, such litigation could have a material adverse effect on our business, financial condition and results of operations. See "Part I, Item 3. Legal Proceedings."

Item 1B. Unresolved Staff Comments

None.

Item 1C. Cybersecurity

As discussed earlier under *General Risk Factors*, we have become increasingly dependent upon technology, including information systems as well as infrastructure and cloud applications and services. These technologies are used to operate our businesses, process and

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record financial and operating data, communicate with our business partners, analyze mining information, estimate quantities of coal reserves, and perform other activities related to our business.

Ramaco uses third parties to manage its information technology ("IT") infrastructure. The Company's process for assessing, identifying, and managing material cybersecurity risks includes the following activities, all of which are performed or assisted by third parties with considerable experience providing managed IT and security services or IT assurance services:

- Assessment of cybersecurity risks, using the National Institute of Standards and Technology Cybersecurity Framework as a guide, as part of the overall IT risk assessment performed annually;
- Network operations center monitoring to establish baseline metrics and assist with anomaly detection;
- Periodic vulnerability scanning;
- Configuration of firewall, antivirus, and malware protection as well as alert thresholds;
- Generation of system audit logs and recovery backups;
- Preparation of an incident response plan and assignment of team members;
- Logical access security reviews for applications and data protection; and
- Awareness training for employees on cybersecurity threats and safe practices.

The Company also uses applications hosted by a reputable third party that are critical to managing Ramaco's business and financial records. The process to oversee and identify cyber risks associated with the third-party service provider involves reviewing its annual System and Organization Controls 2 ("SOC 2"), Type 2 Report as well as conducting recurring status meetings with the third party.

The responsibility for managing and assessing material risks from cybersecurity threats lies with the Company's IT Steering Committee, which is made up of five members of senior management having legal or corporate finance backgrounds. The committee also includes one lead representative of the third-party IT management and security service providers utilized by the Company to mitigate cybersecurity risks as discussed above. The IT Steering Committee met at least on a quarterly basis during 2023 and intends to meet monthly going forward. Information regarding cybersecurity risks and mitigation efforts is reported periodically by the IT Steering Committee to the Company's chief executive officer, chief financial officer, and Audit Committee. The Audit Committee is primarily responsible for the Board of Directors' oversight of cybersecurity risks.

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We have not experienced any cybersecurity incidents to date that have materially affected, or are reasonably likely to materially affect, the Company's business strategy, results of operations, or financial condition. However, cybersecurity threats are constantly evolving, and we may not be successful in preventing or mitigating a cybersecurity incident despite our efforts to protect against such risks. A successful cyberattack could lead to theft of sensitive information, ransomware, destruction of data, or other issues causing financial, legal, or reputational damage. These events are reasonably likely to materially affect us, including our business strategy, results of operations, or financial condition, should they occur.

Item 2. Properties

Summary Overview of Mining Operations

Information concerning our mining properties in this Annual Report has been prepared in accordance with the requirements of subpart 1300 of Regulation S-K, which requires us to disclose our mineral resources, in addition to our mineral reserves, as of the end of our most recently completed fiscal year both in the aggregate and for each of our individually material mining properties.

As used in this Annual Report, the terms "mineral resource," "measured mineral resource," "indicated mineral resource," "inferred mineral resource," "mineral reserve," "proven mineral reserve" and "probable mineral reserve" are defined and used in accordance with subpart 1300 of Regulation S-K. Under subpart 1300 of Regulation S-K, mineral resources may not be classified as "mineral reserves" unless the determination has been made by a qualified person that the indicated and measured mineral resources can be the basis of an economically viable project. You are specifically cautioned not to assume that any part or all of the mineral resources will ever be converted into mineral reserves, as defined by the SEC. See "Item 1A "Risk Factors"

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You are cautioned that, except for that portion of mineral resources classified as mineral reserves, mineral resources do not have demonstrated economic value. Inferred mineral resources are estimates based on limited geological evidence and sampling and have a too high of a degree of uncertainty as to their existence to apply relevant technical and economic factors likely to influence the prospects of economic extraction in a manner useful for evaluation of economic viability. Estimates of inferred mineral resources may not be converted to a mineral reserve. It cannot be assumed that all or any part of an inferred mineral resource will ever be upgraded to a higher category. A significant amount of exploration must be completed in order to determine whether an inferred mineral resource may be upgraded to a higher category. Therefore, you are cautioned not to assume that all or any part of an inferred mineral resource exists, that it can be the basis of an economically viable project, or that it will ever be upgraded to a higher category. Likewise, you are cautioned not to assume that all or any part of measured or indicated mineral resources will ever be converted to mineral reserves. See “Item 1A “Risk Factors”

The information that follows relating to the Elk Creek Complex, Berwind Complex, and Knox Creek Complex is derived, for the most part, from, and in some instances is an extract from, the technical report summaries (“TRS”) relating to such properties prepared in compliance with the Item 601(b)(96) and subpart 1300 of Regulation S-K. Portions of the following information are based on assumptions, qualifications and procedures that are not fully described herein. Reference should be made to the full text of the TRS's, TRSs, incorporated herein by reference and made a part of this Annual Report.

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The following map Item 2 Properties, Figure 1 below shows the location of our mining properties and offices excluding our property near Sheridan, Wyoming, as of December 31, 2022 December 31, 2023:

Graphic

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At December 31, 2022 December 31, 2023, we had four five mining properties, as summarized in the table below (tons produced in 000s), excluding the Brook Mine property being used to support the Company's CORE initiatives: property:

	Location	Controlled Acres	Yrs	Stage	Clean Tons Produced 2020	Clean Tons Produced 2021	Clean Tons Produced 2022	Mine Type	Quality	Processing Facilities - Transportation
Elk Creek Complex	Logan, Wyoming, and Mingo Counties, WV	20,200	20+	Production	1,548	1,981	2,033	Underground, Highwall, Surface	High Volatile A, A/B, B	Elk Creek Preparation Plant - CSX RR, Truck
Berwind Complex	McDowell County, WV, Buchanan and Tazewell Counties, VA	62,500	20+	Production	147	180	416	Underground, Highwall, Surface	Low and Mid Volatile	Berwind Preparation Plant - Truck, Norfolk Southern RR
Knox Creek Complex	McDowell County, WV, Buchanan, Russell, and Tazewell Counties, VA	74,400	15	Production	—	45	235	Underground, Highwall, Surface	Mid and High Volatile A	Knox Creek Preparation Plant - Truck, Norfolk Southern RR
Maben Complex										
RAM Mine	Washington County, PA	1,567	10	Development	—	—	—	Underground	High Volatile C	Truck, Barge
Total		158,667			1,695	2,206	2,684			

	Location	Controlled Acres	Yrs	Stage	Clean Tons Produced 2021	Clean Tons Produ 20
Elk Creek Complex	Logan, Wyoming, and Mingo Counties, WV	20,200	20+	Production	1,981	2,
Berwind Complex	McDowell County, WV, Buchanan and Tazewell Counties, VA	62,500	20+	Production	180	4
Knox Creek Complex	McDowell County, WV, Buchanan, Russell, and Tazewell Counties, VA	64,050	15	Production	45	2
Maben Complex	Wyoming and Raleigh Counties, WV	28,000	18	Production	—	-
RAM Mine	Washington County, PA	1,567	n/a	Commercial Development or Other	—	-
Total		176,317			2,206	2,

At December 31, 2022 December 31, 2023, we owned or controlled, primarily through long-term leases, approximately 157,100 174,750 acres of coal in Virginia and West Virginia and 1,567 acres of coal in Pennsylvania. The aggregate annual production for our properties during the three most recently completed fiscal years are as follows: 3.2 million tons for fiscal year 2023, 2.7 million tons for fiscal year 2022, and 2.2 million tons for fiscal year 2021, and 1.7 million tons for fiscal year 2020. 2021. Our preparation plants and loadout facilities

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are located on properties owned by us or held under leases which expire at varying dates over the next 30 years. Most of the leases contain options to renew. Many of these leases provide for a royalty payment to the lessor based on a specific price per ton of coal extracted or as a percentage of coal sales revenue. We believe that all of our leases were entered into at market terms.

The Company leases office space in Lexington, Kentucky that serves as its executive headquarters. In addition, the Company owns office space in Charleston, West Virginia that serves as an operations center. The Company also owns offices in Sheridan, Wyoming as part of its CORE initiatives. Wyoming. See Item 1. “Business - Our Projects” for additional information about our mining operations and CORE initiatives.

We hold numerous environmental and mineral extraction permits, water rights and other permits, licenses and approvals from governmental authorities authorizing operations at each of our facilities. With respect to each facility at which we produce coal, permits, licenses and approvals are obtained as needed in the normal course of business based on our mine plans and federal, state, and local regulatory provisions regarding mine permitting and licensing. Based on our historical permitting experience, we expect to be able to continue to obtain necessary mining permits and approvals to support historical rates of production.

We are the operators of the mining and processing operations and the mining methods we use consist of surface, underground and highwall mining methods. The mining operations for the Elk Creek, Berwind, and Knox Creek complexes are material to our business and are further described below.

Elk Creek Complex

The Elk Creek Complex is located approximately 45 miles south of Charleston, West Virginia, in Logan, Wyoming, and Mingo Counties at N 37.698718, W 81.778297. 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 Region (the “CAPP Region”) of the United States.

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 Coal 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.

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 Elk Creek Complex is in the production stage and currently has six active mines, three planned and permitted mines, one permitted inactive mine, and one planned but not

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permitted mine. The five planned and/or permitted mines include two contour surface mine developing areas for 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 an 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, Upper Alma, Lower Alma, Powellton, Eagle, and No. 2 Gas seams, in descending stratigraphic order.

Currently, there are six active mines within the complex:

- Ram No. 1 Surface and Highwall Mine;

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- Stonecoal No. 2 Alma Deep Mine;
- Rockhouse Eagle Deep Mine;
- No. 2 Gas Deep Mine;
- Michael Powellton Deep Mine; and
- Crucible Deep Mine Lower Cedar Grove B and C seams. seams

There are three planned and permitted mines within the complex:

- Ram No. 3 Surface and Highwall Mine, scheduled for 2023 startup; 2024 startup
- Ram No. 2 Surface and Highwall Mine (which is the extension of Ram No. 1 above), scheduled for 2023 late 2024 startup; and
- Glenalum Glen Alum Tunnel #1 Deep Mine, scheduled for 2027 startup.

There is one are two permitted inactive mine. mines, the Eight-Kay Deep Mine that is projected to start in 2027 and as well as the Monarch Deep Mine that is scheduled to start in 2026. The Bens Creek Deep Mine is planned but is not yet permitted. The projected startup date for this mine is 2026. 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. With the exception of the Ram No. 3 mine, all planned mines are subject to future Board approval.

The current Elk Creek Complex Life-of-Mine (“LOM”) Plan projects mining through 2040; an expected mine life for the complex of 18 17 years. The Company projects total annual mine production to range from 2.1 to 2.3 million clean tons in 2023.

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All Run-of-Mine (“ROM”) coal is washed at the Elk Creek Preparation Plant. 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, with ROM processing capacity of 700 tons per hour. During 2022, we began work on a throughput upgrade at our Elk Creek Preparation plant. We expect this upgrade will raise completed the expansion in 2023, which raised the nameplate processing capacity to 1,150 1,050 raw tons per hour and our annual

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processing capacity from this complex to approximately 3.0 million three million tons per year. We expect that this upgrade will be completed in the second quarter of 2023.

In order to meet this increased capacity, we We also began development work on additional low-cost, high- volatile high-volatile underground and surface mines at Elk Creek. These mines began production during the second quarter of 2022 and are expected to reach reached full levels of productivity during 2023. Production is expected to increase increased at Elk Creek during 2023 commensurate with the increase in processing capacity discussed above.

The gross book value of the Elk Creek Complex property and its associated plant and equipment was $264 million $269 million as of December 31, 2022 December 31, 2023. The Elk Creek Complex utilizes industry standard, modern surface and underground mining equipment, processing equipment and infrastructure that is in good operating condition and capable of meeting planned production requirements using prudent operating methods and operating schedules.

The Elk Creek Complex produces a high quality, 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 coals, which represent approximately five percent of sales.

Volatiles refers to the volatile matter contained in the coal. Classification of coal as low, mid or high-volatile refers to the specific volatile content within the coal, with coals of 17% to 22% volatile matter being classified as low-volatile, 23% to 31% as mid volatile mid-volatile and 32% or greater as high-volatile. The volatile matter in coal impacts coke yield (i.e. the amount of coke and coke by-products produced per ton of coal charged). Low-volatile coal contains more carbon, but too much carbon can result in coke oven damage. Too much volatile matter results in less carbon and reduces the volume of coke produced. Therefore, coke producers use blends of high-volatile and low-volatile coals for coke production.

We are unaware of any significant encumbrances to the Elk Creek Complex, including current and future permitting requirements and associated timelines, permit conditions, and violations and fines.

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Berwind Complex

The Berwind Complex is located approximately 80 miles south of Charleston, West Virginia; 100 miles west of Roanoke, Virginia; 60 miles northeast of Kingsport, Tennessee; and 160 miles east/southeast of Lexington, Kentucky at N 37.164522, W 81.744893. The complex includes areas in Buchanan and Tazewell Counties, Virginia and McDowell County, West Virginia. The Berwind Complex is within the Southwestern Virginia and Southern West Virginia coal fields of the CAPP Region of the United States.

The Berwind Complex and surrounding area has have an extensive history of coal mining, primarily by underground mining methods. Mining within the Berwind/Knox Creek Complex likely began in the early-1900s and there have been many different mine operators both large and small in the region since then.

The Berwind Property consists of approximately 62,500 acres of leased coal holdings located in McDowell County, West Virginia and Buchanan and Tazewell Counties, Virginia. Ramaco obtained their its initial lease for this property in 2015 and commenced mine operations in 2017. The Berwind Complex is in the production stage and currently has three active mines, one mine that was idle at December 31, 2022 and subsequently reactivated in the first quarter of 2023, and one permitted mine. mines. The three mines that were active at December 31, 2022 include one contour surface mine developing areas for a highwall miner, and two December 31, 2023 are underground room and pillar mines, which use continuous miners for mine development.

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Ramaco started operations at the Berwind Pocahontas 4 Deep Mine in 2017 and idled the mine in mid-July 2022 due to an ignition that an investigation by the Mine Safety and Health Administration (MSHA) suggests was

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caused by lightning that struck a pilot hole for a new shaft. Production at the Berwind No. 1 Deep Mine restarted in the first quarter of 2023.

A majority of the underground mines implement retreat mining, which typically results in mining recovery of greater than 80 percent. Contour mining has an average mining recovery of approximately 90 percent, and the highwall mine has an average mining recovery of approximately 40 percent.

The Berwind Complex is mining several seams and seam splits, including the Pocahontas 6, Pocahontas 5, Pocahontas 4 and Pocahontas 3 seams, in descending stratigraphic order.

Active Mines:

- Laurel Fork Pocahontas 3 Deep Mine
- Triad No. 2 Deep Mine
- Triple S Surface and Highwall Mine

Idle Mine:

- Berwind No. 1 Pocahontas 4 Deep Mine (idle at December 31, 2022 but reactivated in the first quarter of 2023)

Permitted Mines:

- Squire Jim No. 1 Deep Mine, permitted but not planned for startup

The current Berwind Complex Life-of-Mine (LOM) Plan projects mining through 2049, an expected mine life for the complex of 27 20+ years. Ramaco projects total annual production to be approximately 0.9 million clean tons until another super-section is started in the Berwind No. 1 Deep Mine in 2027, and average 1.2 million clean tons per year through 2040 when the Berwind No. 1 Deep Mine is nearing end of mine life. After this, the single-section Laurel Fork Deep Mine is currently planned to operate into 2049 at an average annual rate of approximately 307 thousand clean tons per year. However, 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 Berwind Preparation Plant with no planned direct shipment coal. The Berwind Preparation Plant was initially built in 1955 and commissioned in 1957. Ramaco refurbished the preparation plant in 2021 and 2022 based on a design by Ramsey Industrial, with a current ROM processing capacity of 600 tons per hour.

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The gross book value of the Berwind Complex property and its associated plant and equipment is $148 million was $155 million as of December 31, 2022 December 31, 2023. The Berwind Complex utilizes industry standard, modern surface and underground mining equipment,

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processing equipment and infrastructure that is in good operating condition and capable of meeting planned production requirements using prudent operating methods and operating schedules.

The Berwind Complex produces high quality, high-quality, mid and low volatile low-volatile metallurgical coal. Historically, the market for metallurgical coal from the Berwind Complex has been for both domestic metallurgical coal consumers and the global seaborne metallurgical coal market.

We are unaware of any significant encumbrances to the Berwind Complex, including current and future permitting requirements and associated timelines, permit conditions, and violations and fines.

Knox Creek Complex

The Knox Creek Complex consists of two general properties or areas as follows:

- Big Creek Property; and
- Knox Creek Property

The Knox Creek Complex is located approximately 80 miles south of Charleston, West Virginia; 100 miles west of Roanoke, Virginia; 60 miles northeast of Kingsport, Tennessee; and 160 miles east/southeast of Lexington, Kentucky at N 37.164522, W 81.744893. The complex includes areas in Buchanan, Russell and Tazewell Counties, Virginia and McDowell County, West Virginia. The Knox Creek Complex is within the Southwestern Virginia and Southern West Virginia coal fields of the CAPP Region of the United States.

The Knox Creek Complex and surrounding area has have an extensive history of coal mining, primarily by underground mining methods. Mining within the Knox Creek Complex likely began in the early-1900s and there have been many different mine operators both large and small in the region since then.

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The Knox Creek Complex consists of approximately 74,400 64,050 acres of owned and leased coal holdings. Within the Knox Creek Complex controlled coal holdings, 9,250 5,370 acres lie in McDowell County, West Virginia. The Knox Creek Complex is in the production stage and currently has two active mines and two planned and permitted mines. There are no active or planned West Virginia mines currently within the Knox Creek Complex. The two active mines include one contour surface mine developing areas for a highwall miner, and one underground room and pillar mine, which uses continuous miners for mine development.

Ramaco began production of metallurgical coal at the complex in 2019. The underground mines will implement retreat mining, which typically results in mining recovery of 50 to 80 percent. At the surface mine, contour mining has an average mining recovery of approximately 90 percent, and highwall mining has an average mining recovery of approximately 40 percent.

The Knox Creek Complex is mining or plans to mine several seams and seam splits, including the Jawbone, Kennedy and Tiller seams.

Active Mines:

- Big Creek Jawbone No. 1 Deep Mine
- Big Creek Surface and Highwall Mine

Planned and Permitted Mines:

- Knox Creek Tiller Deep Mine, scheduled for 2024 2026 startup
- Kennedy No. 3 Deep Mine, scheduled for 2024 2026 startup

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The current Knox Creek Complex Life-of-Mine (LOM) Plan projects mining through 2037, an expected mine life for the complex of 15 years. It is anticipated that 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. Both planned mines listed above are subject to future Board approval.

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All Run-of-Mine (ROM) coal is washed at the Knox Creek Preparation Plant. The Knox Creek Preparation Plant, built in 1981 by Powell Construction Company located in Johnson City, Tennessee, is a well designed and constructed preparation plant, with ROM processing capacity of 750 tons per hour.

The gross book value of the Knox Creek Complex property and its associated plant and equipment is $31 million was $47 million as of December 31, 2022 December 31, 2023. The Knox Creek Complex utilizes industry standard, modern surface and underground mining equipment, processing equipment and infrastructure that is in good operating condition and capable of meeting planned production requirements using prudent operating methods and operating schedules.

The Knox Creek Complex produces high quality, high-quality, mid and high volatile high-volatile metallurgical coal. Historically, the market for metallurgical coal from the Knox Creek Complex has included both domestic metallurgical coal consumers and the global seaborne metallurgical coal market. The Knox Creek Complex also sporadically produces a minimal quantity of thermal coal from the surface mine from oxidized zones.

We are unaware of any significant encumbrances to the Knox Creek Complex, including current and future permitting requirements and associated timelines, permit conditions, and violations and fines.

Other Properties

Refer to the discussion of our *Maben Complex* and our *RAM Mine* under Item 1. “Business - Our Projects” for information about these properties, which are not included in the disclosures of mineral resources and reserves at December 31, 2023 to follow. Additional information regarding the acquisition of Maben can be found in Part II, Item 8, Note 4 of this report.

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Summary of Mineral Resources and Reserves

Summaries of our mineral resources and reserves at December 31, 2022 our material properties as of December 31, 2023, are set forth in Tables 1 and 2.

Table 1. Summary of Mineral Resources at the end of Fiscal Year ended December 31, 2022 December 31, 2023

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	Measured Mineral Resources			Indicated Mineral Resources			Measured + Indicated Mineral Resources			Inferred Mineral Resources			Measured Mineral Resources			Indicated Mineral Resources		
		Coal Quality (Dry Basis) Raw			Coal Quality (Dry Basis) Raw			Coal Quality (Dry Basis) Raw			Coal Quality (Dry Basis) Raw			Coal Quality (Dry Basis) Raw			Coal Quality (Dry Basis) Raw	
	Amount (000 Tons)	Ash (%)	Relative Density (Lbs./Cu.Ft.)	Amount (000 Tons)	Ash (%)	Relative Density (Lbs./Cu.Ft.)	Amount (000 Tons)	Ash (%)	Relative Density (Lbs./Cu.Ft.)	Amount (000 Tons)	Ash (%)	Relative Density (Lbs./Cu.Ft.)	Amount (000 Tons)	Ash (%)	Relative Density (Lbs./Cu.Ft.)	Amount (000 Tons)	Ash (%)	Relative Density (Lbs./Cu.Ft.)
Area																		
Berwind Complex	558,581	20.40	91.06	70,376	20.40	91.06	628,957	20.40	91.06	4,495	20.40	91.06	558,581	20.41	91.06	70,375	20.41	91.06
Knox Creek Complex																		
Big Creek Property	35,021	14.10	91.42	—	—	—	35,021	14.10	91.42	—	—	—	35,021	14.10	91.42	—	—	—
Knox Creek Property	258,795	13.50	87.76	6,765	13.50	87.76	265,560	13.50	87.76	—	—	—	234,093	13.62	87.77	6,580	13.62	87.77
Elk Creek Complex																		
Ram Surface	96,776	15.42	88.42	12,626	15.42	88.42	109,402	15.42	88.42	—	15.42	88.42	96,776	15.42	88.42	12,626	15.42	88.42
Crucible Deep	2,285	8.74	84.04	730	8.74	84.04	3,015	8.74	84.04	—	8.74	84.04	2,285	8.74	84.04	730	8.74	84.04
Stonecoal No. 2 Alma Deep Mine	19,928	14.32	86.83	3,041	14.32	86.83	22,969	14.32	86.83	—	14.32	86.83	19,928	14.32	86.83	3,041	14.32	86.83
Michael Powellton Mine	—	32.24	97.85	—	32.24	97.85	—	32.24	97.85	—	32.24	97.85						
Rockhouse Eagle Deep Mine	4,065	19.62	89.07	35	19.62	89.07	4,100	19.62	89.07	—	19.62	89.07	4,065	19.62	89.07	35	19.62	89.07
Moorfork Mine	2,390	15.49	82.24	360	15.49	82.24	2,750	15.49	82.24	—	15.49	82.24	2,390	15.49	82.24	360	15.49	82.24
Bens Creek Deep Mine	15,510	25.83	93.81	24,425	25.83	93.81	39,935	25.83	93.81	—	25.83	93.81	15,510	25.83	93.81	24,425	25.83	93.81
Lower War Eagle	4,965	21.76	90.64	2,870	21.76	90.64	7,835	21.76	90.64	70	21.76	90.64	4,965	21.76	90.64	2,870	21.76	90.64
Glenalum Tunnel #1 Deep Mine	9,295	4.80	81.13	10,855	4.80	81.13	20,150	4.80	81.13	815	4.80	81.13						
Glen Alum Tunnel #1 Deep Mine													9,295	4.80	81.13	10,855	4.80	81.13
Gilbert Deep Mine	2,085	23.56	92.66	2,565	23.56	92.66	4,650	23.56	92.66	85	23.56	92.66	2,085	23.56	92.66	2,565	23.56	92.66
RAM Mine	3,724	6.00	81.12	7,716	6.00	81.12	11,440	6.00	81.12	—	—	—						
Grand Total	**1,013,420**			**142,364**			**1,155,784**			**5,465**			**984,994**			**134,462**		

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Notes:

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- 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 is 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 primarily metallurgical low and mid-volatile coal at the Berwind Complex realizing a sales price of $169 per ton at a cash cost of $101 per clean ton (FOB Mine), primarily metallurgical mid and high-volatile at the Knox Creek Complex realizing a sales price of $184 per ton and cash cost of $99 per clean ton (FOB Mine), and primarily metallurgical high-volatile A and high-volatile B coal at the Elk Creek Complex 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.

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Table 2. Summary of Mineral Reserves at the end of Fiscal Year ended December 31, 2022 December 31, 2023

	Proven Mineral Reserves			Probable Mineral Reserves			Proven + Probable Mineral Reserves			Proven Mineral Reserves			Probable Mineral Reserves			Proven + Proba Reserv	
		Coal Quality (Dry Basis) Raw			Coal Quality (Dry Basis) Raw			Coal Quality (Dry Basis) Raw			Coal Quality (Dry Basis) Raw			Coal Quality (Dry Basis) Raw			Coal (Ba
	Amount (000 Tons)	Ash (%)	Relative Density (Lbs./Cu.Ft.)	Amount (000 Tons)	Ash (%)	Relative Density (Lbs./Cu.Ft.)	Amount (000 Tons)	Ash (%)	Relative Density (Lbs./Cu.Ft.)	Amount (000 Tons)	Ash (%)	Relative Density (Lbs./Cu.Ft.)	Amount (000 Tons)	Ash (%)	Relative Density (Lbs./Cu.Ft.)	Amount (000 Tons)	Ash (%)
Area																	
Berwind Complex																	
Berwind No. 1 Deep Mine	16,897	23.39	92.58	26	23.39	92.58	16,923	23.70	92.82	16,645	23.70	92.82	26	23.70	92.82	16,671	23.70
Laurel Fork Deep Mine	6,188	10.50	84.32	22	12.10	84.89	6,210	10.60	84.32	6,015	10.60	84.32	22	10.60	84.32	6,037	10.60
Triple S Highwall Mine	171	11.20	84.89	44	11.10	84.89	215	11.10	84.89	141	11.10	84.89	37	11.10	84.89	178	11.10
Triad No. 2 Deep Mine	259	39.50	102.58	—	—	—	259	39.50	102.58	129	40.10	103.02	—	—	—	129	40.10
Knox Creek Complex																	
Big Creek Surface and Highwall Mine	348	19.03	89.73	—	—	—	348	19.03	89.73	132	19.00	89.72	—	—	—	132	19.00
Big Creek Jawbone 1 Deep Mine	586	30.60	97.16	—	—	—	586	30.60	97.16	396	30.60	97.38	—	—	—	396	30.60
Knox Creek Tiller Deep Mine	6,362	16.10	88.05	—	—	—	6,362	16.10	88.05	6,362	16.10	88.05	—	—	—	6,362	16.10
Kennedy No. 3 Deep Mine	720	13.60	86.48	—	—	—	720	13.60	86.48	720	13.60	86.48	—	—	—	720	13.60
Elk Creek Complex																	

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Ram Surface and Highwall Mine	1,574	15.10	87.10	35	15.10	87.10	1,609	15.10	87.10	1,220	17.68	88.72	10	17.68	88.72	1,230	17.68
Ram Surface 3 and Highwall Mine	2,760	15.80	87.80	440	15.80	87.80	3,200	15.80	87.80	2,760	15.79	87.83	440	15.79	87.83	3,200	15.79
Crucible Deep	4,180	10.40	84.10	645	10.40	84.10	4,825	10.40	84.10	3,908	10.38	84.11	645	10.38	84.11	4,553	10.38
Stonecoal No. 2 Alma Deep Mine	4,893	23.80	84.60	290	23.80	84.60	5,183	23.80	84.60	4,535	24.32	88.49	60	24.32	88.49	4,595	24.32
Michael Powellton Mine	1,073	42.80	104.60	—	42.80	104.60	1,073	42.80	104.60	971	40.70	103.20	56	40.70	103.20	1,027	40.70
Rockhouse Eagle Deep Mine	1,728	16.30	87.80	495	16.30	87.80	2,223	16.30	87.80	1,426	15.79	87.45	495	15.79	87.45	1,921	15.79
No. 2 Gas Deep Mine	3,722	27.90	94.40	455	27.90	94.40	4,177	27.90	94.40	3,623	22.30	91.40	112	22.30	91.40	3,735	22.30
Eight-Kay	1,390	12.30	85.70	240	12.30	85.70	1,630	12.30	85.70	1,390	12.32	85.73	240	12.32	85.73	1,630	12.32
Bens Creek Deep Mine	1,670	28.60	95.80	170	28.60	95.80	1,840	28.60	95.80	1,670	28.56	95.84	170	28.56	95.84	1,840	28.56
Glenalum Tunnel #1 Deep Mine	2,380	5.90	81.80	2,190	5.90	81.80	4,570	5.90	81.80								
Glen Alum Tunnel #1 Deep Mine										2,380	5.94	81.78	2,190	5.94	81.78	4,570	5.94
Grand Total	**56,901**			**5,052**			**61,953**			**54,423**			**4,503**			**58,926**	

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 for the Berwind Complex are based primarily on metallurgical low and mid-volatile coal realizing a sales price of $169 per ton at a cash cost of $101 per clean ton (FOB Mine), primarily metallurgical mid and high-volatile coal at the Knox Creek Complex realizing a sales price of $184 per ton and cash cost of $99 per clean ton (FOB mine), and primarily a metallurgical high-volatile A and high-volatile B coal at the Elk Creek Complex 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.
- Mineral Reserves are reported exclusive of Mineral Resources.

Our coal resource and reserve estimates at December 31, 2022 December 31, 2023, were prepared by a qualified person ("QP") and have a basis in periodic, historical reserve studies completed by third-party geological engineering firms. Our coal resource and reserve estimates are based on data obtained from our drilling activities and other available geologic data. Acquisitions or sales of coal properties will change these estimates. Changes in mining methods or the utilization of new technologies may increase or decrease the recovery basis for a coal seam. The most recent studies of our coal reserves for the Elk Creek Complex, Berwind Complex, and Knox Creek Complex and RAM Mine were prepared by an independent engineering firm,

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Weir International, Inc. ("Weir"). In periods between third party updates, we update reserves utilizing our internal staff of engineers and geologists based upon on production data. We intend to continue to periodically retain outside experts to assist management with the verification of our estimates of our coal reserves going forward.

Weir prepared our reserve reporting in compliance with the Regulation S-K 1300 requirements. Weir initiated this process with us by completing a historical project review as well as its validation of our complete drill hole database. Weir validated that property control is accurately reflected in reserve modeling, verifying the latest property boundaries, including control by each individual seam. Weir also examined reserve boundaries to ensure agreement with mining parameters, such as minimum thickness, minimum yield and minimum inter-burden between seams. Resource classification is determined based on the expectation of our meeting these mining parameters. Weir also conducted mining integrity checks to ensure each reserve area is minable.

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In determining whether our reserves meet this standard, we take into account, among other things, our potential ability to obtain a mining permit, the possible necessity of revising a mining plan, changes in estimated future costs, changes in future cash flows caused by changes in costs required to be incurred to meet regulatory requirements and obtaining or renewing mining permits, variations in quantity and quality of coal, and varying levels of demand and their effects on selling prices. Further, the economic recoverability of our reserves is based on market conditions including contracted pricing, market pricing and overall demand for our coal. Thus, the actual value at which we no longer consider our reserves to be economically recoverable varies depending on the length of time in which the specific market conditions are expected to last. We consider our reserves to be economically recoverable at a price in excess of our cash costs to mine the coal and fund our ongoing replacement capital. The reserves in this Annual Report are classified by reliability or accuracy in decreasing order of geological assurance as Proven (Measured) and Probable (Indicated).

Summaries of the mineral resources and mineral reserves as of December 31, 2022 December 31, 2023 and December 31, 2021 December 31, 2022 are shown below. Weir served as the QP and prepared the estimates of mineral resources and mineral reserves at the Berwind Complex, Knox Creek Complex, and Elk Creek Complex. A copy of the QP's TRS with respect to the mineral resource and reserve estimates at the Berwind Complex, dated March 9, 2023, with an effective date of December 31, 2022 (the "Berwind TRS"), is filed as Exhibit 96.1, and at the Knox Creek Complex, dated March 9, 2023, with an effective date of December 31, 2022 ("Knox Creek TRS"), is filed as Exhibit 96.2. Since a material change has not occurred from the last TRS filed for the Elk Creek Complex, each complex, the previous year's TRS has years' TRSs have not been updated. Refer to Exhibit 96.3. 96.1, 96.2, and 96.3 for access to the previous TRS for the Berwind Complex, Knox Creek Complex, and Elk Creek Complex, respectively.

(in millions)	Year ended December 31, 2022		Year ended December 31, 2021		Year ended December 31, 2023		Year ended December 31, 2022	
	Measured + Indicated In-Place Resources	Proven + Probable Clean Recoverable Reserves	Measured + Indicated In-Place Resources	Proven + Probable Clean Recoverable Reserves	Measured + Indicated In-Place Resources	Proven + Probable Clean Recoverable Reserves	Measured + Indicated In-Place Resources	Proven + Probable Clean Recoverable Reserves
Area								
Berwind Complex	629	24	239	9	629	23	629	24
Knox Creek Complex	301	8	296	1	275	8	301	8
Elk Creek Complex	215	30	223	29	215	28	215	30
RAM Mine	11	—	11	—	—	—	11	—
Total	1,156	62	769	39	1,119	59	1,156	62

Estimates of coal reserves and resources are updated annually to reflect changes resulting from active mine production, mine plan modifications, property acquisitions/sales, impacts of additional exploration drilling, and any other changes that impact remaining coal reserve and resource tonnage.

The combined proven and probable reserves at the Berwind, Knox Creek and Elk Creek Complexes increased complexes decreased by 23 million three million tons driven by 14 million tons resulting from property acquisitions within the Berwind Complex as well as the conversion of mineral resources due to mineral reserves within the Knox Creek Complex. Similarly, measured 2023 production. Measured and indicated coal resources increased decreased by 387 million 37 million tons driven by 384 million during 2023, approximately 25 million tons resulting from were due to property acquisitions within control changes (assignment of coal leases) at the Berwind Complex. Knox Creek Complex and 11 million tons were due to the permit denial at the RAM mine and our decision not to pursue an appeal.

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Key assumptions and parameters relating to the mineral resources and mineral reserves are discussed in sections 11 and 12, respectively, of each TRS.

Exploration Target

Brook Mine is an exploration property that includes three drillhole programs involving a total of 123 new core drillholes. Specifically, targeting REEs has been completed within the current Brook Mine permit area. So far, the results of these drilling programs indicate elevated levels of REEs, along with significant concentrations of other critical elements such as Yttrium, Gallium, and Germanium. Work is ongoing to evaluate the potential exploitation of these minerals within the current Brook Mine permit area.

There has been insufficient exploration of the Brook Mine to estimate a mineral resource and it is unclear, at present, whether further exploration will result in the estimation of a mineral resource. The exploration target therefore does not represent, and should not be construed to be, an estimate of a mineral resource or mineral reserve as such terms are used in subpart 1300 of Regulation S-K.

Internal Controls

In our exploration and mineral resource and reserve estimation efforts, we utilize an a certified American National Standards Institute certified third-party laboratory, which has in-house quality control and assurance procedures. Once in possession of the samples, the laboratory 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 our 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.

Year-end reserve estimates are and will continue to be reviewed by our Chief Executive Officer and other senior management, and revisions are communicated to our board of directors. Inaccuracies in our estimates of our coal reserves could result in decreased profitability from lower than expected lower-than-expected revenue or higher than expected higher-than-expected costs. Actual production recovered from identified reserve areas and properties, and revenue and expenditures associated with our mining operations, may vary materially from estimates.

Item 3. Legal Proceedings

Due to the nature of our business, we may become, from time to time, involved in routine litigation or subject to disputes or claims related to our business activities. In the opinion of our management, there are no pending litigation, disputes or claims against us which, if decided adversely, will have a material adverse effect on our financial condition, cash flows or results of operations. For a description of our legal proceedings, see “Commitments and Contingencies,” Note 10 to the Notes to Consolidated Financial Statements.

Item 4. Mine Safety Disclosures

The information concerning mine safety violations or other regulatory matters required by Section 1503(a) of the Dodd-Frank Act and Item 104 of Regulation S-K is included in Exhibit 95.1 to this Annual Report.

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PART II

Item 5. Market for Registrant's Common Equity and Related Shareholder Matters

On June 12, 2023, an amendment to our amended and restated certificate of incorporation was approved by shareholder vote to reclassify the Company's existing common stock as shares of Class A common stock, par value $0.01 per share, and create a separate Class B common stock having a par value of $0.01 per share.

The initial distribution of Class B common stock occurred on June 21, 2023 via a stock dividend to existing holders of common stock as of May 12, 2023. On the date of initial distribution, each holder of common stock received 0.2 shares of Class B common stock for every one share of existing common stock held on the record date.

Market Information. Our Class A and Class B common stock is are listed on the NASDAQ Global Select Market under the symbol symbols "METC" and "METCB," respectively, and our Notes are listed on the NASDAQ Global Select Market under the symbol "METCL."

Holders. As of the close of business on February 28, 2023 February 29, 2024, there were eighty-four 87 holders of record of our Class A common stock and 76 holders of record of our Class B common stock. Because many of our common shares are held by brokers and other institutions on behalf of stockholders, we are unable to estimate the total number of stockholders represented by these holders of record.

Dividends. On December 8, 2022, In addition to the stock dividend discussed above, the Company announced that its board declared $27.5 million of directors total cash dividends during 2023, which includes $5.6 million under the Company's single class structure, $17.0 million to Class A shareholders, and $3.6 million to Class B shareholders as well as $1.2 million of forfeitable dividends subject to the vesting conditions of outstanding restricted stock units and performance stock units.

For holders of Class A common stock, including common stock reclassified to Class A common stock, cash dividends were declared a $0.1250 per common share cash dividend payable on March 15, 2023 to shareholders of record as of March 1, 2023, which represents a 10% increase quarterly in the amount of $0.125 per share with the exception of the final quarterly cash dividends paid dividend, which was declared in 2022 the amount of $0.1133 $0.1375 per common share. The Company anticipates paying declaring cash dividends on a quarterly basis at the newly approved amount; however, future declarations of dividends are subject to Board of Directors' approval and may be adjusted as business needs or market conditions change.

For holders of Class B common stock, cash dividends were declared in the amount of $0.165 per share and $0.249 per share in the third and fourth quarter, respectively. In addition, the Company declared another quarterly cash dividend in February 2024, subsequent to the date of the financial statements, in the amount of $0.242 per share of Class B common stock. All cash dividends declared to date for Class B common stock were based on 20% of CORE royalty and infrastructure fees for the previous quarter. The Company anticipates continuing to declare quarterly cash dividends based on 20% of CORE royalty and infrastructure fees; however, future declarations of dividends are subject to the sole discretion of the Company's Board of Directors. In addition, the Board of Directors retains the power to change or add expense allocation policies related to CORE, redefine CORE assets, and redetermine CORE's per-ton usage fees at any time without shareholder approval.

In regard to stock dividends, such as the initial non-cash distribution of Class B common stock discussed above, there are currently no plans to declare additional dividends payable in stock.

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Equity Compensation Plans. The Company does not have any non-stockholder approved equity compensation plans. Refer to Part II, Item 8, Note 9 for the Company's equity compensation plan information.

Stock repurchases. The Company routinely allows employees to surrender common stock to pay estimated taxes that would be issuable upon the vesting or exercise of stock-based compensation awards. awards to pay estimated taxes. The value of common stock tendered surrendered by employees is determined based on the price of the Company's common stock at the time of relinquishment. There were no other repurchases of common shares during the quarter or year ended December 31, 2022 December 31, 2023.

Item 6. [Reserved]

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Item 6. [Reserved]

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations

The following discussion is intended to assist you in understanding our results of operations and our present financial condition and contains forward-looking statements that reflect our future plans, estimates, beliefs and expected performance. The forward-looking statements are dependent upon events, risks and uncertainties that may be outside our control. We caution you that our actual results could differ materially from those discussed in these forward-looking statements. Factors that could cause or contribute to such differences are discussed elsewhere in this Annual Report, particularly in the "Cautionary Note Regarding Forward-Looking Statements" and "Risk Factors," all of which are difficult to predict. In light of these risks, uncertainties and assumptions, the forward-looking events discussed may not occur. We do not undertake any obligation to publicly update any forward-looking statements except as otherwise required by applicable law.

Overview

Our primary source of revenue is the sale of metallurgical coal. We are a pure play pure-play metallurgical coal company with 62 million 59 million reserve tons and 1,156 million 1,119 million measured and indicated resource tons of high-quality metallurgical coal reserves and resources, respectively. coal. Our plan is to continue development of our existing properties and grow annual production over the next few years to approximately 6.5 million seven million clean tons of metallurgical coal, subject to market conditions, permitting and additional capital deployment in the medium-term. We may make acquisitions of reserves or infrastructure that continue our focus on advantaged geology and lower costs.

During 2022, we sold 2.5 million tons of coal. Of this, 58% was sold in North American markets and 42% was sold in export markets, excluding Canada, principally to Europe, South America, Asia and Africa. The Company is responsible for rail and loadout costs for coal sold into export markets. During 2021, we sold 2.3 million tons of coal. Of this amount, 51% was sold in North American markets and 49% was sold in export markets, excluding Canada. We purchase coal from third parties for sale for our own account from time to time; however, sales of higher-margin Company produced coal made up 98% of total sales in both 2022 and 2021.

The overall outlook of the metallurgical coal business is dependent on a variety of factors such as pricing, regulatory uncertainties and global economic conditions. Coal consumption and production in the U.S. is driven by several market dynamics and trends including the U.S. and global economies, the U.S. dollar's strength relative to other currencies and accelerating production cuts. Coal In addition, blast furnace steelmaking is more prevalent outside the U.S. compared to domestic steel production, which creates demand for exports of metallurgical coal.

Although conflicts overseas continue and economic growth remains uncertain in some regions of the world, supply constraints continue to support the global metallurgical coal market overall. Ongoing bans on the import of Russian coal have affected the availability of supply to

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certain seaborne markets as well as contributed to volatility in prices.

Metallurgical coal benchmark prices soared increased significantly in early 2022, but then fell throughout the rest of the year. Market pricing for 2023 was generally down from 2022 levels but remains favorable versus long-term averages. We expect metallurgical coal prices to remain volatile in the near term. In addition, we anticipate that inflation may remain high in the near term for steel prices, freight rates, labor, and materials, which would continue to negatively affect our profitability.

Uncertainty related to COVID-19 continues to linger across the world. During 2023, we sold 3.5 million tons of coal. North American markets made up 33% of our 2023 revenues and export markets, excluding Canada, accounted for 67% of our 2023 revenues. The Company actively monitors is responsible for developments rail and may take further actions altering our business operations that loadout costs for coal sold into export markets. During 2022, we determine are in the best interests sold 2.5 million tons of coal. North American markets made up 58% of our employees, customers, suppliers, 2022 revenues and stakeholders, or as required by federal, state, or local authorities.

Regarding the military conflict involving Russia and Ukraine, resulting sanctions and future market or supply disruptions in the region, are impossible to predict, but could be significant and may have a severe adverse effect on the region. Globally, various governments have banned imports export markets, excluding Canada, accounted for 42% of our 2022 revenues. We purchase coal from Russia including commodities such as oil, natural gas and coal. These events have contributed to volatility in the commodity markets. This volatility, including market expectations of potential changes in coal prices and inflationary pressures on steel products, may have a significant effect on market prices and overall demand third parties for sale for our own account from time to time; however, sales of Company-produced coal made up 95% and the cost 98% of supplies total sales in 2023 and equipment. We are closely monitoring the potential effects on the market.

We have no meaningful direct financial exposure to Russia and Ukraine; however, the European Union ban on Russian coal has put upward pressure on international thermal coal prices. In addition, fear of economic contraction may affect future demand for coking coal. Values of certain indices for high quality thermal coal exceeded values of coking coal indices for part of 2022. Available coking coal may be directed into thermal markets when such conditions occur. 2022, respectively.

The annual contracting season with North American steel producers generally occurs in late-summer through the fall. As of December 31, 2022 December 31, 2023, we had entered into forward sales contracts with certain North American customers for 2023 on a fixed price basis for 1.2 million 1.4 million tons of coal at an average realizable price of $198/ $166 per ton, FOB mine. excluding freight. This

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level of pricing in 2023 is higher lower than the average price of $187 $198 per ton FOB mine that was obtained during the previous contracting season for North America. This is due to a combination of factors, including changes in demand, variations in the types of coal qualities being purchased, fluctuations in steel prices, and other macroeconomic trends. In addition, we anticipate a shift The Company shifted to

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more export sales in the Company's mix of revenues during 2023. 2023, which will likely continue into 2024. Export sales often contain index-based pricing and, therefore, could lead to greater volatility in pricing and revenues compared to 2022. revenues.

In 2023, our capital expenditures were $82.9 million, excluding capitalized interest of $1.1 million. In 2022, our capital expenditures were $123.0 million, excluding cash paid for the acquisitions of Ramaco Coal and Maben Coal assets which totaled $23.6 million as well as

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capitalized interest of $1.1 million. Our capital expenditures in 2021 were $29.5 million, excluding cash paid for the acquisition of the Amonate assets which totaled $30.1 million. The increase decrease in capital expenditures was due to continued investments in the Company's progress related to strategic growth projects at our Elk Creek and Berwind mining complexes. We expect to complete improvements completed the expansion of processing capacity at the Elk Creek preparation plant in the second quarter of 2023, which should result in now has an increase in annualized processing and shipping capacity from 2 million tons to 3 million of approximately three million tons per year. Production is also expected to increase at Elk Creek commensurate with the increase in processing capacity.

On July 10, 2022, we experienced a methane ignition at the Berwind No. 1 mine, which was one of the active mines at our Berwind mining complex. The other mines resumed production while the Berwind No. 1 mine was idled until a full investigation could be conducted. There were no personnel in the mine at the time of the incident and no injuries or fatalities occurred. The overall impact to pre-tax earnings in 2022 was immaterial except for idle mine costs of $9.5 million recognized during the year. The Company subsequently recognized other income of $8.1 million in 2023 related to insurance proceeds received for the event. Production from the Berwind No. 1 mine restarted in the first quarter of 2023. The Company expects the mine to achieve regular levels of production by the third quarter of 2023.

The As a result of the increase in capacity at the Elk Creek plant, and the re-opening of the Berwind No. 1 mine as described above, as well as and the expected start of production at the Maben mine are expected during 2023, the Company was producing just under an annualized four million tons per year run rate at the later part of 2023. The Company expects to increase production produce between 4.0 million and earnings starting 4.4 million tons in 2024 depending on market conditions.

On June 21, 2023, the Company distributed Class B common stock, a tracking stock, to provide existing holders of the Company's common stock an opportunity to participate directly in the financial performance of the Company's CORE assets on a stand-alone basis, separate from the Company's metallurgical coal operations. CORE assets were acquired initially by the Company as part of the Company's acquisition of Ramaco Coal in the second quarter of 2023. We expect 2022. The financial performance of CORE assets consists of the following non-cost-bearing revenue streams based on the Company's current expectations:

- Royalty fees derived from the royalties associated with the Ramaco Coal and Amonate reserves, which we believe approximates 3% of Company-produced coal sales revenue excluding coal sales revenue from Knox Creek,
- Infrastructure fees based on $5.00 per ton of coal processed at our preparation plants and $2.50 per ton of loaded coal at the Company's rail load-out facilities, and
- Future income derived, if and when realized, from advanced carbon products and rare earth elements initiatives.

The Company anticipates paying a quarterly cash dividend equal to be producing 20% of the total fees above; however, any dividend amounts declared and paid are subject to the sole discretion of the Company's Board of Directors. Dividends paid on the tracking stock allow the Company to return to Class B common stockholders a portion of the savings from royalties and infrastructure usage fees resulting from the acquisition of Ramaco Coal. In addition, the tracking stock provides an annualized four million ton per year run rate by opportunity for Class B common stockholders to participate directly in the potential revenue growth associated with the development of carbon products and rare earth elements. The Company paid cash dividends on Class B common stock during the third and fourth quarter of 2023.

Separate financial statements for CORE have not been included as exhibits to this filing since CORE's financial performance and dividends will be evaluated based on non-cost-bearing revenue streams, at least initially, and other potential forms of passive income rather than reduced by allocated costs and expenses.

The Company continues to assess its potential REEs deposit in Wyoming. To date, the results of drilling programs indicate elevated levels of REEs, along with significant concentrations of other critical elements such as Yttrium, Gallium, and Germanium. The exploration target does not represent, and should not be construed to be, a mineral resource or mineral reserve as such terms are used in subpart 1300 of Regulation S-K. The Company also continues its work to advance new carbon product technologies with the goal of commercializing products that use coal in both an improved economic and environmental manner.

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Results of Operations

	Years ended December 31,			Years ended December 31,		
(In thousands)	**2022**	**2021**	**2020**			
(In thousands, except per share amounts)				**2023**	**2022**	**2021**
Revenue	$ 565,688	$ 283,394	$ 168,915	$693,524	$565,688	$283,394
Costs and expenses						
Cost of sales (exclusive of items shown separately below)	332,960	195,412	145,503	493,793	332,960	195,412
Asset retirement obligations accretion	1,115	615	570	1,403	1,115	615
Depreciation, depletion, and amortization	41,194	26,205	20,912	54,252	41,194	26,205
Selling, general and administrative expenses	40,032	21,629	21,023	48,831	40,032	21,629
Total costs and expenses	415,301	243,861	188,008	598,279	415,301	243,861
Operating income (loss)	150,387	39,533	(19,093)			
Operating income				95,245	150,387	39,533
Other income (expense), net	2,637	7,429	11,926	18,321	2,637	7,429
Interest expense, net	(6,829)	(2,556)	(1,224)	(8,903)	(6,829)	(2,556)
Income (loss) before tax	146,195	44,406	(8,391)			
Income before tax				104,663	146,195	44,406
Income tax expense (benefit)	30,153	4,647	(3,484)			
Income tax expense				22,350	30,153	4,647
Net income (loss)	$ 116,042	$ 39,759	$ (4,907)			
Net income				$ 82,313	$116,042	$ 39,759
Earnings (loss) per common share						
Basic	$ 2.63	$ 0.90	$ (0.12)			
Diluted	$ 2.60	$ 0.90	$ (0.12)			
Earnings per common share						
Basic - Single class (through 6/20/2023)				$ 0.71	$ 2.63	$ 0.90
Basic - Class A (6/21/2023 - 12/31/2023)				$ 1.06	$ —	$ —
Total				$ 1.77	$ 2.63	$ 0.90
Basic - Class B (6/21/2023 - 12/31/2023)				$ 0.42	$ —	$ —
Diluted - Single class (through 6/20/23)				$ 0.70	$ 2.60	$ 0.90
Diluted - Class A (6/21/2023 - 12/31/2023)				$ 1.03	$ —	$ —
Total				$ 1.73	$ 2.60	$ 0.90
Diluted - Class B (6/21/2023 - 12/31/2023)				$ 0.40	$ —	$ —
Adjusted EBITDA	$ 204,555	$ 79,042	$ 18,455	$182,126	$204,555	$ 79,042

Net income and Adjusted EBITDA were significantly higher lower in 2023 compared to 2021, which was driven by higher 2022, despite the increase in sales volume, due to lower sales pricing and higher cost per ton sold in 2022. 2023. Net income and Adjusted EBITDA for 2023 benefitted from $15.9 million of pre-tax income for proceeds received from insurance claims related to the 2022 Berwind ignition event and 2018 silo failure. Refer to *Non-GAAP Financial Measures* below for an explanation of the Company's calculation of Adjusted EBITDA.

Year Ended December 31, 2022 December 31, 2023 compared to Year Ended December 31, 2021 December 31, 2022

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Revenue. Our revenue includes sales to customers of Company produced Company-produced coal as well as smaller amounts of coal purchased from third parties. We include amounts billed by us for transportation to our customers within revenue and transportation costs incurred within cost of sales.

For the year ended December 31, 2022, we had revenue of $565.7 million from the sale of 2.45 million tons of coal including 0.05 million tons of purchased coal. During 2021, we sold 2.29 million tons of coal including 0.05 million tons of purchased coal for total revenue of $283.4 million.

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For the year ended December 31, 2023, we had revenue of $693.5 million from the sale of 3.5 million tons of coal. During 2022, we sold 2.5 million tons of coal for total revenue of $565.7 million.

Coal sales information is summarized as follows: below:

(In thousands)	Year ended December 31, 2022	2021	Increase	Year ended December 31, 2023	2022	Increase
Revenue:						
Company Produced						
Coal sales revenue	$ 553,830	$ 276,725	$ 277,105	$657,090	$553,830	$103,260
Tons sold	2,396	2,239	157	3,299	2,396	903
Company-produced revenue per ton sold (GAAP)				$ 199	$ 231	$ (32)
Purchased from Third Parties						
Coal sales revenue	$ 11,858	$ 6,669	$ 5,189	$ 36,434	$ 11,858	$ 24,576
Tons sold	54	47	7	156	54	102
Purchased coal revenue per ton sold (GAAP)				$ 234	$ 220	$ 14
Totals						
Coal sales revenue	$ 565,688	$ 283,394	$ 282,294	$693,524	$565,688	$127,836
Tons sold	2,450	2,286	164	3,455	2,450	1,005
Total revenue per ton sold (GAAP)				$ 201	$ 231	$ (30)
Cost of Sales:						
Company Produced						
Cost of sales				$468,992	$323,550	$145,442
Tons sold				3,299	2,396	903
Company-produced cost of sales per ton sold (GAAP)				$ 142	$ 135	$ 7
Purchased from Third Parties						
Cost of sales				$ 24,801	$ 9,410	$ 15,391
Tons sold				156	54	102
Purchased coal cost of sales per ton sold (GAAP)				$ 159	$ 174	$ (15)
Totals						
Cost of sales				$493,793	$332,960	$160,833
Tons sold				3,455	2,450	1,005
Total cost of sales per ton sold (GAAP)				$ 143	$ 136	$ 7

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Refer to Non-GAAP Financial Measures for supplemental calculations of revenue per ton sold (FOB mine) and cash cost per ton sold (FOB mine)

Coal sales revenue for 2022 2023 increased nearly 100% 23% from 2021, 2022, which was driven by improved fixed pricing for domestic the 41% increase in tons sold. The increase in sales volume was due to greater export sales and favorable spot/index pricing was aided by the Company's increased capacity for export sales in 2022. production achieved during 2023. Revenue per ton sold increased 86% decreased 13% from $124/ $231 per ton in 2021 2022 to $231/ $201 per ton in 2022. 2023. Revenue per ton sold (FOB mine), a non-GAAP measure which excludes transportation revenues increased 91% and demurrage, decreased 18% from $109/ $207 per ton in 2021 2022 to $207/ $170 per ton in 2022. In addition, we 2023 including company-produced coal and purchased coal. The decrease in both revenue per ton sold 0.2 million more tons of coal measures in 2022 compared to 2021 despite rail-related constraints occurring 2023 was driven by the variability in 2022. index-based pricing for export sales.

Refer to Note 2—Summary of Significant Accounting Policies—Concentrations and Note 11—Revenues in Item 8, Part II for additional information regarding sales to customers.

Cost of sales. Our cost of sales totaled $333.0 million for increased 48% from 2022, as compared to $195.4 million for 2021. The 70% increase versus the prior year which was driven primarily by inflationary pressures on labor and supplies. Total the increase in tons sold discussed above. Cost of sales per ton sold increased 5% from $136 per ton in 2022 to $143 per ton in 2023. Cash cost per ton sold increased 59% from $85/ton in 2021 to $136/ton in 2022. Total *cash* cost per ton sold *(FOB (FOB mine)*, a non-GAAP measure which excludes transportation costs and idle mine costs, related to the Berwind ignition event, increased 54% 3% from $70/ $108 per ton in 2021 2022 to $108/ $111 per ton in 2022. 2023, including company-produced coal and purchased coal. The increase in both cost per ton sold measures in 2023 was primarily due to inflationary pressures on labor and supplies.

Table of sales for coal we purchased from third parties was $9.4 million in 2022 compared to $5.4 million in 2021. Contents

Asset retirement obligation accretion. ARO accretion was $1.4 million for 2023 and $1.1 million for 2022 and $0.6 million for 2021. 2022. The higher level of accretion in 2022 2023 was driven primarily by AROs assumed as part changes in estimates of the acquisition of Amonate assets in December 2021. future cash flows.

Depreciation, depletion, and amortization. Depreciation, of our plant depletion, and equipment amortization expense totaled $24.1 million for the year ended December 31, 2022 as $54.3 million in 2023 compared with $17.9 million for the previous year. Higher depreciation expense for 2022 was principally due to the $41.2 million in 2022. The increase in deployment of additional mining equipment. Amortization and depletion of capitalized mine development costs and mineral rights totaled $12.2 million in 2022 as compared 2023 occurred across all asset classes consistent with the Company's initiative to $7.2 million for the previous year. Higher amortization and depletion expense for 2022 was driven by higher production volumes. Amortization of right of use assets related to equipment finance leases totaled $4.8 million in 2022 as compared to $1.1 million in the previous year. The higher amortization for 2022 was due to new equipment finance leases. grow production.

Selling, general and administrative expenses. Selling, general and administrative expenses were $48.8 million for 2023 compared to $40.0 million for 2022. The 22% increase in 2023 was primarily due to greater compensation-related expenses and headcount as well as increased spending for professional services consistent with the year ended December 31, 2022 compared to $21.6 million for 2021. This increase reflects the Company's growth of our organization including higher stock compensation expense, incentives, and professional services. efforts.

Other income (expense), net. Other income, net was $18.3 million in 2023 compared to $2.6 million in 2022. The activity in 2023 was related mostly to insurance proceeds received in 2023 related to the 2022 Berwind ignition event that occurred in 2022 and the silo failure that occurred in 2018. The Company received proceeds of $17.0 million during 2023 and had accrued a recovery asset of $1.1 million in the previous period; thus, a gain of $15.9 million was recognized in 2023. This activity is not indicative of expected future results. The activity in 2022 was driven by the gain of $2.1 million recognized on the sale of mineral rights. For 2021, other income, net was $7.4 million principally

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due to the recognition of $5.4 million associated with the Coronavirus Aid, Relief and Economic Security Act (the "CARES Act") Employee Retention Tax Credit.

Interest expense, net. Interest expense, net was approximately $6.8 million $8.9 million in 2022 2023 as compared to $2.6 million $6.8 million in 2021. 2022. The increase in net interest expense in 2022 2023 was primarily due to debt incurred to finance acquisitions in 2022 as well as increased use of the issuance of Senior Notes in July 2021. revolving credit facility during 2023.

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Income tax expense. We recognized income tax expense of $22.4 million and $30.2 million in 2023 and $4.6 million 2022, respectively. The lower amount in 2022 and 2021, respectively. Income tax expense 2023 was largely due to the decrease in income before taxes. Refer to Note 13 to the Consolidated Financial Statements included in Item 8 of Part I in this Annual Report on Form 10-K for 2022 includes a $1.5 million benefit for stock-based compensation and a $0.5 million benefit related to state tax rate changes. Income tax expense for 2021 includes a $2.3 million benefit associated with changes in state income tax regulations for Virginia and West Virginia and a $0.2 million benefit for stock-based compensation. Excluding these discrete items, our effective tax rate was 22% for 2022 and 16% for 2021. The primary difference from an explanation of differences versus the statutory rate of 21% is related to permanent differences for state income taxes, non-deductible expenses (including limitations on compensation), and the difference in depletion expense between generally accepted accounting principles in the U.S.("U.S. GAAP") and federal income tax purposes. .

Year Ended December 31, 2021 December 31, 2022 compared to Year Ended December 31, 2020 December 31, 2021

Please see Part I, Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations" in our 2021 2022 Annual Report on Form 10-K for a discussion of the results of operation for the year ended December 31, 2021 December 31, 2022 as compared to the year ended December 31, 2020. December 31, 2021.

Non-GAAP Financial Measures

Adjusted EBITDA. Adjusted EBITDA is used as a supplemental non-GAAP financial measure by management and external users of our financial statements, such as industry analysts, investors, lenders and rating agencies. We believe Adjusted EBITDA is useful because it allows us to more effectively evaluate our operating performance.

We define Adjusted EBITDA as net income plus net interest expense; stock-based compensation; depreciation, depletion, and amortization expenses; income taxes; certain non-operating expenses (charitable contributions); and accretion of asset retirement obligations. A reconciliation of net income to Adjusted EBITDA is included below.

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Adjusted EBITDA is not intended to serve as a substitute to U.S. GAAP measures of performance and may not be comparable to similarly-titled measures presented by other companies.

(In thousands)	Years ended December 31, 2022	2021	2020	Years ended December 31, 2023	2022	2021
Reconciliation of Net Income to Adjusted EBITDA						
Net income (loss)	$ 116,042	$ 39,759	$ (4,907)			

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Net income				$ 82,313	$116,042	$39,759
Depreciation, depletion, and amortization	41,194	26,205	20,912	54,252	41,194	26,205
Interest expense, net	6,829	2,556	1,224	8,903	6,829	2,556
Income tax expense (benefit)	30,153	4,647	(3,484)			
Income tax expense				22,350	30,153	4,647
EBITDA	194,218	73,167	13,745	167,818	194,218	73,167
Stock-based compensation	8,222	5,260	4,140	12,905	8,222	5,260
Other non-operating expenses	1,000	—	—	—	1,000	—
Accretion of asset retirement obligation	1,115	615	570	1,403	1,115	615
Adjusted EBITDA	$ 204,555	$ 79,042	$ 18,455	$182,126	$204,555	$79,042

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Non-GAAP revenue per ton. ton sold. Non-GAAP revenue per ton sold (FOB mine) is calculated as coal sales revenue less transportation costs, revenues and demurrage, divided by tons sold. We believe revenue per ton (FOB mine) provides useful information to investors as it enables investors to compare revenue per ton we generate against similar measures made by other publicly-traded coal companies and more effectively monitor changes in coal prices from period to period excluding the impact of transportation costs which are beyond our control. The adjustments made to arrive at these measures are significant in understanding and assessing our financial performance. Revenue per ton sold (FOB mine) is not a measure of financial performance in accordance with U.S. GAAP and, therefore, should not be considered as a substitute to revenue under U.S. GAAP.

	Year ended December 31, 2022			Year ended December 31, 2021			Year ended December 31, 2023			Year ended December 31, 2022		
(In thousands, except per ton amounts)	Company Produced	Purchased Coal	Total	Company Produced	Purchased Coal	Total	Company Produced	Purchased Coal	Total	Company Produced	Purchased Coal	Total
Revenue	$553,830	$ 11,858	$565,688	$276,725	$ 6,669	$283,394	$ 657,090	$ 36,434	$ 693,524	$553,830	$ 11,858	$565,688
Less: Adjustments to reconcile to Non-GAAP revenue (FOB mine)												
Transportation costs	(57,299)	(813)	(58,112)	(33,922)	(1,225)	(35,147)						
Transportation							(100,174)	(4,723)	(104,897)	(57,299)	(813)	(58,112)
Non-GAAP revenue (FOB mine)	$496,531	$ 11,045	$507,576	$242,803	$ 5,444	$248,247	$ 556,916	$ 31,711	$ 588,627	$496,531	$ 11,045	$507,576
Tons sold	2,396	54	2,450	2,239	47	2,286	3,299	156	3,455	2,396	54	2,450
Revenue per ton sold (FOB mine)	$ 207	$ 203	$ 207	$ 108	$ 116	$ 109						

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Non-GAAP revenue per ton sold (FOB mine)	$ 169	$ 203	$ 170	$ 207	$ 203	$ 207

Refer to coal sales information for revenue per ton sold (GAAP) calculations

Non-GAAP cash cost per ton sold. Non-GAAP cash cost per ton sold (FOB mine) is calculated as cash cost of sales less transportation costs and idle mine costs, divided by tons sold. We believe cash cost per ton sold provides useful information to investors as it enables investors to compare our cash cost per ton against similar measures made by other publicly-traded coal companies and more effectively monitor changes in coal cost from period to period excluding the impact of transportation costs which are beyond our control. The adjustments made to arrive at these measures are significant in understanding and assessing our financial performance. Cash cost per ton sold (FOB mine) is not a measure of financial performance in accordance with U.S. GAAP and, therefore, should not be considered as a substitute to cost of sales under U.S. GAAP.

	Year ended December 31, 2022			Year ended December 31, 2021		
(In thousands, except per ton amounts)	Company Produced	Purchased Coal	Total	Company Produced	Purchased Coal	Total
Cost of sales	$ 323,550	$ 9,410	$ 332,960	$ 190,056	$ 5,356	$ 195,412
Less: Adjustments to reconcile to Non-GAAP cash cost of sales						
Transportation costs	(57,300)	(813)	(58,113)	(33,934)	(1,225)	(35,159)
Idle mine costs	(9,474)	—	(9,474)	—	—	—
Non-GAAP cash cost of sales	$ 256,776	$ 8,597	$ 265,373	$ 156,122	$ 4,131	$ 160,253
Tons sold	2,396	54	2,450	2,239	47	2,286
Cash cost per ton sold	$ 107	$ 158	$ 108	$ 70	$ 88	$ 70

2023

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	Year ended December 31, 2023			Year ended December 31, 2022		
(In thousands, except per ton amounts)	Company Produced	Purchased Coal	Total	Company Produced	Purchased Coal	Total
Cost of sales	$ 468,992	$ 24,801	$ 493,793	$ 323,550	$ 9,410	$ 332,960
Less: Adjustments to reconcile to Non-GAAP cash cost of sales						
Transportation costs	(101,564)	(4,175)	(105,739)	(57,300)	(813)	(58,113)
Idle mine costs	(3,978)	—	(3,978)	(9,474)	—	(9,474)

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Non-GAAP cash cost of sales	$ 363,450	$ 20,626	$ 384,076	$ 256,776	$ 8,597	$ 265,373
Tons sold	3,299	156	3,455	2,396	54	2,450
Non-GAAP cash cost per ton sold (FOB mine)	$ 110	$ 132	$ 111	$ 107	$ 158	$ 108

Refer to coal sales information for cost per ton sold (GAAP) calculations

2024 Sales Commitments

As of December 31, 2022 December 31, 2023, we had entered into forward sales contracts for approximately 1.5 million 1.4 million tons to North American customers at an average fixed price of $202/ $166 per ton, excluding freight, as well as roughly 0.7 million 2.1 million additional tons to export customers priced against various benchmark indices. These volumes were mostly metallurgical quality coal. The Company expects to satisfy approximately 88% of these commitments in 2024 and the remainder in 2025. Sales commitments of another 0.4 million tons were obtained subsequent to December 31, 2022.

December 31, 2023 for delivery in 2024. We anticipate a expect the shift to more export sales in the Company's mix of revenue that occurred in 2023 to continue during 2023 compared to 2022, 2024, which may lead to greater volatility in revenues due to index-based pricing.

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Liquidity and Capital Resources

Our primary source of cash is proceeds from the sale of our coal production to customers. Our primary uses of cash include the cash costs of coal production, capital expenditures, acquisitions, royalty payments, and other operating expenditures.

Cash flow information is as follows:

	Years ended December 31,			Years ended December 31,		
(In thousands)	2022	2021	2020	2023	2022	2021
Consolidated statement of cash flow data:						
Cash flows provided by operating activities	$ 187,870	$ 53,340	$ 13,312	$161,036	$ 187,870	$ 53,340
Cash flows used for investing activities	(145,708)	(59,613)	(24,753)	(72,211)	(145,708)	(59,613)
Cash flows (used for) provided by financing activities	(28,495)	22,369	11,286	(82,517)	(28,495)	22,369
Net change in cash and cash equivalents and restricted cash	$ 13,667	$ 16,096	$ (155)	$ 6,308	$ 13,667	$ 16,096

Cash flows provided by operating activities during 2022 increased $134.5 million 2023 decreased $26.8 million versus the prior year driven by lower cash earnings. Changes in operating assets and liabilities were favorable versus the prior year due to a variety of factors, most notably, variations in income tax payments as the Company received an $11.8 million refund in 2023.

Net cash used for investing activities during 2023 decreased $73.5 million versus the prior year primarily due to higher cash earnings. Changes lower capital expenditures and acquisition-related activity of $40.1 million and $22.2 million, respectively. The decrease in working capital were also favorable versus the prior year as accounts payable increased in 2022 and accounts receivable decreased slightly in 2022 despite the large increase in revenues. These changes were offset partially by the increase in inventories in 2022, which expenditures was driven by logistical and rail challenges experienced during 2022. The Company expects a meaningful decline in inventories in 2023 from sales of 2022 carryover tonnage and the increase in processing capacity at the Elk Creek preparation plant discussed earlier.

Net cash used for investing activities increased $86.1 million versus the prior year primarily due to $93.5 million of increased capital expenditures, or $94.6 million including the effect of capitalized interest, driven by Company's progress related to strategic growth projects at the our Elk Creek and Berwind mining complexes to increase capacity and accommodate higher production levels. complexes. The strategic

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acquisitions of Maben Coal and Ramaco Coal, and Maben Coal assets as well as the concurrent sale of mineral rights, took place in 2022 are largely being paid for by and no such transactions occurred in 2023. In addition, the Company over time received $11.2 million of insurance proceeds during 2023 related to property, plant, and therefore, are included in equipment claims from the discussion 2022 Berwind ignition event and 2018 silo failure.

Table of *Indebtedness* below. Contents

Net cash used for financing activities was $28.5 million $54.0 million higher in 2023 versus 2022, which was driven by $20.0 million greater repayment of debts and similar financings including $25.0 million and $9.6 million related to the Ramaco Coal and Maben Coal asset acquisitions, respectively. In addition, the Company also paid $5.8 million more cash dividends during 2023, which was largely due to $3.6 million of cash dividend payments made by dividends paid on Class B common stock that was initially distributed in 2023, as part of the Company Company's strategy to increase value for its shareholders. Net The Company declared an additional quarterly cash flows provided by financing activities dividend for holders of Class B common stock in February 2024, subsequent to the date of the financial statements, in the amount of $0.242 per share of Class B common stock.

All cash dividends declared to date for Class B common stock were $22.4 million based on 20% of CORE royalty and infrastructure fees for 2021, which was primarily due to proceeds received from the issuance of our Senior Notes having a face value of $34.5 million offset partially by payments made on our revolving credit facilities. previous quarter as shown below.

(In thousands)	Three months ended December 31, 2023	Three months ended September 30, 2023	Three months ended June 30, 2023
Royalties			
Ramaco Coal	$ 3,276	$ 3,572	$ 1,351
Amonate Assets	722	614	752
Other	14	13	—
Total Royalties	$ 4,012	$ 4,199	$ 2,103
Infrastructure Fees			
Preparation Plants (Processing at $5.00/ton)	$ 4,432	$ 4,521	$ 3,433
Rail Load-outs (Loading at $2.50/ton)	2,198	2,202	1,726
Total Infrastructure Fees (at $7.50/ton)	$ 6,630	$ 6,723	$ 5,159
CORE Royalty and Infrastructure Fees	$ 10,642	$ 10,922	$ 7,262
Total Cash Available for Dividend for Class B Common Stock	$ 10,642	$ 10,922	$ 7,262
20% of Cash Available for Dividend for Class B Common Stock	$ 2,128	$ 2,184	$ 1,452

Restricted cash balances at December 31, 2023 and December 31, 2022 were $0.8 million and December 31, 2021 were $0.9 million , respectively, and consisted of funds held in escrow for potential future workers' compensation claims. Restricted cash balances were included in other current assets on the consolidated balance sheets.

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Please see Part I, Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations" in our 2021 2022 Annual Report on Form 10-K for a discussion of the Company's cash flows for the year ended December 31, 2021 December 31, 2022 as compared to the year ended December 31, 2020 December 31, 2021.

Indebtedness

At December 31, 2022 December 31, 2023, we had $128.9 million $91.4 million of outstanding debts, or $127.2 million $90.2 million net of unamortized discounts and issuance costs. Our indebtedness was comprised of $61.0 million related to $42.5 million of outstanding borrowings under the financing of significant acquisitions (of which $40.0 million is related party debt), Revolving Credit Facility, $34.5 million of Senior Notes ($32.8 33.3 million net of unamortized discounts and issuance costs), $25.0 million $11.4 million of outstanding borrowings under unpaid financing related to the Revolving Credit Facility, Maben Coal assets acquisition, and $8.4 million $3.0 of various equipment loans. Of these amounts, $75.6 million $56.5 million is expected to be repaid in 2023, 2024, including $20.0 million $42.5 million of revolver borrowings that were repaid shortly after the balance sheet date using funds from current operations and $49.6 million $11.4 million of acquisition financing that is contractually due in 2023 (of which $40.0 million is due to a related party). 2024. The remaining amount of $53.3 million $34.9 million, or $51.6 $33.7 net of unamortized discounts and issuance costs, is mostly comprised of the Senior Notes due in 2026.

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The Company's outstanding debt increased decreased approximately $83.9 million $37.0 million in 2022 2023 and was due primarily to the repayment of financing of associated with the previous acquisitions of Ramaco Coal and Maben Coal during in the year as well as revolver amount of $40.0 million and $9.6 million, respectively. The Company's outstanding borrowings associated with under the management of our normal operating cash position that remained outstanding at the reporting date. Revolving Credit Facility increased $17.5 million compared to 2022.

The acquisitions acquisition of Ramaco Coal and Maben Coal help helps to reduce royalty expenses associated with the Company's metallurgical operations in the Appalachian basin and, along with the acquisition of Maben Coal, complement our existing low-vol portfolio, both of which help achieve the Company's objective of remaining among the lowest cost producers of metallurgical coal in the U.S.. In addition, the acquisition of Ramaco Coal includes potential concentrations of rare earth elements and is being used to support the Company's possible expansion into the manufacture and commercialization of advanced carbon products and materials from coal, both of which provide additional growth opportunities in the future.

The Revolving Credit Facility contains usual and customary covenants including limitations on liens, additional indebtedness, investments, restricted payments, asset sales, mergers, affiliate transactions and other customary limitations, as well as financial covenants. At December 31, 2022, we financing associated with the acquisition of Ramaco Coal, which was provided by a related party, was repaid in full during 2023.

Revolver borrowings are typically used for the management of our normal operating cash position. Revolver borrowings that were outstanding at December 31, 2023 were repaid in compliance with all debt covenants under the Revolving Credit Facility. full during January 2024.

In addition to the debts discussed above, the Company finances the payment of premiums associated with various insurance policies. The Company's liability at December 31, 2022 December 31, 2023 was $4.6 million $4.0 million, which must be repaid in 2023. 2024.

The Company also has various finance leases for mining equipment, which are generally for include terms up from three to 36 months. five years. The Company's total liability for finance leases at December 31, 2022 December 31, 2023 was $10.9 million $10.4 million, which includes $6.0 million $5.5 million due in 2023 2024 and $4.9 million due thereafter.

Refer to Notes 7 and 8 to the Consolidated Financial Statements included in Item 8 of Part I in this Annual Report on Form 10-K for additional information on indebtedness.

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As discussed above, the Company repaid $20.0 million of the $25.0 million of borrowings under the Revolving Credit Facility shortly after the balance sheet date using funds from current operations. At a later date, on February 15, 2023, the Company entered into a new revolving credit agreement involving KeyBank National Association indebtedness and multiple other lending parties, as discussed under *Liquidity* below, that resulted in additional borrowings of $20.0 million. The Company used $10.0 million of the proceeds from these borrowings to pay down more expensive related-party debt associated with the acquisition of Ramaco Coal. Revolving loans under the new facility bear interest at either the base rate plus 1.50% or the secured overnight financing rate plus 2.00%. The base rate equals the highest of the administrative agent's prime rate, the federal funds effective rate plus 0.5%, or 3%. leases.

Liquidity

As of December 31, 2022 December 31, 2023, our available liquidity was $49.1 million $90.6 million, comprised of $35.6 million $42.0 million of cash and cash equivalents and $13.5 million $48.6 million of availability under the Revolving Credit Facility for future borrowings. Subsequent Total current assets were in excess of total current liabilities, which included $42.5 million of revolver borrowings repaid in January 2024, by $19.7 million. The Company is party to an arrangement that began in 2023 whereby our cash and cash equivalents are placed at various banks in amounts no greater than the date of $250,000 FDIC-insured limit to help safeguard against potential losses in the financial statements, on February 15, 2023, the Company entered into the Second Amended and Restated sector. The Revolving Credit and Security Agreement, facility, which involves includes multiple lending parties and provides additional borrowing capacity compared to the facility utilized in 2022. The new facility, which has a maturity date of February 15, 2026, provides an initial aggregate revolving commitment of $125.0 million added flexibility to the Company to pursue our strategic growth initiatives and manage our normal operating cash position as well as an accordion feature of $50.0 million subject to certain terms and conditions, including lenders' consent. The aggregate revolving commitment had a borrowing base of $66.3 million at the closing date of the new facility after consideration of collateral and reserve requirements. The remaining availability under the new facility was $41.3 million at the closing date after total outstanding borrowings of $25.0 million. withstand potential changes in macroeconomic conditions.

The terms of the new Revolving Credit facility include covenants limiting the ability of the Company to incur additional indebtedness, make investments or loans, incur liens, consummate mergers and similar fundamental changes, make restricted payments, and enter into transactions with affiliates. The terms of the new facility also contain a financial covenant that requires require the Company to maintain a certain covenants, including fixed charge ratio and compensating balance requirements. A fixed charge coverage ratio of not less than 1.10:1.00, calculated as of the last day of each fiscal quarter, starting with must be maintained by the first quarter of 2023. The new facility also contains certain

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compensating balance requirements, which include that Company. In addition, the Company must maintain an average daily cash balance of $5 million, as determined on a monthly basis, in a dedicated account as well as an additional $1 million in a separate dedicated account to assure future credit availability. At December 31, 2023, we were in compliance with all debt covenants under the Revolving Credit Facility.

The new facility provides greater liquidity to the Company Our primary use of cash includes capital expenditures for mine development, infrastructure, and added flexibility to pursue our strategic growth initiatives equipment as well as withstand potential changes in macroeconomic conditions.

We ongoing operating expenses and repayment of financing associated with previous acquisitions. As of the date of this Annual Report, we expect to fund our capital and liquidity requirements for the next twelve months and the reasonably foreseeable future with cash on hand, borrowings and credit facility discussed above, under the Revolving Credit Facility, and projected cash flow

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flows from operations. Factors that could adversely impact our future liquidity and ability to carry out our capital expenditure program include the following:

- Timely delivery of our product by rail and other transportation carriers;
- Timely payment Late payments of accounts receivable by our customers;
- Cost overruns in our purchases of equipment needed to complete our mine development plans;
- Delays in completion of development of our various mines, processing plants and refuse disposal facilities, which would reduce the coal we would have available to sell and our cash flow from operations; and
- Adverse changes in the metallurgical coal markets that would reduce the expected cash flow from operations.

Capital Requirements

Our primary use of cash includes capital expenditures for mine development, infrastructure, and equipment. During 2022 we spent $123.0 million, over 75% of which related to ongoing growth projects, including the increase in capacity to accommodate higher production levels at the Elk Creek and Berwind mining complexes. We also used cash to acquire Ramaco Coal and Maben Coal assets in 2022, which totaled $23.6 million. The Company also capitalized interest of $1.1 million in 2022.

We anticipate capital expenditures of approximately $60-80 million in 2023, which includes both maintenance capital and growth capital for development projects. The growth capital will allow the Company to continue to grow production, which encompasses starting new mines, expansion of existing mines, and upgrades to existing preparation, processing, and rail-loading facilities.

As of the date of this Annual Report, management believes that current cash on hand, cash flow from operations and available liquidity under our Revolving Credit Facility will be sufficient to meet its capital expenditure and operating plans. We expect to fund any new reserve acquisitions from cash on hand, cash from operations and potential future issuances of debt or equity securities.

If future cash flows were to become insufficient to meet our liquidity needs or capital requirements, due to changes in macroeconomic conditions or otherwise, we may reduce our expected level of capital expenditures for new mine production and/or fund a portion of our capital expenditures through the issuance of debt or equity securities, new debt arrangements, or from other sources such as asset sales.

On September 1, 2023, the Company filed a shelf registration statement to sell any combination of Class A common stock, Class B common stock, preferred stock, depositary shares, debt securities, warrants, and rights at an aggregate initial offering price of up to $400.0 million, which was declared effective on September 29, 2023. However, the Company has no specific plans to raise capital at this time and no securities may be sold until a prospectus supplement describing the method and terms of any future offering is delivered.

In March 2024, Ramaco initiated actions to extend the maturity date and increase the size of its existing Revolver facility. The Company is targeting a $200 million facility with a $75 million accordion feature and a maturity date of five years from the closing date. The Company hopes to achieve a successful syndication of the new facility during the second quarter of 2024, which would strengthen our liquidity and provide additional flexibility in support of the Company's strategic initiatives and operations.

Working Capital

Accounts receivable were $96.9 million at December 31, 2023, which increased $55.7 million versus December 31, 2022 driven by the $67.5 million increase in fourth quarter revenues. Inventories were $37.2 million at December 31, 2023, which decreased $7.8 million versus December 31, 2022 driven by the logistical and rail challenges we experienced in 2022. Accounts payable were $51.6 million at December 31, 2023, up from December 31, 2022 due to increased spending.

Capital Requirements

During 2022 we spent $123.0 million for capital additions, over 75% of which related to ongoing growth projects, including the increase in capacity to accommodate higher production levels at the Elk Creek and Berwind mining complexes. During 2023 the Company spent $82.9 million on capital additions, a significantly lower amount versus 2022, as the Company has made substantial progress in achieving its growth initiatives.

We anticipate capital expenditures of approximately $53-63 million in 2024, which will likely be weighted more toward maintenance capital than growth capital and development projects. The shift toward maintenance capital is due to the Company's substantial investments in growth projects in previous periods and its progress to date regarding these initiatives. Despite this shift, it should be noted that the Company entered into an agreement during February 2024 to purchase preparation plant assets for the Maben Complex at a price of $3 million. The Company anticipates spending an additional $8 million in capital expenditures related to the plant in 2024. These assets will be relocated to the

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Maben Complex and reassembled there for future use with the purpose of reducing the cost of transporting current raw coal production. These assets will also provide the Company with a preparation facility to handle additional future production from a deep mine complex at Maben should the Company decide in the future to pursue such development.

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Contractual Obligations

The following table summarizes our significant contractual obligations at December 31, 2022 December 31, 2023:

	Payments due by period				
(In thousands)	Total	1 year	2 – 3 years	4 – 5 years	More than 5 years
Minimum coal lease and royalty obligations	$ 27,098	$ 3,339	$ 6,698	$ 6,027	$ 11,034
Debt, excluding interest	128,896	75,639	18,757	34,500	—
Insurance financing	4,577	4,577	—	—	—
Leases	12,161	6,463	5,362	336	—
Take or pay obligations	5,059	3,903	1,156	—	—
Total	$ 177,791	$ 93,921	$ 31,973	$ 40,863	$ 11,034

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	Payments due by period				
(In thousands)	Total	1 year	2 – 3 years	4 – 5 years	More than 5 years
Minimum coal lease and royalty obligations	$ 27,195	$ 3,358	$ 6,486	$ 6,316	$ 11,035
Debt, excluding interest	91,383	56,534	34,849	—	—
Insurance financing	4,037	4,037	—	—	—
Leases	11,940	6,075	3,953	1,912	—
Take-or-pay obligations	20,237	5,612	9,000	5,625	—
Total	$ 154,792	$ 75,616	$ 54,288	$ 13,853	$ 11,035

Minimum royalties represent the contractual minimum amounts to be paid monthly, quarterly or annually for the right to access mineral properties and mine certain reserves and resources. The amounts are generally recoupable against future production royalties to be paid.

Refer to the previous discussion of *Indebtedness* above for additional information regarding the Company's outstanding debt, insurance financing, and finance leases. Leases payments in the table above include payments for both financing and operating leases.

Take or pay Take-or-pay obligations represent those liquidated damage obligations as determined by contract volume minimums for transportation of coal at the representative rates of transportation or a portion thereof. Additional take or pay take-or-pay commitments totaling

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$15.1 million for the next annual period were entered into renewed after the balance sheet date and have been excluded from the table above. These commitments are estimated at approximately $14 million based on last year's average rate.

Asset retirement obligations have been excluded from the table above. Accounting for asset retirement obligations requires a number of estimates, including the amount and timing of payments to satisfy the obligation. The total liability recognized on the Company's balance sheet for asset retirement obligations was $28.9 million $29.0 million at December 31, 2022 December 31, 2023. Refer to *Critical Accounting Policies and Estimates* below as well as Note 5 to the Consolidated Financial Statements included in Item 8 of Part I in this Annual Report on Form 10-K for additional information.

Estimated payments related to worker's compensation and occupational disease obligations have also been excluded from the table above. Refer to *Critical Accounting Policies and Estimates* below for additional information related to these obligations. Refer also to Note 6 to the Consolidated Financial Statements included in Item 8 of Part I in this Annual Report on Form 10-K for additional information related to accrued expenses and other long-term liabilities.

Off-Balance Sheet Arrangements

In the normal course of business, we are a party to certain off-balance sheet arrangements, such as bank letters of credit and performance or surety bonds. Liabilities related to these arrangements are not reflected in consolidated balance sheets, and we do not expect any material adverse effects on our financial condition, results of operations, or cash flows to result from these arrangements. We primarily use surety bonds to secure our financial obligations related to reclamation and other matters. Total surety bonds at December 31, 2022 December 31, 2023, were $25.9 million $27.2 million.

Critical Accounting Policies and Estimates

The preparation of consolidated financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the consolidated financial statements and the amounts of revenue and expenses reported for the period then ended.

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Coal Reserves. Our coal reserves and resources are generally updated on an annual basis. There are numerous uncertainties inherent in estimating quantities and values of coal reserves and resources, including many factors beyond our control. As a result, estimates of coal reserves and resources are by their nature uncertain. Information about our reserves and resources consists of estimates based on engineering, economic, and geological data assembled by third-party qualified persons. Information used to determine recoverable reserves and resources include geological conditions, historical production from the area compared with production from other producing areas, assumed effects of regulations and taxes by governmental agencies, assumptions governing future prices, and future operating costs. Each of these may in fact vary considerably from the assumptions used in estimating reserves and resources. For these reasons, estimates of economically recoverable quantities of coal attributable to a particular group of properties, and classification of these reserves and resources based on risk of recovery and estimates of future net cash flows, may vary substantially. Actual production, revenues, and expenditures with respect to reserves and resources will likely vary from estimates and these variances may be material. Variances could affect our projected future revenues and expenditures, valuation of coal reserves and resources, and amortization and depletion of mine development costs and mineral rights.

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Asset Retirement Obligations. We initially recognize as a liability an asset retirement obligation, or ARO, associated with the retirement of a tangible long-lived asset in the period in which it is incurred or a reasonable estimate of fair value can be made, with an associated increase in the carrying amount of the related long-lived asset. The initially recognized asset retirement cost is amortized using the same method and useful life as the long-lived asset to which it relates. Accretion expense is recognized over time as the discounted liability is accreted to its expected settlement value. The liability is reduced as the reclamation work is performed and the related costs are applied.

Estimating the ARO requires management to make estimates and judgments regarding timing and existence of a liability, as well as what constitutes adequate restoration. Inherent in the fair value calculation are numerous assumptions and judgments including the ultimate costs, inflation factors, credit adjusted credit-adjusted discount rates, and the timing of the related cash flows. On at least an annual basis, we review our ARO liabilities and make necessary adjustments for significant increases in disturbed acreage, mining permit changes, significant mine plan revisions, and changes in cost estimates or timing of performance. To the extent future revisions are made to the ARO liability, a corresponding adjustment is made to the related asset.

The $6.3 million increase in total Our ARO liabilities at December 31, 2023 were nearly flat versus December 31, 2022 as the accretion of the liability during 2022 was driven the year and the downward revision to estimates were mostly by revisions to offsetting. We lowered our estimate of inflation. The inflation per year assumption of from 3.75% used in 2022 was higher than the assumption used to 3% in 2021 of 2.3% 2023 based on macroeconomic trends. If our assumptions differ from actual experience, or if changes in the regulatory environment occur, our actual cash expenditures and costs that we incur could be materially different than currently estimated.

Occupational Disease (Pneumoconiosis) Obligations. We recognize as a liability to provide for occupational illness (pneumoconiosis) benefits to eligible employees, former employees and dependents as required by the Mine Act. The occupational illness benefit obligation represents the present value of the actuarially computed liabilities for such benefits over the employees' applicable years of service.

Estimating the future occupational disease (pneumoconiosis) benefits requires management to make estimates and judgments regarding timing and existence of a liability utilizing third-party actuaries to assist in preparing what constitutes adequate liability amounts. Inherent in the calculation are numerous assumptions and judgments including the ultimate costs, inflation mortality factors, credit adjusted credit-adjusted discount rates, and timing of settlement awards in the legal and regulatory environments. settlement. These estimates are subject to uncertainty due to a variety of factors, including extended lag times in the reporting and resolution of claims, changes in limited Ramaco-specific claim settlement patterns, volume and future cost trends. As a result, volatility in future estimates may occur and actual costs could differ significantly from the estimated amounts.

Impairment of Long-lived Assets. We review our held-and-used long-lived assets for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset or asset group may not be recoverable. Assets are grouped at the lowest level for which there are identifiable cash flows that are largely independent of the cash flows of other groups of assets, which is generally at the mine level or at the mining complex level for mines that share infrastructure and/or developed access. Additional judgment may be required for development properties.

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Events and circumstances that may trigger a recoverability assessment include, but are not limited to, a current expectation that a long-lived asset will be disposed of significantly before the end of its previously estimated useful life, a significant adverse change in the extent or manner in which a long-lived asset or asset group is being used or in the physical condition of the asset(s), and an accumulation of costs significantly in excess of the amount originally expected. We generally do not view short-term declines in metallurgical coal prices as a triggering event for conducting impairment tests because of historic price volatility. In addition, a temporary idling of operations at a particular mine or complex may or may not be viewed as a triggering event depending on the remaining life of the mine, the length of time the mine is expected to be idle, and the amount of incremental costs expected to resume operations.

When events or changes in circumstances occur that trigger a recoverability test, the test is performed by comparing projected undiscounted cash flows from the use and eventual disposition of an asset or asset group to its carrying amount. If the projected undiscounted cash flows are less than the carrying amount, an impairment loss is recorded for the excess of the carrying amount over the estimated fair value of the asset or asset group, if any.

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We make various assumptions, including assumptions regarding future cash flows in our assessments of long-lived assets for impairment. The assumptions about future cash flows and growth rates are based on the current and long-term business plans related to the long-lived assets.

Income Taxes. We are required to estimate the amount of tax payable or refundable for the current year and the deferred income tax liabilities and assets for future consequences of events that have been reflected in our financial statements or tax returns for each tax paying jurisdiction in which we operate. This process requires management to make judgments regarding the timing and probability of the ultimate tax impact of various agreements and transactions. We initially recognize the effects of a tax position when it is more than 50% likely, based on the technical merits that the position will be sustained upon examination. Our determination of whether or not a tax position has met the recognition threshold depends on the facts, circumstances, and information available at the reporting date.

We provide for deferred income taxes for temporary differences arising from differences between the financial statement and tax basis of assets and liabilities existing at each balance sheet date using enacted tax rates. A valuation allowance may be recorded to reflect the amount of future tax benefits that management believes are not likely to be realized. The assessment takes into account expectations of future taxable income or loss, available tax planning strategies and the reversal of temporary differences. The development of these expectations involves the use of estimates such as production levels, operating profitability, timing of development activities and the cost and timing of reclamation work. If actual outcomes differ from our expectations, we may record an additional valuation allowance through income tax expense in the period such determination is made. The Company had no valuation allowance at December 31, 2023.

Actual income taxes could vary from the estimates and judgments above due to future changes in income tax law, significant changes in the jurisdictions in which we operate, our ability to generate sufficient future taxable income, or unpredicted results from the final determination of each year's liability by taxing authorities. These changes could have a significant impact on our financial position.

Recent Accounting Pronouncements. See Item 8 of Part II, "Financial Statements and Supplementary Data—Note 2—Summary of Significant Accounting Policies—Recent Accounting Pronouncements."

Item 7A. Quantitative and Qualitative Disclosure About Market Risk

In addition to the risks inherent in operations, we are exposed to financial, market, political and economic risks. The following discussion provides additional detail regarding our exposure to the risks related to changes in commodity prices, interest rates and foreign exchange rates.

Commodity Price Risk. Our primary product is metallurgical coal, which is in itself a commodity. Our Sales commitments in the metallurgical coal market are typically not long-term in nature. The Company's domestic sales contracts have terms of about one year and the pricing is sold under short-term fixed price typically fixed. Export sales have spot or term contracts, term transactions utilizing index and pricing or on a spot basis. is often derived from an index. As such, we are exposed to changes in the international price of metallurgical coal.

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Our sales commitments as of February 29, 2024 are as follows:

	2024	
	Volume	Average Price

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North America, fixed priced	1.5	$ 167
Seaborne, fixed priced	0.2	$ 159
Total, fixed priced	1.7	$ 166
Index priced	2.2	
Total committed tons	3.9	

Sales commitments of 0.4 million tons were obtained subsequent to December 31, 2023, which are included in the table above.

Sales commitments in the metallurgical coal market are typically not long-term in nature and, therefore, we are subject to fluctuations in market pricing. We attempt expect the shift to more export sales in the Company's mix of revenue that occurred in 2023 to continue during 2024, which may lead to volatility in revenues due to index-based pricing. The Company does not currently manage this risk by keeping tight control over through the use of derivative instruments. We also have exposure to price risk for supplies that are used directly or indirectly in the normal course of production such as diesel fuel, explosives, and other items. The Company manages its risk for these items through strategic sourcing contracts in normal quantities with our mining costs. suppliers.

Interest Rate Risk. Based We are exposed to risk from changes in interest rates; however, based on the current levels of debt and leases, the Company does not attempt to manage our exposure to interest rate fluctuations. we are not overly exposed to interest rate risk. Should we incur additional debt The Company has senior unsecured notes with a face value of $34.5 million that mature on July 30, 2026, unless redeemed prior to maturity, bearing interest at a fixed rate of 9% per annum and paid quarterly.

Some of the Company's debts may be affected by changes in the future or increase our cash position, the general level of benchmark interest rates, will begin such as the Secured Overnight Financing Rate ("SOFR"). Borrowings under the Company's Revolving Credit Facility, which has a maturity date of February 15, 2026, bear interest at either a base rate plus 1.5% or the applicable SOFR plus 2%. The base rate equals the highest of the administrative agent's prime rate, the Federal Funds Effective Rate plus 0.5%, or 3%. The Company's outstanding financing related to take on greater importance. At that time, we will manage our exposure through the Maben coal acquisition, which had a variety balance of financial tools designed to minimize exposure to $11.4 million at December 31, 2023 and is due in full in 2024, bears interest rate fluctuations. at the applicable SOFR plus 3% compounded monthly.

Foreign Exchange Rate Risk. International sales of coal are typically denominated in U.S. dollars. As a result, we do not have direct exposure to currency valuation exchange rate fluctuations. However, because our coal is sold internationally, to the extent that the U.S. dollar strengthens against the foreign currency of a customer or potential customer, we may find our coal at a price disadvantage as compared with other non-U.S. suppliers. This could lead to our receiving lower prices or being unable to compete for that specific customer's business. Consequently, currency fluctuations could adversely affect the competitiveness of our coal in international markets.

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Item 8. Financial Statements and Supplementary Data

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REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Shareholders and Board of Directors
and
Stockholders of Ramaco Resources, Inc.
Lexington, Kentucky

Opinion on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheet sheets of Ramaco Resources, Inc. and subsidiaries (the "Company" "Company") as of December 31, 2022, December 31, 2023 and 2022, and the related consolidated statements of operations, equity, and cash flows for each of the year then years in the two-year period ended December 31, 2023, and the related notes (collectively referred to as the "financial statements") financial statements). We also have audited the Company's internal control over financial reporting as of December 31, 2022, based on criteria established in 2013 Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission ("COSO").

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2022, December 31, 2023 and 2022, and the results of its operations and its cash flows for each of the year then years in the two-year period ended December 31, 2023, in conformity with accounting principles generally accepted in the United States of America. Also

We also have audited, in our opinion, accordance with the standards of the Public Company maintained, in all material respects, effective Accounting Oversight Board (United States) ("PCAOB"), the Company's internal control over financial reporting as of December 31, 2022 December 31, 2023, based on criteria established in 2013 *Internal Control-Integrated Control–Integrated Framework (2013)* issued by COSO. the Committee of Sponsoring Organizations of the Treadway Commission ("COSO"), and our report dated March 14, 2024, expressed an adverse opinion.

Basis for Opinion

The Company's management is responsible for these These financial statements for maintaining effective internal control over financial reporting, and for its assessment are the responsibility of the effectiveness of internal control over financial reporting. Company's management. Our responsibility is to express an opinion on the Company's Company's financial statements and an opinion on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) ("PCAOB") PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws, and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

fraud. Our audits of the financial statements included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that responds respond to those risks. Such procedures included

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examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions. opinion.

Definition and Limitations of Internal Control over Financial Reporting

An entity's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with accounting principles generally accepted in the United States of America. An entity's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the entity; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financialstatements in accordance with accounting principles generally accepted in the United States of America, and that receipts and expenditures of the entity are being

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made only in accordance with authorizations of management and directors of the entity; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the entity's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Critical Audit Matters

The critical audit matter matters communicated below is a matter are matters arising from the current period audit of the financial statements that were communicated or required to be communicated to the audit committee and that: (1) relate to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the financial statements, taken as a whole, and we are not, by communicating the critical audit matter matters below, providing a separate opinion opinions on the critical audit matter matters or on the accounts or disclosures to which it relates. they relate.

Critical Audit Matter – Asset Retirement Obligations **Obligation Description**

At December 31, 2022 December 31, 2023, the Company's asset retirement obligation ("ARO") liabilities totaled $28.9 million $29.0 million. As discussed in Note 2 and Note 5 to the financial statements, the Company estimates its ARO liabilities for final reclamation based upon detailed engineering calculations of the amount and timing of the future cash spending for a third party to perform the required work. The Company records an ARO asset associated with the discounted liability for final reclamation. The obligation and corresponding asset are recognized in the period

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in which the liability is incurred. As changes in estimates occur, the revisions to the obligation and asset are recognized at the appropriate credit-adjusted, risk-free rate.

We identified the valuation of the asset retirement obligation as a critical audit matter because the estimate involves a high degree of subjectivity and auditing the significant assumptions utilized by management in estimating the amount of the liability requires judgment. In particular, the obligation is determined using a discounted cash flow technique and is based upon mining permit requirements and various assumptions including discount rates, inflation rate, estimates of disturbed acreage and reclamation activities, timing of reclamation activities, and third-party reclamation costs.

To**How the Critical Audit Matter was Addressed in the Audit**

Our principal audit procedures performed to address this critical audit matter included the ARO liabilities, our procedures included, among others: following:

- We obtained an understanding of the relevant controls related to the Company's accounting for the ARO liability, including the controls over management's review of the significant assumptions and other inputs.
- We evaluated the methodology used, and tested the significant assumptions discussed above and the underlying data used by the Company in its estimate.
  - We compared assumptions including the credit-adjusted risk-free rate and inflation rate to current market data. In addition, to assess the estimates of disturbed acreage, timing of reclamation activities, and reclamation costs, we evaluated significant changes from the prior estimate.
  - We utilized an external specialist to assist in our assessment of the Company's ARO liability. As part of this effort, the specialist performed a selected observation of mine site operations, interviewed members of the Company's management's engineering staff, specialist, assessed the completeness of the mine reclamation estimate with respect to meeting mine closure and post closure plan regulatory requirements by comparing costs to permits on selected sites, and evaluated the reasonableness of the engineering estimates and assumptions.

Critical Audit Matter – Class B Common Stock Distribution Description

/s/ MCM CPAs & Advisors LLPDuring the year ended December 31, 2023, the Company created a separate Class B common stock as discussed in Note 9 of the financial statements. An initial distribution of this Class B common stock occurred on June 21, 2023, via a stock dividend to existing holders of common stock as of May 12, 2023. At the date of distribution, each holder of common stock received 0.2 shares of Class B common stock for every one share of existing common stock held on the record date. Similar actions or modifications occurred for holders of outstanding stock-based awards. The holders of the Class B shares have different dividend expectations that are subject to the sole discretion of the Company's Board of Directors. Also, the Class B shares do not represent a direct interest in a separate legal entity or direct interest in specific assets.

We have served asThe accounting for this distribution and its effect on other areas of financial reporting involved complex accounting considerations including interpretive guidance. The magnitude of the Company's auditor since 2022. transaction and uniqueness of the characteristics of the Class B shares required significant research and judgment regarding accounting and disclosure conclusions.

Louisville, Kentucky

March 14, 2023**How the Critical Audit Matter was Addressed in the Audit**

Our principal audit procedures performed to address this critical audit matter included the following:

- We read the related agreements and analyzed the terms of the Class B equity transaction.
- We evaluated management's interpretation and application of the relevant accounting guidance in relation to the facts and circumstances involved and the conclusions reached regarding the accounting treatment for this transaction.
- We evaluated the disclosures surrounding the Class B shares and rights, earnings per share, and fair value, to ensure these were disclosed in accordance with the relevant accounting guidance.

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/s/ Cherry Bekaert LLP

We have served as the Company's auditor since 2022 (such date takes into account the acquisition of MCM CPAs & Advisors LLP by Cherry Bekaert LLP effective October 31, 2023)

Louisville, Kentucky
March 14, 2024

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REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and
Stockholders of Ramaco Resources, Inc.
Lexington, Kentucky

Opinion on Internal Control over Financial Reporting

We have audited Ramaco Resources, Inc.'s (the "Company's") internal control over financial reporting as of December 31, 2023, based on criteria established in *Internal Control–Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission ("COSO"). In our opinion, because of the effect of the material weakness described in the following paragraph on the achievement of the objectives of the control criteria, the Company has not maintained effective internal control over financial reporting as of December 31, 2023, based on criteria established in *Internal Control–Integrated Framework (2013)* issued by COSO.

A material weakness is a control deficiency, or a combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of the Company's annual or interim financial statements will not be prevented or detected on a timely basis. The following material weakness has been identified and included in management's assessment. Management identified a material weakness related to a pervasive lack of sufficient documentation of accounting policies, procedures, and controls. This lack of sufficient documentation does not allow management to effectively assess its relevant risks and key controls to properly test for design and operating effectiveness. This material weakness was considered in determining the nature, timing, and extent of audit tests applied in our audit of the 2023 financial statements, and this report does not affect our report dated March 14, 2024, on those financial statements.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) ("PCAOB"), the consolidated balance sheets and the related consolidated statements of operations, equity, and cash flows of the Company, and our report

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dated March 14, 2024, expressed an unqualified opinion.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management's Report on Internal Control over Financial Reporting included in Item 9A–Controls and Procedures in the Company's 2023 Annual Report on Form 10-K. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audit also included performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial

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reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ Cherry Bekaert LLP

Louisville, Kentucky
March 14, 2024

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REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

Stockholders and the Board of Directors of Ramaco Resources, Inc.
Lexington, Kentucky

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheet of Ramaco Resources, Inc. (the "Company") as of December 31, 2021, the related consolidated statements of operations, equity, and cash flows of Ramaco Resources, Inc. (the “Company”) for the year then ended December 31, 2021, and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position results of the Company as of December 31, 2021, and the results of its Company's operations and its cash flows for the year then ended December 31, 2021, in conformity with accounting principles generally accepted in the United States of America.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) ("PCAOB") and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audit we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion.

Our audit included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audit also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audit provides a reasonable basis for our opinion.

/s/ Crowe LLP

We served as the Company’s auditor from January 2022 through April 2022.

Houston, Texas
March 31, 2022

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REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and Stockholders of Ramaco Resources, Inc.
Lexington, Kentucky

Opinion on the Financial Statements

We have audited the accompanying consolidated statements of operations, equity, and cash flows of Ramaco Resources, Inc. (the Company) for the year ended December 31, 2020 and the related notes (collectively referred to as the financial statements). In our opinion, the consolidated financial statements present fairly, in all material respects, the consolidated results of its operations and its cash flows for the year ended December 31, 2020 in conformity with accounting principles generally accepted in the United States of America.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audits, we are required to obtain an understanding of internal control over financial reporting, but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion.

Our audit included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audit also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audit provides a reasonable basis for our opinion.

/s/ Briggs & Veselka Co.

We served as the Company's auditor from 2015 to 2021.

Houston, Texas
February 18, 2021

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Ramaco Resources, Inc.
Consolidated Balance Sheets

In thousands, except share and per share information	December 31, 2022	December 31, 2021
Assets		
Current assets		
Cash and cash equivalents	$ 35,613	$ 21,891
Accounts receivable	41,174	44,453
Inventories	44,973	15,791
Prepaid expenses and other	25,729	4,626
Total current assets	147,489	86,761
Property, plant and equipment, net	429,842	227,077
Financing lease right-of-use assets, net	12,905	9,128
Advanced coal royalties	3,271	5,576
Other	2,832	491
Total Assets	$ 596,339	$ 329,033
Liabilities and Stockholders' Equity		
Liabilities		
Current liabilities		
Accounts payable	$ 34,825	$ 15,346
Accrued expenses	41,806	19,410
Asset retirement obligations	29	489
Current portion of long-term debt	35,639	7,674
Current portion of related party debt	40,000	—
Current portion of financing lease obligations	5,969	3,461
Insurance financing liability	4,577	280
Total current liabilities	162,845	46,660
Asset retirement obligations	28,856	22,060
Long-term debt, net	18,757	3,339
Long-term financing lease obligations, net	4,917	4,599
Senior notes, net	32,830	32,363
Deferred tax liability, net	35,637	6,406
Other long-term liabilities	3,299	2,532
Total liabilities	287,141	117,959
Commitments and contingencies	—	—
Stockholders' Equity		
Preferred stock, $0.01 par value, 50,000,000 shares authorized, none issued and outstanding	—	—
Common stock, $0.01 par value, 260,000,000 shares authorized, 44,155,735 at December 31, 2022 and 44,092,981 at December 31, 2021 shares issued and outstanding	442	441
Additional paid-in capital	168,711	163,566
Retained earnings	140,045	47,067
Total stockholders' equity	309,198	211,074
Total Liabilities and Stockholders' Equity	$ 596,339	$ 329,033

In thousands, except share and per share information	December 31, 2023	December 31, 2022
Assets		
Current assets		
Cash and cash equivalents	$ 41,962	$ 35,613

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Accounts receivable	96,866	41,174
Inventories	37,163	44,973
Prepaid expenses and other	13,748	25,729
Total current assets	189,739	147,489
Property, plant, and equipment, net	459,091	429,842
Financing lease right-of-use assets, net	10,282	12,905
Advanced coal royalties	2,964	3,271
Other	3,760	2,832
Total Assets	$ 665,836	$ 596,339
Liabilities and Stockholders' Equity		
Liabilities		
Current liabilities		
Accounts payable	$ 51,624	$ 34,825
Accrued liabilities	52,225	41,806
Current portion of asset retirement obligations	110	29
Current portion of long-term debt	56,534	35,639
Current portion of related party debt	—	40,000
Current portion of financing lease obligations	5,456	5,969
Insurance financing liability	4,037	4,577
Total current liabilities	169,986	162,845
Asset retirement obligations, net	28,850	28,856
Long-term debt, net	349	18,757
Long-term financing lease obligations, net	4,915	4,917
Senior notes, net	33,296	32,830
Deferred tax liability, net	54,352	35,637
Other long-term liabilities	4,483	3,299
Total liabilities	296,231	287,141
Commitments and contingencies	—	—
Stockholders' Equity		
Preferred stock, $0.01 par value, 50,000,000 shares authorized, none issued or outstanding	—	—
Common stock, $0.01 par value, 260,000,000 shares authorized, 44,155,735 shares issued and outstanding at December 31, 2022 *	—	442
Class A common stock, $0.01 par value, 225,000,000 shares authorized, 44,002,581 shares issued and outstanding at December 31, 2023 *	440	—
Class B common stock, $0.01 par value, 35,000,000 shares authorized, 8,809,557 shares issued and outstanding at December 31, 2023	88	—
Additional paid-in capital	277,133	168,711
Retained earnings	91,944	140,045
Total stockholders' equity	369,605	309,198
Total Liabilities and Stockholders' Equity	$ 665,836	$ 596,339

** Common stock was reclassified to Class A common stock during Q2 2023. Refer to Note 9.*

The accompanying notes are an integral part of these consolidated financial statements.

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Ramaco Resources, Inc.

Consolidated Statements of Operations

In thousands, except per-share amounts	Year ended December 31, 2022	2021	2020
Revenue	$ 565,688	$ 283,394	$ 168,915
Costs and expenses			
Cost of sales (exclusive of items shown separately below)	332,960	195,412	145,503
Asset retirement obligations accretion	1,115	615	570
Depreciation, depletion, and amortization	41,194	26,205	20,912
Selling, general and administrative	40,032	21,629	21,023
Total costs and expenses	415,301	243,861	188,008
Operating income (loss)	150,387	39,533	(19,093)
Other income (expense), net	2,637	7,429	11,926
Interest expense, net	(6,829)	(2,556)	(1,224)
Income (loss) before tax	146,195	44,406	(8,391)
Income tax expense (benefit)	30,153	4,647	(3,484)
Net income (loss)	$ 116,042	$ 39,759	$ (4,907)
Earnings (loss) per common share			
Basic	$ 2.63	$ 0.90	$ (0.12)
Diluted	$ 2.60	$ 0.90	$ (0.12)
Basic weighted average shares outstanding	44,164	43,964	42,460
Diluted weighted average shares outstanding	44,702	44,257	42,460

In thousands, except per-share amounts	Year ended December 31, 2023	2022	2021
Revenue	$ 693,524	$ 565,688	$ 283,394
Costs and expenses			
Cost of sales (exclusive of items shown separately below)	493,793	332,960	195,412
Asset retirement obligations accretion	1,403	1,115	615
Depreciation, depletion, and amortization	54,252	41,194	26,205
Selling, general, and administrative	48,831	40,032	21,629
Total costs and expenses	598,279	415,301	243,861
Operating income	95,245	150,387	39,533
Other income (expense), net	18,321	2,637	7,429
Interest expense, net	(8,903)	(6,829)	(2,556)
Income before tax	104,663	146,195	44,406
Income tax expense	22,350	30,153	4,647
Net income	$ 82,313	$ 116,042	$ 39,759
Earnings per common share *			
Basic - Single class (through 6/20/2023)	$ 0.71	$ 2.63	$ 0.90
Basic - Class A (6/21/2023 - 12/31/2023)	$ 1.06	$ —	$ —
Total	$ 1.77	$ 2.63	$ 0.90

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Basic - Class B (6/21/2023 - 12/31/2023)	$ 0.42	$ —	$ —
Diluted - Single class (through 6/20/2023)	$ 0.70	$ 2.60	$ 0.90
Diluted - Class A (6/21/2023 - 12/31/2023)	$ 1.03	$ —	$ —
Total	$ 1.73	$ 2.60	$ 0.90
Diluted - Class B (6/21/2023 - 12/31/2023)	$ 0.40	$ —	$ —

** Refer to Note 14 for earnings per common share calculations*

The accompanying notes are an integral part of these consolidated financial statements.

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Ramaco Resources, Inc.
Consolidated Statements of Equity

In thousands	Common Stock	Additional Paid-in Capital	Retained Earnings (Deficit)	Total Stockholders' Equity
Balance at January 1, 2020	$ 410	154,957	14,716	170,083
Restricted stock surrendered for withholding taxes payable	(1)	(220)	—	(221)
Stock-based compensation	18	4,122	—	4,140
Net loss	—	—	(4,907)	(4,907)
Balance at December 31, 2020	427	158,859	9,809	169,095
Restricted stock surrendered for withholding taxes payable	(1)	(538)	—	(539)
Stock-based compensation	15	5,245	—	5,260
Dividends declared	—	—	(2,501)	(2,501)
Net income	—	—	39,759	39,759
Balance at December 31, 2021	441	163,566	47,067	211,074
Restricted stock surrendered for withholding taxes payable	(2)	(3,181)	—	(3,183)
Stock options exercised	—	107	—	107
Stock-based compensation	3	8,219	—	8,222
Dividends declared	—	—	(23,064)	(23,064)
Net income	—	—	116,042	116,042
Balance at December 31, 2022	$ 442	$ 168,711	$ 140,045	$ 309,198

In thousands	Common Stock *	Class B Common Stock	Additional Paid-in Capital	Retained Earnings	Total Stockholders' Equity
Balance at January 1, 2021	$ 427	$ —	$ 158,859	$ 9,809	$ 169,095
Shares surrendered for withholding taxes	(1)	—	(538)	—	(539)
Stock-based compensation	15	—	5,245	—	5,260
Cash dividends declared	—	—	—	(2,501)	(2,501)
Net income	—	—	—	39,759	39,759
Balance at December 31, 2021	441	—	163,566	47,067	211,074
Shares surrendered for withholding taxes	(2)	—	(3,181)	—	(3,183)

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Stock options exercised	—	—	107	—	107
Stock-based compensation	3	—	8,219	—	8,222
Cash dividends declared	—	—	—	(23,064)	(23,064)
Net income	—	—	—	116,042	116,042
Balance at December 31, 2022	442	—	168,711	140,045	309,198
Shares surrendered for withholding taxes	(6)	(1)	(7,310)	—	(7,317)
Stock options exercised (cashless)	1	—	(1)	—	—
Stock-based compensation	3	—	12,902	—	12,905
Stock dividend declared and distributed	—	89	102,831	(102,920)	—
Cash dividends and dividend equivalents declared	—	—	—	(27,494)	(27,494)
Net income	—	—	—	82,313	82,313
Balance at December 31, 2023	$ 440	$ 88	$ 277,133	$ 91,944	$ 369,605

** Common stock was reclassified to Class A common stock during Q2 2023.*

Refer to Note 9 for additional information.

The accompanying notes are an integral part of these consolidated financial statements.

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Ramaco Resources, Inc.

Consolidated Statements of Cash Flows

	Years ended December 31,		
In thousands	**2022**	**2021**	**2020**
Cash flows from operating activities:			
Net income (loss)	$ 116,042	$ 39,759	$ (4,907)
Adjustments to reconcile net income to net cash from operating activities:			
Accretion of asset retirement obligations	1,115	615	570
Depreciation, depletion, and amortization	41,194	26,205	20,912
Amortization of debt issuance costs	491	214	58
Stock-based compensation	8,222	5,260	4,140
Loss on disposal of equipment	756	—	—
Other income - gain on sale of mineral rights	(2,113)	—	—
Other income - employee retention tax credit	—	(5,407)	—
Other income - PPP loan	—	—	(8,444)
Deferred income taxes	29,229	4,644	(3,503)
Changes in operating assets and liabilities:			
Accounts receivable	3,279	(24,154)	(1,043)
Prepaid expenses and other current assets	(14,378)	5,519	986
Inventories	(29,182)	(3,844)	3,314
Other assets and liabilities	1,127	1,124	(1,270)
Accounts payable	12,727	(1,820)	2,753
Accrued expenses	19,361	5,225	(254)
Net cash provided by operating activities	187,870	53,340	13,312
Cash flow from investing activities:			
Capital expenditures	(123,012)	(29,466)	(24,753)

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Acquisition of Ramaco Coal assets	(11,738)	—	—
Acquisition of Maben Coal assets	(11,897)	—	—
Acquisition of Amonate assets	—	(30,147)	—
Proceeds from sale of mineral rights	2,000	—	—
Other	(1,061)	—	—
Net cash used for investing activities	(145,708)	(59,613)	(24,753)
Cash flows from financing activities:			
Proceeds from PPP Loan	—	—	8,444
Proceeds from borrowings	42,000	54,368	50,043
Proceeds from stock options exercised	107	—	—
Payments of debt issuance cost	—	(2,356)	—
Payment of dividends	(20,041)	—	—
Repayment of borrowings	(26,026)	(26,300)	(45,598)
Repayment of Ramaco Coal acquisition financing - related party	(15,000)	—	—
Repayments of insurance financing	(1,290)	(862)	(1,382)
Repayments of equipment finance leases	(5,062)	(1,942)	—
Shares surrendered for withholding taxes payable	(3,183)	(539)	(221)
Net cash (used for) provided by financing activities	(28,495)	22,369	11,286
Net change in cash and cash equivalents and restricted cash	13,667	16,096	(155)
Cash and cash equivalents and restricted cash, beginning of period	22,806	6,710	6,865
Cash and cash equivalents and restricted cash, end of period	$ 36,473	$ 22,806	$ 6,710
Supplemental cash flow information:			
Cash paid for interest (net of $1,061 capitalized in 2022)	$ 5,997	$ 1,601	$ 1,095
Cash paid for taxes	15,500	9	19
Non-cash investing and financing activities:			
Leased assets obtained under new financing leases	7,888	10,002	—
Financed equipment purchases	6,409	—	—
Capital expenditures included in accounts payable and accrued expenses	13,404	6,652	1,228
Ramaco Coal acquisition financing	56,551	—	—
Maben Coal acquisition financing	21,000	—	—
Financed insurance	5,587	280	1,588
Accrued dividends payable	5,524	2,501	—

	Years ended December 31,		
In thousands	**2023**	**2022**	**2021**
Cash flows from operating activities:			
Net income	$ 82,313	$ 116,042	$ 39,759
Adjustments to reconcile net income to net cash from operating activities:			
Accretion of asset retirement obligations	1,403	1,115	615
Depreciation, depletion, and amortization	54,252	41,194	26,205
Amortization of debt issuance costs	776	491	214
Stock-based compensation	12,905	8,222	5,260
Loss on disposal of equipment	—	756	—
Other income - gain on insurance recoveries	(10,192)	—	—
Other income - gain on sale of mineral rights	—	(2,113)	—
Other income - employee retention tax credit	—	—	(5,407)
Deferred income taxes	18,714	29,229	4,644
Changes in operating assets and liabilities:			
Accounts receivable	(55,692)	3,279	(24,154)
Prepaid expenses and other current assets	14,361	(14,378)	5,519

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Inventories	7,810	(29,182)	(3,844)
Other assets and liabilities	(430)	1,127	1,124
Accounts payable	24,549	12,727	(1,820)
Accrued liabilities	10,267	19,361	5,225
Net cash provided by operating activities	161,036	187,870	53,340
Cash flows from investing activities:			
Capital expenditures	(82,904)	(123,012)	(29,466)
Acquisition of Ramaco Coal assets	—	(11,738)	—
Acquisition of Maben assets (bond recovery in 2023)	1,182	(11,897)	—
Acquisition of Amonate assets	(608)	—	(30,147)
Proceeds from sale of mineral rights	—	2,000	—
Insurance proceeds related to property, plant, and equipment	11,256	—	—
Capitalized interest	(1,137)	(1,061)	—
Net cash used for investing activities	(72,211)	(145,708)	(59,613)
Cash flows from financing activities:			
Proceeds from borrowings	130,000	42,000	54,368
Proceeds from stock options exercised	—	107	—
Payments of debt issuance cost	—	—	(2,356)
Payment of dividends	(25,820)	(20,041)	—
Repayment of borrowings	(127,514)	(26,026)	(26,300)
Repayment of Ramaco Coal acquisition financing - related party	(40,000)	(15,000)	—
Repayments of insurance financing	(5,207)	(1,290)	(862)
Repayments of equipment finance leases	(6,659)	(5,062)	(1,942)
Shares surrendered for withholding taxes payable	(7,317)	(3,183)	(539)
Net cash (used for) provided by financing activities	(82,517)	(28,495)	22,369
Net change in cash and cash equivalents and restricted cash	6,308	13,667	16,096
Cash and cash equivalents and restricted cash, beginning of period	36,473	22,806	6,710
Cash and cash equivalents and restricted cash, end of period	$ 42,781	$ 36,473	$ 22,806
Supplemental cash flow information:			
Cash paid for interest (net of $1,137 and $1,061 capitalized in 2023 and 2022)	$ 8,113	$ 5,997	$ 1,601
Cash paid for income taxes	771	15,500	9
Cash received for income tax refund	11,758	—	—
Non-cash investing and financing activities:			
Leased assets obtained under new financing leases	6,144	7,888	10,002
Financed equipment purchases	—	6,409	—
Capital expenditures included in accounts payable and accrued liabilities	4,939	13,404	6,652
Ramaco Coal acquisition financing	—	56,551	—
Maben Coal acquisition financing	—	21,000	—
Financed insurance	5,803	5,587	280
Financed insurance (2022 adjustment recorded in 2023)	(1,136)	—	—
Accrued dividends payable	7,198	5,524	2,501

The accompanying notes are an integral part of these consolidated financial statements.

statements .

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Ramaco Resources, Inc.
Notes to Consolidated Financial Statements

NOTE 1—DESCRIPTION OF BUSINESS

Ramaco Resources, Inc. ("Ramaco" (the "Company," "Ramaco," "we," "us," or "our") is a Delaware corporation formed in October 2016. Our principal corporate and executive offices are located in Lexington, Kentucky. Kentucky with operational offices in Charleston, West Virginia and Sheridan, Wyoming. We are an operator and developer of high-quality, low-cost metallurgical coal in southern West Virginia southwestern Virginia, and southwestern Pennsylvania.

As used herein, "the Company," "we," "us," "our," and similar terms include Ramaco Resources, Inc. and its subsidiaries, unless the context indicates otherwise.

Our development portfolio primarily includes the following properties: Elk Creek, Berwind, Knox Creek and RAM Mine. Each Virginia. We believe each of these properties possesses geologic and logistical advantages that make our coal among the lowest delivered-cost U.S. metallurgical coal to our domestic target customer base, North American blast furnace steel mills and coke plants, as well as international metallurgical coal consumers. In addition, the Company completed acquisitions of Ramaco Coal, LLC ("Ramaco Coal") and Maben Coal, LLC ("Maben Coal") in the second and third quarter of 2022, respectively. With the Ramaco Coal acquisition, we We also control mineral deposits near Sheridan, Wyoming along with facilities that house research and development activities. With the Maben Coal acquisitions, the Company has obtained control of additional coal deposits in Wyoming County and Raleigh County, West Virginia.

Our operations include three deep mines and a surface mine at our Elk Creek mining complex (the "Elk Creek Complex"). Development of this complex commenced in 2016 and included construction of a preparation plant and rail load-out facilities. The Elk Creek property consists of approximately 20,200 acres of controlled mineral rights and contains approximately 16 seams that we have targeted for production. The Company commenced expansion as part of the Elk Creek preparation plant during 2022 to increase production in future periods.

Development Company's initiatives regarding the potential recovery of our Berwind mining complex (the "Berwind Complex") began in late-2017. In 2020, we suspended development at the Berwind Complex due to lower pricing and demand largely caused by the COVID-19 outbreak. In early-2021, as pricing and demand improved, Berwind development was restarted. We successfully reached the thicker Pocahontas No. 4 seam in late 2021. In December 2021, we completed the acquisition of "Amonate Assets" from subsidiaries of Coronado Global Resources Inc. ("Coronado"), which include controlled mineral rights and a processing plant located in our Berwind Complex, saving us transportation costs to our Knox Creek plant 26 miles away. The Berwind Complex experienced an ignition event during 2022 that resulted in idling mining operations for one of the active mines. Production from the affected mine restarted in the first quarter of 2023.

Our Knox Creek facility includes a preparation plant and controlled mineral rights that we expect to develop in the future. The Knox Creek preparation plant processes coal from our Berwind Complex (until the newly acquired plant at the Berwind Complex is placed into operation) rare earth elements as well as the potential commercialization of coal-to-carbon-based products and materials.

Although conflicts overseas continue and global economic growth remains uncertain, supply constraints support the global metallurgical coal mined from the rights acquired in the Maben Coal transaction and coal purchased from third parties.

Our RAM Mine property is located in southwestern Pennsylvania and is scheduled for initial production after a mining permit is issued and market conditions warrant development.

COVID-19—Uncertainty related toCOVID-19 continues to linger across the world. The Company actively monitors for developments and may take further actions altering our business operations that we determine are in the best interests of our employees, customers, suppliers, and stakeholders, or as required by federal, state, or local authorities.

Russia/Ukraine Conflict--Regarding the military conflict involving Russia and Ukraine, resulting sanctions and future market or supply disruptions in the region, are impossible to predict, but could be significant and may have a severe adverse effect market. Ongoing bans on the region. Globally, various governments import of Russian coal have banned imports from Russia including commodities such affected the availability of supply to certain seaborne markets as oil, natural gas and coal. These events have well as contributed to volatility in the commodity markets. This volatility, including market expectations of potential changes in coal prices and inflationary pressures on steel

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products, may have a significant effect on market prices and overall demand for our coal and the cost of supplies and equipment. We are closely monitoring the potential effects on the market.

We have no meaningful direct financial exposure to Russia and Ukraine; however, the European Union ban on Russian coal has put upward pressure on international thermal coal prices. In addition, fear of economic contraction may affect future demand for coking coal.

NOTE 2—SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Basis of Presentation and Consolidation—The accompanying consolidated financial statements have been prepared in accordance with accounting principles generally accepted in the United States of America ("U.S. GAAP") and U.S. Securities and Exchange Commission regulations. The financial statements are presented on a consolidated basis for all periods presented. All significant intercompany balances and transactions between consolidated entities have been eliminated in consolidation. Certain prior year amounts in the Notes to Consolidated Financial Statements have been adjusted to conform to current presentation.

Use of estimates—The preparation of these financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect certain reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements, and the reported amounts of revenue and expenses during the reporting period. Actual results could differ from those estimates. The most significant estimates are related to the quantity and value of coal inventories, stock-based compensation, asset retirement obligations, occupational disease obligations, evaluation of long-lived assets for impairment, and the quantities and values of coal reserves, depletion and amortization, useful lives, and income taxes.

Revenue Recognition—Our primary source of revenue is from the sale of coal through contracts with steel producers usually having durations of less than one year. Revenue is recognized when performance obligations under the terms of a contract with our customers are satisfied. This occurs when control of the coal is transferred to our customers. For coal shipments to domestic customers via rail, control is generally transferred when the railcar is loaded. Control is transferred for export coal shipments to customers via ocean vessel when the vessel is loaded at the port.

Our coal sales generally include up to 90-day payment terms following the transfer of control of the goods to our customer. In the case of some of our foreign customers, our contracts also require that letters of credit are posted to secure payment of any outstanding receivable. We do not include extended payment terms in our contracts. Our contracts with customers typically provide for minimum specifications or qualities of the coal we deliver. Variances from these specifications or qualities are settled by means of price adjustments. Generally, these price adjustments are settled within 30 days of delivery and are insignificant.

Certain of our contracts with customers include provisions in which the price is derived from an index. If control of the goods transfers to the customer in the period before the final price is determined, revenue is recorded based on the estimated consideration to be received. The Company estimates the amount to which it expects to receive by reference to forward curve or other relevant data. These data, if available, and generally does not constrain such estimates have not been constrained for accounting purposes

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due to the short period of time over which the uncertainty is resolved. However, certain estimates of provisional pricing for which no forward curve data was available were constrained at December 31, 2023 due to index volatility.

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Freight Revenue and Expense—Costs incurred to transport coal to the point of sale at the port facility are included in cost of sales and the gross amounts billed to customers to cover shipping to and handling of the coal at the port are included in revenue.

Cash and Cash Equivalents—We classify all highly-liquid instruments with an original maturity of three months or less as cash equivalents. Restricted cash balances at December 31, 2023 and December 31, 2022 were $0.8 million and December 31, 2021 were $0.9 million, respectively, and consisted of funds held in escrow for potential future workers' compensation claims. Restricted cash balances were included in other current assets on the consolidated balance sheets. sheet. The Company pools individual bank accounts with the same institution for the purpose of assessing if a bank overdraft exists based on the contractual terms of the arrangement.

Inventories— Coal is reported as inventory at the point in time it is extracted from the mine. Coal inventories are valued at the lower of average cost or net realizable value, with cost determined on a first-in, first-out inventory valuation method. Coal inventory costs include labor, supplies, equipment costs, freight, operating overhead,

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depreciation and amortization. Coal inventory quantities are adjusted periodically based on aerial surveys of coal stockpiles. Lower of cost or net realizable value adjustments were not material. Supply inventories are valued at average cost. Coal inventories at December 31, 2022, were made up Inventories consisted of $22.4 million of raw coal, $18.2 million of saleable coal, and $4.4 million of supplies. Coal inventories at December 31, 2021, were made up of $12.5 million of saleable coal, $2.6 million of supplies, and $0.7 million of raw coal. the following:

(In thousands)	December 31, 2023	December 31, 2022
Raw coal	$ 20,122	$ 22,414
Saleable coal	12,013	18,223
Supplies	5,028	4,336
Total inventories	$ 37,163	$ 44,973

Property, Plant and Equipment—Property, plant and equipment is recorded at cost. Expenditures which extend the useful lives of existing plant and equipment are capitalized. Planned major maintenance costs which do not extend the useful lives of existing plant and equipment are expensed as incurred. When assets are retired or otherwise disposed, the related cost and accumulated depreciation are removed from the respective accounts and any profit or loss on disposition is recognized in the consolidated statements of operations.

Coal exploration costs are expensed as incurred. Coal exploration costs include those incurred to ascertain existence, location, extent or quality of ore or minerals before beginning the development stage of the mine.

Mining property and mineral rights costs represent the costs incurred to acquire the rights to access and mine certain coal property either through deeds, leases, or other conveyance agreements. These costs include the costs of acquiring, and accessing mineral reserves, resources and surface areas for mining activities.

Mine development begins when the facts and circumstances clearly establish the presence of a commercial mineralized deposit. Capitalized mine development costs represent the costs incurred to prepare mine sites and/or seams of coal for future mining. These costs include costs of acquiring, permitting, planning, research, and developing access to identified mineral reserves and other preparations for commercial production as necessary to develop and permit the properties for mining activities. When components of capitalized mine development costs are replaced with new components, the Company capitalizes the replacement as a separate component and charges off the net book value of the component that was replaced at the cease-use date.

If it is determined that an undeveloped mineral interest cannot be economically converted into proven and probable reserves, capitalized costs are assessed for impairment and future development costs are expensed as incurred.

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Operating expenditures, including certain professional fees and overhead costs, are not capitalized but are expensed as incurred.

Mineral rights and capitalized mine development costs are depleted and amortized on a units-of-production basis as mining of that mine's assigned reserves takes place. Depreciation of plant and equipment is calculated on the straight-line method over their estimated useful lives ranging from three to thirty years.

Advanced Coal Royalties—In most cases, we acquire the right to mine coal reserves under leases which call for the payment of royalties on coal as it is mined and sold. In many cases, these mineral leases require the payment of advance or minimum coal royalties to lessors that are recoupable against future production royalties. These advance payments are deferred and charged to operations as the coal reserves are mined.

Impairment of Long-lived Assets—We review and evaluate held-and-used long-lived assets, including property, plant and equipment and mine development costs, for impairment when events or changes in circumstances indicate that the asset or asset group's carrying value may not be recoverable. Recoverability is measured by comparing the carrying amount of the asset or asset group to the estimated undiscounted future cash flows expected to be generated by the asset or asset group. If the carrying amount of the asset or asset group exceeds its estimated undiscounted future cash flows, an impairment loss is recorded for the excess of the carrying amount over the estimated fair value, if any. We may, under limited circumstances, idle mining operations in response to certain events or conditions. Because an idling is not a permanent closure, it is not considered an automatic indicator of impairment.

Asset Retirement Obligations—Legal obligations associated with the retirement of long-lived assets are initially recognized at their estimated fair value, with a corresponding charge to capitalized development costs, at the time they are incurred. Our asset retirement obligations primarily consist of spending estimates related to reclaiming metallurgical coal land and support facilities in accordance with federal and state reclamation laws as defined by each mining permit. Spending estimates are adjusted for inflation and then discounted at the credit-adjusted, risk-free rate. We record the fair

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value of a liability for an asset retirement obligation in the period in which it is incurred and a corresponding increase in the carrying amount of the related long-lived asset. The liability is accreted to its present value each period over time and the capitalized cost is amortized using the units-of-production method over estimated recoverable reserves upon commencement of mining. We review our asset retirement obligations on at least an annual basis for significant changes in the estimated timing or amount of cash flows.

Occupational Disease (Pneumoconiosis) Obligations. We recognize as a liability to provide for occupational disease (pneumoconiosis) benefits to eligible employees, former employees and dependents as required by the Federal Mine Safety and Health Act of 1969, as amended. The occupational disease benefit obligation represents the present value of the actuarially computed liabilities for such benefits over the employees' applicable years of service.

Estimating our occupational disease (pneumoconiosis) benefits obligation requires management to make estimates and judgments regarding timing and existence of a liability utilizing third-party actuaries to assist in preparing what constitutes adequate liability amounts. Inherent in the calculation are numerous assumptions and judgments including the ultimate costs, inflation mortality factors, credit adjusted credit-adjusted discount rates, and timing of settlement awards in the legal and regulatory environments. settlement. Adjustments to

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estimated liabilities due to changes in actuarial assumptions are recorded immediately in earnings in the period in which the change in estimate occurs.

Other Income—We accounted for the SBA Paycheck Protection Program Loan ("PPP Loan") as an in-substance government grant because we expected to meet the PPP Loan forgiveness eligibility criteria and concluded that the loan represents, in substance, a grant that is expected to be forgiven. Proceeds from the PPP Loan were initially recognized as a deferred income liability. Subsequently, we reduced this liability and recognized income on a systematic basis over the period in which the related costs for which the PPP Loan was intended were incurred. PPP Loan income is presented as other income within the consolidated statements of operations for 2020.

In addition, we recognized $5.4 million associated with the Coronavirus Aid, Relief and Economic Security Act Employee Retention Tax Credit as other income within the consolidated statements of operations for 2021.

Leases—We determine if an arrangement is or contains a lease at contract inception, and lease classification is determined at the commencement date. Leases are recognized on the balance sheet as right-of-use ("ROU") assets and lease liabilities except for leases with a term of 12 months or less.

ROU assets represent our right to use an underlying asset for the lease term and lease liabilities represent our obligation to make lease payments arising from the lease. Operating and finance lease ROU assets and liabilities are recognized at commencement date based on the present value of the fixed lease payments over the lease term. The

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Company does not separate lease and non-lease components for all leases as permitted under the accounting guidance for leases. As most of our leases do not contain a readily determinable implicit rate, we generally use our incremental borrowing rate based on the estimated rate of interest for collateralized borrowing over a similar term of the lease payments at commencement date. The operating and finance lease ROU assets also include lease prepayments made by the Company and are reduced by any lease incentives received by the Company prior to commencement. Our lease terms may include options to extend or terminate the lease when it is reasonably certain that we will exercise that option. For operating leases, lease expense is recorded in the income statement based on a straight-line recognition of the total fixed payments over the lease term. For finance leases, accretion of the liability is recognized as interest expense and the ROU asset is amortized separately on a straight-line basis similar to the depreciation of equipment owned by the Company.

Leases of mineral reserves and the related land leases are exempted under U.S. GAAP from recognition on the consolidated balance sheets.

Fair Value Measurements— Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. Assets and liabilities that are recognized or disclosed at fair value are categorized in the fair value hierarchy based on the observability of the inputs utilized in the valuation. The levels of the hierarchy include: Level 1 - inputs are quoted prices in active markets for the identical assets or liabilities; Level 2 - inputs are other than quoted prices included in Level 1 that are directly or

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indirectly observable through market-corroborated inputs; and Level 3 - inputs are unobservable, or observable but cannot be market-corroborated, requiring us to make assumptions about pricing by market participants.

The fair values of cash and cash equivalents, accounts receivable, restricted cash, and accounts payable approximate their carrying amounts at each reporting date. The Company's Senior Notes have had an estimated fair value of $36 million $35.5 million and $38 million $36.3 million at December 31, 2022 December 31, 2023 and 2021, 2022, respectively. The fair values of the Company's Senior Notes were based on observable market prices and were considered a Level 2 measurement at December 31, 2022 December 31, 2023 and a Level 1 measurement at December 31, 2021 December 31, 2022 based on trading volumes. The difference between the fair value and carrying amount of the Company's remaining debts is not material due to the similarity between the terms of the debt agreements and prevailing market terms available to the Company. Refer to Note 7 for additional information regarding debt.

Nonrecurring fair value measurements of the Company include asset retirement obligations and estimated values used to allocate the acquisition cost of long-lived assets to individual assets, neither of which are subject to the fair value disclosure requirements.

The fair value of asset retirement obligations is determined as the present value of estimated cash flows related to reclamation obligations, which is would likely be a Level 3 measurement due to the use of unobservable inputs such as estimates regarding the amount and timing of costs to be incurred, inflation rates, and the Company's credit-adjusted discount rate, and inflation rates. rate.

The consideration for the Company's prior year acquisitions was allocated based on the relative fair values of the assets acquired, the primary asset of which was mineral rights. The fair values of mineral rights were determined based on Level 3 inputs, which are generally unobservable, requiring the Company to make assumptions about future coal prices, capital expenditures, future coal production, costs of production, and an appropriate rate at which to discount the future cash flows.

Income Taxes—Income tax expense (benefit) includes Federal and state income taxes. Certain income and expenses are not reported in tax returns and financial statements in the same year. The tax effect of such temporary differences is reported as deferred income taxes. We account for deferred income taxes by applying statutory tax rates in effect at the reporting date of the balance sheet. A valuation allowance is established if it is more likely than not that the related tax benefits will not be realized. In determining the appropriate valuation allowance, we consider the projected realization of tax benefits based on expected levels of future taxable income, available tax planning strategies and reversals of existing taxable temporary differences. The Company had no valuation allowances on the balance sheet as of December 31, 2023 and 2022.

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Uncertain tax positions are recognized only if it is more likely than not that the tax position will be sustained on examination by the taxing authorities, based on the technical merits of the position. We had no uncertain tax positions requiring liability recognition as of December 31, 2022 December 31, 2023 and 2021. 2022. We file income tax returns in the U.S. and in various state and local jurisdictions which may be routinely examined by tax authorities. The statute of limitations for examination of the Company's tax filings by taxing authorities is currently open for all tax returns filed. filed for the year 2020 and thereafter.

The Company recognizes accrued interest related to income tax matters in interest expense, net, separately from the tax provision recorded in income tax expense on the income statement.

Segment Reporting—Our properties located in West Virginia Virginia and Pennsylvania Virginia each consist of mineral reserves for production of metallurgical coal from both underground and surface mines. These operations are within the Appalachian basin. Geology, coal transportation routes to customers, regulatory environments and coal quality or type are characteristic to a basin. For financial reporting purposes, these operations represent a single segment because each possesses similar production methods, distribution methods, and customer quality and consumption characteristics, resulting in similar long-term expected financial performance.

The Ramaco Coal acquisition in 2022, as discussed in greater detail in Note 4, provides the Company with royalty savings and controlled mineral rights as well as a research and pilot facility located near Sheridan, Wyoming related to the Company's possible expansion into the manufacturing and commercialization of advanced carbon products and materials from coal. The Wyoming Wyoming. This property

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includes a thermal coal deposit and permit and is currently undergoing mineral analysis and core drilling to assess potential concentrations of rare earth elements. The Company refers property also includes a research and pilot facility related to this potentially new business line the Company's possible expansion into the manufacturing and commercialization of advanced carbon products and materials from coal. Research and development expenses related to advanced carbon products and materials are not yet material for separate disclosure. Ramaco is also a party to certain collaborative arrangements with government researchers and other organizations, which involve providing in-kind contributions such as "CORE" (Carbon Ore-Rare Earth), signifying its focus on carbon ore ores, samples, feedstock, and rare earth elements. services.

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CORE represents The activities at the Sheridan property represent a separate operating segment and has have economic and geographic differences compared to the Company's metallurgical operations in the Appalachian basin; however, CORE does basin. Nonetheless, these activities do not meet the significance tests for separate disclosure as a reportable segment at this time. In addition, reconciling items of the metallurgical coal segment to the Company's consolidated results are not yet material.

The chief operating decision maker does not regularly review segment asset information for the purpose of assessing performance and making resource allocation decisions.

Stock-Based Compensation—Compensation cost for equity awards is based on the grant-date fair value of the award and is recognized over the requisite service period. Forfeitures are recognized as they occur.

The fair values of restricted stock and restricted stock unit awards having only a service condition were determined using the publicly-traded price of our common stock on the grant date. The fair value of performance stock units, which vest based on the achievement of relative total shareholder return goals, was determined on the date of grant based on a Monte Carlo simulation. The fair value of stock option awards was calculated using the Black-Scholes option-pricing model. The Black-Scholes model requires us to make assumptions and judgments about the variables used in the calculation, including the expected term, expected volatility, risk-free interest rate, dividend rate and service period.

Concentrations—Our current operations are all related to metallurgical coal within the mining industry. A reduction in metallurgical coal prices or other disturbances in the metallurgical coal markets could have an adverse effect on our operations. financial results. In 2023, 2022, and 2021, and 2020, approximately 58% 33%, 51% 58%, and 71% 51%, respectively, of our revenue was derived from coal shipments to customers in North American markets. The decrease in North American revenue in 2023 was due to sales within the United States.

During 2023, sales to three customers accounted for 15%, 13%, and 13% of our revenues, or collectively 41% of total revenue. During 2022, sales to two customers accounted for 21% and 17% of our revenues, or collectively 38% of total revenue. During 2021, sales to three customers accounted for 30%, 15%, and 13% of our revenues, or

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collectively 58% of total revenue. The number of customers comprising the concentrations above is based on a threshold of 10% or more of total revenues.

Financial instruments that potentially subject us to a significant concentration of credit risk consist primarily of cash and cash equivalents, restricted cash, and accounts receivable. We maintain deposits in federally insured financial institutions in excess of federally insured limits. We monitor the credit ratings and concentration of risk with these financial institutions on a continuing basis to safeguard our

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cash deposits. In addition, the Company is party to an arrangement that began in 2023 whereby our cash and cash equivalents are placed at various banks in amounts no greater than the $250,000 FDIC-insured limit to help safeguard against potential losses in the financial sector.

We have a limited number of customers. Contracts with these customers provide for billings principally upon shipment and compliance with payment terms is monitored on an ongoing basis. Outstanding receivables beyond payment terms are promptly investigated and discussed with the specific customer. We estimate an allowance for doubtful accounts credit losses by taking into consideration the age of past due accounts and an assessment of our customers' ability to pay. An allowance for doubtful accounts credit losses was not necessary as of December 31, 2022 December 31, 2023 and 2021. 2022.

During 2022, sales to two Three customers accounted for approximately 38% 22%, 19%, and 15%, of total revenue. The total our trade receivables, or collectively 56% of the Company's accounts receivable balance due from these customers at December 31, 2022 was approximately 32% of total accounts receivable. During 2021, sales to three customers accounted for approximately 58% of total revenue. The total balance due from these customers at December 31, 2021 was approximately 58% of total accounts receivable. During 2020, sales to three customers accounted for approximately 70% of total revenue. December 31, 2023. The number of customers comprising the concentrations above is based on a threshold of 10% or more of total revenues and related receivables. accounts receivable.

Recent Accounting Pronouncements Adopted Standards Updates

In June 2016, October 2023, the Financial Accounting Standards Board ("FASB") issued Accounting Standards Update ("ASU") 2023-06, *Disclosure Improvements: Codification Amendments in Response to the SEC's Disclosure Update and Simplification Initiative* ("ASU 2023-06"). The amendments in ASU 2023-06 clarify or improve disclosure and presentation requirements for a variety of topics, including debt and earnings per share. The effective date for each amendment in ASU 2023-06 will be the effective date of the SEC's removal of that related disclosure from existing SEC regulations, and each amendment should be applied prospectively after its effective date. A material impact to our disclosures is not expected at this time since the Company is already subject to existing SEC disclosure requirements.

In November 2023, the FASB issued ASU 2016-13, 2023-07, *Financial Instruments—Credit Losses Segment Reporting (Topic 280): Improvements to Reportable Segment Disclosures*, ("ASU 2023-07"). The amendments in ASU 2023-07 require incremental disclosures related to a public entity's reportable segments and increase the frequency with which replaces most segment disclosures are made. Incremental disclosures required by the existing incurred ASU include significant segment expenses regularly provided to the chief operating decision maker ("CODM") and included within the segment's measure of profit or loss, impairment model the title and position of the CODM and an explanation how the CODM uses the reported measure of a segment's profit or loss to assess performance and allocate resources, and the amount and composition of other segment items necessary to reconcile segment revenue, significant expenses, and the reported measure of profit or loss. The ASU also expands interim disclosure requirements such that nearly all annual quantitative segment disclosures will be made on an interim basis and requires that entities with a methodology single reportable segment provide all segment disclosures that reflects expected credit losses and requires consideration of a broader range of reasonable and supportable information to inform credit loss estimates. We adopted this standard effective January 1, 2020. The adoption of this ASU did are not have a material impact on our consolidated evident from the primary financial statements, because we do not have including significant segment expenses, consistent with the approach used by management to evaluate performance. ASU 2023-07 is effective starting with Ramaco's 2024 annual financial statements and on a history quarterly basis thereafter. Retrospective application is required. The Company is currently evaluating the impact of credit losses on our financial instruments and have no material expected losses. the ASU; however, incremental disclosures will likely occur upon adoption.

In August 2018, December 2023, the FASB issued ASU 2018-15, 2023-09, *Internal-Use Software Income Taxes (Topic 740): Improvements to Income Tax Disclosures*, which addresses ("ASU 2023-09"). The amendments in ASU 2023-09 require reporting entities to disclose annual income taxes paid, net of refunds, disaggregated by federal, state, and foreign taxes and to provide additional disaggregated information for individual jurisdictions that equal or exceed 5% of total income taxes paid, net of refunds. ASU 2023-09 also requires public business entities to disclose additional categories of information about federal, state, and foreign income taxes in their annual rate reconciliation table and provide more information about some categories if the accounting for implementation costs associated with a hosted service. quantitative threshold is met. The standard provides that implementation costs be evaluated for capitalization using the same criteria as that used for internal-use software development costs, with amortization expense being recorded ASU will also require disclosure of amounts *and* percentages in the same annual rate reconciliation table, rather than amounts *or* percentages, and will eliminate certain existing disclosure requirements related to uncertain tax positions and unrecognized deferred tax liabilities. ASU 2023-09 is effective starting with Ramaco's 2025 annual financial statements and may be applied prospectively to only the income statement expense line as the hosted service costs and over the expected term of the tax disclosures

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hosting arrangement. We adopted this standard as provided for 2025 or retrospectively by providing revised disclosures for all periods presented. Early adoption is permitted. The Company is currently evaluating the impact of January 1, 2020, the ASU; however, incremental disclosures will likely be provided on a prospective basis. The adoption of this ASU did not have a material impact on our consolidated basis in the Company's 2025 annual financial statements. statements upon adoption.

In December 2019, the FASB issued ASU 2019-12, *Income Taxes*, which enhances and simplifies various aspects of the income tax accounting guidance, including requirements such as tax basis step-up in goodwill obtained in a transaction that is not a business combination, ownership changes in investments, and interim-period accounting for enacted changes in tax law. The standard was effective for us in the first quarter of 2021. The adoption of this ASU did not have a material impact on our consolidated financial statements.

In March 2020, the FASB issued ASU 2020-04, *Reference Rate Reform (Topic 848): Facilitation of the Effects of Reference Rate Reform on Financial Reporting,* which became effective immediately.The amendments in ASU 2020-04 provide optional relief regarding the accounting effects of reference rate reform, including various types of contract modifications (e.g., debt) as well as hedging relationships. Overall, the guidance permits financial reporting that generally reflects the intended continuation of contracts that reference rates, such as the London Interbank Offered Rate ("LIBOR"), that are expected to be discontinued as a result of reference rate reform initiatives. In December 2022, the FASB issued ASU 2022-06, which defers the sunset date of ASC 848 from December 31, 2022 to December 31, 2024. The Company had previously entered into a term loan that referenced LIBOR; however, this debt was repaid in the fourth quarter of 2022 and, therefore, a contract amendment to replace LIBOR is not required. The Company is unaware of any additional references to rates that will be discontinued under reform initiatives.

NOTE 3—PROPERTY, PLANT, AND EQUIPMENT

Property, plant, and equipment consisted of the following:

	December 31,		December 31,	
(In thousands)	2022	2021	2023	2022
Plant and equipment	$ 232,885	$ 167,019	$ 290,060	$ 232,885
Mining property and mineral rights	120,760	26,064	120,532	120,760
Construction in process	34,698	9,972	13,984	34,698
Capitalized mine development costs	153,436	104,291	174,260	153,436
Less: accumulated depreciation and amortization	(111,937)	(80,269)		
Total property, plant and equipment, net	$ 429,842	$ 227,077		
Less: accumulated depreciation, depletion, and amortization			(139,745)	(111,937)
Total property, plant, and equipment, net			$ 459,091	$ 429,842

Capitalized amounts related to coal reserves at properties where we are not currently engaged in mining operations totaled $17.4 million as of December 31, 2023 and $33.4 million as of December 31, 2022 and $25.1 million as of December 31, 2021.

In addition to the amounts discussed above, on On July 10, 2022, the Company experienced a methane ignition at the Berwind No. 1 mine, which was one of the active mines at our Berwind mining complex. The other mines resumed production while the Berwind No. 1 mine was idled until a full investigation could be conducted. There were no personnel in the mine at the time of the incident and no injuries or fatalities occurred. The overall impact to pre-tax earnings in 2022 was immaterial except for idle mine costs of $9.5 million recognized during the year. Production from the Berwind No. 1 mine restarted in the first quarter of 2023. The Company received $9.2 million of insurance proceeds during 2023 related to this matter, which have been reported as part of *Insurance proceeds related to property, plant, and equipment* in the investing activities section of the Consolidated Statements of Cash Flows, and recognized a gain of $8.1 million in *Other income (expense), net* on the Consolidated Statement of Operations in 2023 as the Company had previously accrued a $1.1 million recovery asset at December 31, 2022.

Mining property and mineral rights are made up primarily of significant asset acquisitions that occurred in 2022 and 2021. Refer to Note 4 for more information.

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Depreciation, depletion, and amortization included:

(In thousands)	Year ended December 31, 2022	2021	2020	Year ended December 31, 2023	2022	2021
Depreciation of plant and equipment	$ 24,132	$ 17,945	$ 17,094	$30,913	$24,132	$17,945
Amortization of right of use assets (finance leases)	4,846	1,109	—			
Amortization and depletion of capitalized mine development costs and mineral rights	12,216	7,151	3,818			
Amortization of right-of-use assets (finance leases)				8,547	4,846	1,109
Amortization and depletion of capitalized mine development costs and mineral rights				14,792	12,216	7,151
Total depreciation, depletion, and amortization	$ 41,194	$ 26,205	$ 20,912	$54,252	$41,194	$26,205

NOTE 4—ACQUISITIONS

Ramaco Coal

On April 29, 2022, the acquisition of Ramaco Coal, an entity owned by an investment fund managed by Yorktown Partners and certain members of the Company's management, was completed pursuant to a Purchase and Sale Agreement, dated February 23, 2022. The purchase price was approximately $65 million, consisting of an initial payment of $10 million paid at closing and a deferred purchase price of $55 million to be paid during the remainder of 2022 in $5 million

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$5 million ratable quarterly installments, and $10 million ratable quarterly installments to be paid in 2023 plus interest at a rate of 9%.

Ramaco Coal controls certain coal mineral interests of principally metallurgical coal properties which are owned in fee or leased under long-term leases that are, in turn, leased or subleased to the Company and various third parties. Such lessees pay a royalty based on the amount of metallurgical coal mined and the realized price per ton.

Ramaco Coal also controls a large thermal coal deposit and permit near Sheridan, Wyoming covering approximately 16 thousand acres, including a research and development facility and associated equipment and has a goal of converting coal to carbon products, such as graphene, graphite and carbon fiber.

Concurrent with this acquisition, the Company and Ramaco Coal each sold certain mineral rights located in West Virginia (the “Split Ridge Arrangement”). To compensate for the sale of these rights, we received an overriding royalty arrangement which included $2 million up

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front and $125 thousand quarterly minimum royalty payment beginning in January 2024 until December 2028. The fair value of this arrangement was $3.7 million, of which, $1.6 million was treated as an allocation of the fair value of this disposed component of Ramaco Coal and, separately, a $2.1 million gain on the sale of the Company's mineral rights included in *Other income (expense), net* on the 2022 Consolidated Statement of Operations.

The acquisition of Ramaco Coal was accounted for as a purchase of assets due to substantially all of the fair value being concentrated in a single asset, the rights to metallurgical coal deposits. The consideration paid in connection with the acquisition of Ramaco Coal, including $1.6 million in closing costs, relinquishment of $1.6 million of prepaid royalties and $0.1 million paid to a mineral owner as part of the acquisition, was approximately $68.3 million and was allocated based on fair values to mining property and mineral rights ($65.1 million), buildings ($2.6 million) and equipment ($0.6 million). Refer to Note 7 for a description of the acquisition financing.

Maben Coal

On September 23, 2022, the Company completed the acquisition of 100% of the equity interests of Maben Coal, LLC ("Maben Coal") pursuant to the Securities Purchase Agreement dated August 8, 2022, with Appleton Coal, LLC. The purchase price was approximately $30.0 million, consisting of an initial payment of $9.0 million and proceeds from a new two-year loan in the amount of $21.0 million. The Company also paid approximately $1.7 million of transaction costs and recognized liabilities of $1.3 million on the closing date, primarily related to $1.2 million of cash bond replacement obligations incurred by the Company as part of the transaction. In October the fourth quarter of 2022, the Company paid

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off the $1.2 million cash bond replacement obligation to Appleton Coal, LLC, which has been was included in the investing activities section of the statement of cash flows. The $1.2 million bond replacement payment was subsequently recovered in 2023, which reduced the cash investment related to this transaction to $10.7 million.

We acquired a large coal deposit on approximately 28 thousand leased acres located in Wyoming County and Raleigh County, West Virginia. We assumed existing mining permits issued by the West Virginia Department of Environmental Protection, which authorize authorizes mining by both surface and highwall mining methods as well as by underground methods. The property also has issued permits covering an existing haul road, as well as an active refuse disposal area together with a preparation plant and unit train loadout, neither of which had been constructed as of the closing date.

The acquisition of Maben Coal was accounted for as a purchase of assets due to substantially all of the fair value being concentrated in a single asset, the rights to leased metallurgical coal deposits. The total consideration of approximately $33.0 million was allocated to mining property and mineral rights ($30.6 million), capitalized mine development costs ($1.0 million), receivable for the right to recover cash bond replacement payments made by the Company as discussed above ($1.2 million) million, which was received in 2023), and recoupable royalties ($0.2 million). Refer to Note 7 for information regarding the acquisition financing.

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Amonate Assets

In December 2021, we acquired what are referred to as the "Amonate Assets" from Coronado, pursuant to an asset purchase agreement. The acquisition, for a total cash consideration of $30 million, included a mine complex located in McDowell County, West Virginia and Tazewell County, Virginia adjacent and contiguous to the Company's existing Berwind Complex. The acquisition primarily consists of high quality, high-quality, low and mid-vol metallurgical coal reserves and resources, much of which will be mined from the Company's Berwind Complex. Also purchased were several additional permitted mines and a currently idled 1.3-million-ton per annum capacity coal preparation plant. The Company paid an additional $0.6 million in 2023 for transaction-related costs, which was also included in investing activities since the delay in payment was due to administrative reasons rather than financing.

NOTE 5—ASSET RETIREMENT OBLIGATIONS

We estimate asset retirement obligations ("ARO") for final reclamation based upon detailed engineering calculations of the amount and timing of the future cash spending for a third-party third party to perform the required work. Amounts recorded related to asset retirement obligations were as follows:

(In thousands)	December 31, 2022	December 31, 2021	December 31, 2023	December 31, 2022
Balance at beginning of year	$ 22,549	$ 15,156	$28,885	$22,549
Additional asset retirement obligations acquired/incurred	1,440	6,919	542	1,440
Expenditures made	—	(62)	—	—
Accretion expense	1,115	615	1,403	1,115
Revisions to estimates	3,781	(79)	(1,870)	3,781
Balance at end of year	$ 28,885	$ 22,549	$28,960	$28,885

NOTE 6—ACCRUED EXPENSES LIABILITIES AND OTHER LONG-TERM LIABILITIES

Accrued liabilities at December 31, 2023 consisted of accrued compensation of $14.6 million and various other liabilities. Accrued expenses at December 31, 2022 consisted of accrued compensation and related benefits of $14.3 million, accrued purchases of $11.5 million, and various other liabilities. Accrued expenses at December 31, 2021 consisted of accrued compensation and related benefits of $5.6 million, accrued purchases of $2.8 million, $12.1 million and various other liabilities. The Company sponsors a defined contribution plan to assist eligible employees in providing for their future retirement needs. The Company's contributions Contribution expenses related to the plan totaled $2.3 million $3.1 million, $1.2 million $2.3 million, and $0.9 million $1.2 million for the years ended December 31, 2022 December 31, 2023, 2021, 2022, and 2020, 2021, respectively.

Other long-term liabilities were comprised primarily of worker's compensation and occupational disease obligations discussed below.

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Workers' Compensation and Occupational Disease Obligations

We are self-insured for certain losses relating to workers' compensation claims and occupational disease obligations under the Federal Mine Safety and Health Act of 1969, as amended. Starting in 2023, the Company also elected to self-insure employee medical expenses. We purchase insurance coverage to reduce our exposure to significant levels of these claims. Self-insured losses are accrued based upon estimates of the aggregate liability for uninsured claims incurred as of the balance sheet date using current claims data and historical claims experience and certain actuarial assumptions. The occupational disease benefit obligation represents the present value of the actuarially

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computed liabilities for such benefits over the employees' applicable years of service. The occupational disease benefit liability was calculated using a discount rate of 5.60% 5.3% and 3.26% 5.6% at December 31, 2022 December 31, 2023 and 2021, 2022, respectively.

As of December 31, 2023, the estimated aggregate liability for uninsured claims totaled $5.2 million, including $2.3 million of occupational disease obligations. Of the aggregate liability, $3.1 million was included in *Other long-term liabilities* on the Consolidated Balance Sheet. As of December 31, 2022, the estimated aggregate liability for uninsured claims totaled $3.6 million, including $1.5 million of occupational disease obligations. Of the aggregate liability, $2.7 million was included in other*Other long-term liabilities* within the consolidated balance sheets. As Consolidated Balance Sheet.

Table of December 31, 2021, the estimated aggregate liability for uninsured claims totaled $3.9 million, including $1.4 million of occupational disease obligations. Of the aggregate liability, $2.4 million was included in other long-term liabilities within the consolidated balance sheets. Contents

NOTE 7—DEBT

Our outstanding debt consisted of the following:

(In thousands)	December 31, 2022	December 31, 2021	December 31, 2023	December 31, 2022
Term loan	$ —	$ 3,334		
Revolving Credit Facility	25,000	—	$ 42,500	$ 25,000
Equipment loans	8,396	7,679	2,983	8,396
Senior Notes, net	32,830	32,363	33,296	32,830
Financing of Ramaco Coal acquisition - Related party debt	40,000	—	—	40,000
Financing of Maben Coal acquisition	21,000	—	11,400	21,000
Total debt	$ 127,226	$ 43,376	$ 90,179	$ 127,226
Current portion of long-term debt	75,639	7,674	56,534	75,639
Long-term debt, net	$ 51,587	$ 35,702	$ 33,645	$ 51,587

Revolving Credit Facility and Term Loan— Facility—On November 2, 2018 February 15, 2023, we entered into a Credit and Security Agreement (as amended or amended and restated) with KeyBank National Association ("KeyBank"), as the administrative agent, and other lenders party thereto. The Credit Agreement was amended on February 20, 2020 and March 19, 2021. On October 29, 2021, we Company entered into the Amendment and Restatement with KeyBank. Prior to the Amendment and Restatement, the Credit Agreement consisted of the $10.0 million Term Loan and up to $30.0 million revolving line of credit, including $3.0 million letter of credit availability. The Amendment and Restatement increased the overall availability under the revolving credit line to $40.0 million and extended the maturity date to December 31, 2024. All personal property assets, including, but not limited to accounts receivable, coal inventory and certain mining equipment are pledged to secure the Revolving Credit Facility. On April 29, 2022, we entered into the First Amendment to the Second Amended and Restated Credit and Security Agreement, with which includes KeyBank to allow for the Ramaco Coal acquisition. On September 23, 2022 National Association ("KeyBank"), we entered into a Second Amendment to the Amended and Restated Credit and Security Agreement with KeyBank to allow for the Maben Coal acquisition.

multiple lending parties. The Revolving Credit Facility facility, which has a maturity date of December 31, 2024 February 15, 2026, provides an initial aggregate revolving commitment of $125.0 million as well as an accordion feature of $50 million subject to certain terms and bears conditions, including lender's consent. The borrowing base at December 31, 2023 was $91.1 million based on eligible accounts receivable and inventory collateral and reserve requirements. The remaining availability under the facility at December 31, 2023, after $42.5 million of outstanding borrowings, was $48.6 million.

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Revolving loans under the facility bear interest based on at either the base rate plus 1.50% or the Secured Overnight Financing Rate ("SOFR") + 2.0% or Base Rate + 1.5% plus 2.00%. "Base Rate" is The base rate equals the highest of (i) KeyBank's the administrative agent's prime rate, (ii) the Federal Funds Effective Rate + plus 0.5%, or (iii) SOFR + 2.0% 3%. Advances under the Revolving Credit Facility are made initially as Base Rate loans but may be converted to SOFR rate loans at certain times at our discretion. At December 31, 2021, the borrowing base was $38.5 million and there were $25.0 million

The terms of borrowings outstanding under the facility leaving $13.5 million include covenants limiting the ability of remaining availability.

Table the Company to incur additional indebtedness, make investments or loans, incur liens, consummate mergers and similar fundamental changes, make restricted payments, and enter into transactions with affiliates. The terms of Contents

The Term Loan is secured under a Master Security Agreement with a pledge the facility also require the Company to maintain certain covenants, including fixed charge ratio and compensating balance requirements. A fixed charge coverage ratio of certain underground and surface mining equipment, bears interest at LIBOR + 5.15% and is required to be repaid in monthly installments of $278 thousand including accrued interest. The term loan was repaid in full not less than 1.10:1.00, calculated as of December 31, 2022.

The Credit Agreement contains usual and customary covenants including limitations the last day of each fiscal quarter, must be maintained by the Company. In addition, the Company must maintain an average daily cash balance of $5 million, as determined on liens, additional indebtedness, investments, restricted payments, asset sales, mergers, affiliate transactions and other customary limitations, a monthly basis, in a dedicated account as well as financial covenants. an additional $1 million in a separate dedicated account to assure future credit availability. At December 31, 2022 December 31, 2023, we were in compliance with all financial debt covenants under the Revolving Credit Agreement. Facility.

Key Equipment Finance Loan—On April 16, 2020, we entered into an equipment loan with Key Equipment Finance, a division of KeyBank, as lender, in the principal amount of approximately $4.7 million for the financing of existing underground and surface equipment (the "Equipment Loan"). The Equipment Loan bears accrued interest at 7.45% per annum and is was payable in 36 monthly installments of $147 thousand. There is a 3% premium for prepayment of the note within the first 12 months. This premium declines by 1% during each successive 12-month period. installments. The outstanding principal balance was $0.6 million at December 31, 2022. and was repaid in full in April 2023.

J. H. Fletcher & Co. Loan—On July 23, 2021 and November 24, 2021, we entered into equipment loans with J. H. Fletcher & Co., as lender, in the principal amount of approximately $0.9 million and $3.9 million, respectively, for the financing of underground equipment (the "Fletcher Equipment Loan"). The Fletcher Equipment Loan bears interest at 0% per annum and is payable in 24 monthly installments totaling $200 thousand. In the third quarter of 2022, we obtained additional equipment loans of $4.4 million. The 2022 loans bear no interest and are payable in 24 monthly installments of $195 thousand. The total outstanding principal balance of the Fletcher Equipment Loans was $6.1 million $1.9 million at December 31, 2022. December 31, 2023 and is due in full in 2024.

Komatsu Financial Limited Partnership Loan—On August 16, 2021, we entered into an equipment loan with Komatsu Financial Limited Partnership, as lender, in the principal amount of approximately $1.0 million for the financing of surface equipment (the "Komatsu Equipment Loan"). Additional equipment loans of $0.7 million were entered into during October 2022. The Komatsu Equipment Loan bears interest at 4.6% per annum and is payable in 36

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monthly installments of $36 thousand for the first six months and then at $28 thousand until maturity. The outstanding principal balance of the Komatsu Equipment Loan was $0.5 million $0.6 million at December 31, 2022 December 31, 2023.

Brandeis Machinery & Supply Company—On January 11, 2022, we entered into equipment loans with Brandeis Machinery & Supply Company, as lender, in the principal amount of $1.4 million for the financing of surface equipment (the "Brandeis Equipment Loans"). The Brandeis Equipment Loans bear interest at 4.8% per annum and are payable in 48 monthly installments. Additional equipment loans of $0.6 million were entered into during October 2022. The outstanding principal balance of the Brandeis Equipment Loans was $1.2 million $0.5 million at December 31, 2022 December 31, 2023.

9.00% Senior Unsecured Notes due 2026—On July 13, 2021, we completed an offering of $34.5 million, in the aggregate, of the Company's 9.00% Senior Unsecured Notes due 2026 (the "Senior Notes"), less $2.4 million for issuance costs. The Senior Notes mature on July 30, 2026, unless redeemed prior to maturity. The Senior Notes bear interest at a rate of 9.00% per annum, payable quarterly in arrears on the 30th day of January, April, July and October of each year, commencing on July 30, 2021. We may redeem the Senior Notes in whole or in part, at our option, at any time on or after July 30, 2023, or upon certain change of control events, at a redemption price equal to 100% of the principal amount plus accrued and unpaid interest to, but not including, the date of redemption. Issuance costs for the Senior Notes included underwriters' fees, attorney, accounting and filing costs totaling $2.4 million. These issuance costs are reported as a debt discount which is being amortized over the Senior Notes term using an effective rate method. The outstanding principal remains at $34.5 million; however, the balance of the Senior Notes reported at December 31, 2022 December 31, 2023 was $32.8 million $33.3 million, which is net of unamortized discounts and issuance costs of $1.7 million $1.2 million. The effective interest rate is approximately 10.45%.

Ramaco Coal Deferred Purchase Price—On April 29, 2022, we acquired the assets of Ramaco Coal (see Note 4) and entered into an agreement whereby an investment fund managed by Yorktown Partners, as lender, provided financing for the acquisition in the principal amount of $55.0 (the "Ramaco Coal Loan"). The Ramaco Coal Loan bears accrued interest at 9% per annum and is was payable in seven quarterly installments of $5 million for each remaining quarter in 2022

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and $10 million for each quarter in 2023 until maturity. The outstanding principal balance of the Ramaco Coal Loan was $40.0 million at December 31, 2022 and is secured by the membership interests of Ramaco Coal, LLC. In the event we make an initial public offering of the equity interests of all or substantially all of the acquired assets of Ramaco Coal, the seller shall have the option to convert up to fifty percent (50%) of the then outstanding principal balance, not to exceed $30 million, into a proportionate equity ownership. The loan was repaid in such initial public offering. full during 2023.

Financing of Maben Coal Acquisition – On September 23, 2022, we acquired 100% of the equity interests of Maben Coal, LLC (see Note 4) and entered into a secured loan with Investec Bank PLC in the amount of $21.0 million to pay a portion of the purchase price. The loan bears interest at the applicable secured overnight financing rate ("SOFR") plus a margin of 3.0% payable in cash, compounded monthly. Beginning in In January 2023, the Company must start started making monthly repayments of the outstanding principal in the amount of $800 thousand per month and will continue to do so until making a balloon payment for the remaining amount on the maturity date of September 23, 2024. The outstanding principal balance was $21.0 million $11.4 million at December 31, 2022 December 31, 2023.

The loan contains certain financial covenants, including minimum cash balance, leverage ratio, and interest coverage ratio requirements. At December 31, 2022 December 31, 2023, we were in compliance with the financial covenants related to the loan.

Current portion of long-term debt – The current portion Company's short-term debt at December 31, 2023 was comprised of the Company's outstanding debt was made up of $20.0 million $42.5 million borrowed under the Revolving Credit Facility, which was paid repaid shortly after the balance sheet date as well as $6.0 million using funds from current operations, $11.4 million of equipment loans, $40.0 million of related party debt associated with the Ramaco Coal acquisition, and $9.6 million of unpaid financing associated with the Maben Coal acquisition. Acquisition, and $2.6 million due under equipment loans. The weighted average interest rate on these borrowings is approximately 7.4%.

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SBA Paycheck Protection Program Loan— On April 20, 2020, we received proceeds from the PPP Loan in the amount of $8.4 million from KeyBank, as lender, pursuant to the PPP of the CARES Act. The purpose of the PPP is to encourage the continued employment of workers. We used all of the PPP Loan proceeds for eligible payroll expenses, lease, interest and utility payments. We recognized $8.4 million of other income during 2020 for the anticipated full forgiveness of Paycheck Protection Program loan we received. On July 29, 2021, we were notified by KeyBank that full forgiveness had been approved by the SBA. There were no amounts outstanding as of December 31, 2022 and 2021.

Insurance financing—In the fourth quarter of 2022, the The Company financed premium payments of $5.6 million $5.8 million associated with various insurance policies, which must be repaid to a third-party finance company in monthly installments over a one-year term. The outstanding debt balance was $4.6 million $4.0 million at December 31, 2022 December 31, 2023, which is not reflected in the tables above or below. The total unamortized asset balance associated with upfront payments of insurance premiums to insurance carriers was $5.1 million at December 31, 2022, and was included in Prepaid expenses and other on the Consolidated Balance Sheet.

Maturities of our debt, which include $1.7 million of discounts and issuance costs to be accreted over future periods, are as follows:

(In thousands) **Years ending December 31:**	
2023	$ 75,639
2024	18,406
2025	351
2026	34,500
2027	—
Total debt	$ 128,896

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Maturities of our debt are presented below, which are $1.2 million higher than total debt on the balance sheet due to discounts and issuance costs to be accreted over future periods.

(In thousands) **Years ending December 31:**	
2024	$ 56,534
2025	335
2026	34,514
2027	—
2028	—
Total debt	$ 91,383

NOTE 8—LEASES

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The Company has various finance leases for mining equipment, which are generally for include 3-5 year terms up to 36 months and expire through 2025. 2028. In addition, we have one operating lease for office space with a term of approximately five years that runs through 2027.

Amortization of right of use right-of-use assets associated with finance leases was $4.8 million $8.5 million, $1.1 million $4.8 million, and $0.0 million $1.1 million in 2023, 2022, 2021, and 2020. 2021, respectively, as discussed in Note 3. Interest expense recognized for financing lease liabilities was $0.4 million $0.6 million, $0.1 million $0.4 million, and $0.0 million $0.1 million in 2023, 2022, 2021, and 2020. 2021, respectively. Operating lease expense was $0.2 million in 2023, $0.2 million in 2022, and $0.1 million per year in 2021 and 2020. 2021.

Right-of-use assets and lease liabilities are determined as the present value of the lease payments, discounted using either the implicit interest rate in the lease or our estimated incremental borrowing rate based on similar terms, payments and the economic environment where the leased asset is located. Below is a summary of our leases:

(In thousands)	Classification	December 31, 2022	December 31, 2021	Classification	December 31, 2023	December 31, 2022
Right-of-use assets						
Financing	Financing lease right-of-use assets, net	$ 12,905	$ 9,128	Financing lease right-of-use assets, net	$ 10,282	$ 12,905
Operating	Other assets	694	25	Other assets	540	694
Total right-of-use assets		$ 13,599	$ 9,153		$ 10,822	$ 13,599
Current lease liabilities						
Financing	Current portion of financing lease obligations	$ 5,969	$ 3,461	Current portion of financing lease obligations	$ 5,456	$ 5,969
Operating	Accrued expenses	122	25	Accrued expenses	134	122
Non-current lease liabilities						
Financing	Long-term portion of financing lease obligations	$ 4,917	$ 4,599	Long-term portion of financing lease obligations	$ 4,915	$ 4,917
Operating	Other long-term liabilities	585	—	Other long-term liabilities	450	585
Total lease liabilities		$ 11,593	$ 8,085		$ 10,955	$ 11,593

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Minimum lease payments for our lease obligations are as follows:

(In thousands)	December 31, 2022			December 31, 2023		
	Financing	Operating	Total	Financing	Operating	Total
Future minimum lease payments:						
2023	$ 6,302	$ 161	$ 6,463			
2024	4,005	161	4,166	$ 5,910	$ 165	$ 6,075
2025	1,032	164	1,196	2,390	165	2,555
2026	—	168	168	1,233	165	1,398
2027	—	168	168	1,233	165	1,398
2028				514	—	514
Total undiscounted lease payments	11,339	822	12,161	11,280	660	11,940
Less: Amounts representing interest	(453)	(115)	(568)	(909)	(76)	(985)
Present value of lease obligations	$ 10,886	$ 707	$ 11,593	$10,371	$ 584	$10,955
Weighted average remaining term (years)	2.0	5.0		2.8	4.0	
Weighted average discount rate	4.2%	6.0%		4.2%	6.0%	

During 2023, the Company also entered into a lease of office space in Charleston, WV, which is not reflected in the disclosures above because the commencement date has not occurred for accounting purposes. The lease will be recognized at a later date when the space is ready to be occupied by the Company. The term of the lease is expected to be in the range of 6-8 years.

Coal Leases and Associated Royalty Commitments—Leases of mineral reserves and related land leases are exempt from the lease accounting requirements addressed above. Refer to Note 10 for information regarding coal leases and associated royalty commitments.

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NOTE 9—EQUITY

On June 12, 2023, an amendment to the Company's amended and restated certificate of incorporation was approved by shareholder vote to reclassify the Company's existing common stock as shares of Class A common stock and create a separate Class B common stock. We are authorized to issue up to a total of 260,000,000 225,000,000 shares of Class A common stock and 35,000,000 shares of Class B common stock as well as 50,000,000 shares of preferred stock, each having a par value of $0.01 per share.

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The initial distribution of Class B common stock occurred on June 21, 2023 via a stock dividend to existing holders of common stock as of May 12, 2023. On the date of initial distribution, each holder of common stock received 0.2 shares of Class B common stock for every one share of existing common stock held on the record date. Similar actions or modifications occurred for holders of outstanding stock-based awards.

The distribution of the Class B common stock provides existing holders of the Company's common stock with an opportunity to participate directly in the financial performance of the Company's CORE assets on a stand-alone basis, separate from the Company's metallurgical coal operations. CORE assets were acquired initially as part of the Company's acquisition of Ramaco Coal in the second quarter of 2022. The financial performance of CORE assets consists of the following non-cost-bearing revenue streams based on the Company's current expectations:

- Royalty fees derived from the royalties associated with the Ramaco Coal and Amonate reserves, which we believe approximates 3% of Company-produced coal sales revenue excluding coal sales revenue from Knox Creek,
- Infrastructure fees based on $5.00 per ton of coal processed at our preparation plants and $2.50 per ton of loaded coal at the Company's rail load-out facilities, and
- Future income derived, if and when realized, from advanced carbon products and rare earth elements initiatives.

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The Company expects to pay a dividend equal to 20% of the total fees above; however, any dividend amounts declared and paid are subject to the sole discretion of the Company's Board of Directors.

In addition, the Board of Directors retains the power to change or add expense allocation policies related to CORE, redefine CORE assets, and redetermine CORE's per-ton usage fees at any time, in its sole discretion, without shareholder approval. Holders of our shares of Class A common stock continue to be entitled to receive dividends when and if declared by the Board of Directors subject to any statutory or contractual restrictions on the payment of dividends and to any prior rights and preferences that may be applicable to outstanding preferred stock, if any.

CORE is not a separate legal entity and holders of Class B common stock do not own a direct interest in the assets of CORE. Holders of Class B common stock are entitled stockholders of Ramaco Resources, Inc. and are subject to one all risks and liabilities of the Company as a whole.

With respect to voting rights, holders of Class A common stock and Class B common stock vote for each share held of record together as a single class on all matters submitted to a vote of the stockholders and are entitled to one vote per share. The holders of Class A common stock and Class B common stock do not have cumulative voting rights in the election of directors. Class B common stock does not have any specific voting rights or governance rights with respect to CORE.

With respect to liquidation rights, holders of common stock are entitled to receive ratably in proportion the assets available for distribution to the stockholders after payment of liabilities and the liquidation preference of outstanding preferred stock, if any. That is, the rights to residual net assets upon liquidation are equal between holders of Class A and Class B common stock. Holders of Class B common stock do not have specific rights to CORE assets in the event of liquidation.

Shares of Class A common stock have no preemptive or conversion rights and are not subject to further calls or assessment by us. There are no redemption or sinking fund provisions applicable to Class A common stock. The Board of Directors retains the ability, in its sole discretion, to exchange all outstanding shares of Class B common stock held by them any dividends declared from time to time by the board of directors. Our into Class A common stock has no preferences or rights based on an exchange ratio determined by a 20-day trailing volume-weighted average price for each class of conversion, exchange, pre-exemption or other subscription rights. stock.

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The Company routinely allows employees initial distribution of the tracking stock was recorded as a stock dividend at fair value, which was estimated to surrender common stock to pay estimated taxes upon the vesting or exercise of stock-based compensation awards. The value of common stock tendered by employees is determined be $11.00 per share based on the closing price of Class B shares on the Company's first day of regular-way trading. The effect of the equity restructuring was a $102.9 million reduction in retained earnings and an increase of $102.9 million to Class B common stock at and additional paid-in capital during the time second quarter of relinquishment. There were no other repurchases 2023. The Company initially distributed 8,201,956 shares of Class B common shares. shares as well as additional restricted stock, restricted stock units, and performance stock units discussed below.

Stock-Based Compensation Awards

Outstanding stock-based awards were reclassified to Class A common stock as part of the equity restructuring discussed above. In addition, pursuant to the terms of the Company's outstanding stock-based awards, equitable adjustments were made in accordance with such terms, as discussed below, based on the same factor of 0.2 for every outstanding award. Since there were no changes in fair value, vesting conditions, or award classification, no incremental compensation expense resulted.

Our Long-Term Incentive Plan ("LTIP") is currently authorized by shareholders for the issuance of awards of up to approximately 10.9 million shares of common stock. As of December 31, 2022 December 31, 2023, there were approximately 5.4 million 4.6 million shares of common stock available for grant under the LTIP, which includes 4.0 million authorized shares that became effective LTIP. The one-time distribution of Class B has no bearing on February 23, 2022. Additionally, the authorization under the LTIP.

In general, granted but unvested shares are forfeited upon termination of employment, unless an employee enters into another written arrangement, and arrangement. However, exceptions exist for certain executives that are entitled to accelerated vesting if terminated without cause. Granted but unvested shares may not be sold, assigned, transferred, pledged or otherwise encumbered.

As of December 31, 2022, we had four types of stock-based awards outstanding: stock options, restricted stock, restricted stock units, and performance stock units. Stock-based compensation expense for all stock-based awards totaled $8.2 million in 2022, $5.3 million in 2021, and $4.1 million in 2020.

Options—We granted optionsfor the purchase of a total of 937,424 shares of our common stock for $5.34 per share to two executives on August 31, 2016. The options have a ten-year term from the grant date and are fully vested. During the third quarter of 2022, 20,000 options with an intrinsic value of $0.124 million were exercised, leaving a balance of 917,424 options. The remaining options are outstanding and unexercised and were in-the-money at December 31, 2022 with an intrinsic value of $3.2 million. No compensation expense was recognized for these awards in 2022, 2021, or 2020 as the awards became fully vested in previous years.

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As of December 31, 2023, we had four types of stock-based awards outstanding: stock options, restricted stock, restricted stock units, and performance stock units. Stock-based compensation expense for all stock-based awards totaled $12.9 million in 2023, $8.2 million in 2022, and $5.3 million in 2021.

Stock Options—We granted optionsfor the purchase of a total of 937,424 shares of our common stock for $5.34 per share to two executives on August 31, 2016. The options have a ten-year term from the grant date and are fully vested. During the third quarter of 2022, options to purchase 20,000 shares of common stock options with an intrinsic value of $0.124 million were exercised, leaving a balance of options to purchase 917,424 shares of common stock at December 31, 2022. During 2023, stock options of 183,484 shares of Class B awards were distributed to these individuals under the equitable adjustments discussed above. During the fourth quarter of 2023, options to purchase 168,712 shares of Class A common stock were exercised and stock options for 33,742 shares of Class B common stock were exercised having a combined intrinsic value of $2.6 million. The remaining options outstanding and unexercised at December 31, 2023 were 748,712 for

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Class A common stock and 149,742 for Class B common stock, which were in-the-money at December 31, 2023, having a total intrinsic value of $10.9 million. No compensation expense was recognized for these awards in 2023, 2022, or 2021 as the awards became fully vested in previous years.

The following table summarizes the remaining stock-based awards outstanding, as well as activity for the periods:

	Restricted Stock		Restricted Stock Units		Performance Stock Units	
	Shares	Weighted Average Grant Date Fair Value	Shares	Weighted Average Grant Date Fair Value	Shares	Weighted Average Grant Date Fair Value
Outstanding at December 31, 2020	2,845,525	4.28	—	—	—	—
Granted	1,592,659	4.37	—	—	—	—
Vested	(567,135)	6.55	—	—	—	—
Forfeited	(129,279)	4.11	—	—	—	—
Outstanding at December 31, 2021	3,741,770	$ 3.98	—	$ —	—	$ —
Granted	214,363	14.59	248,706	15.65	248,706	22.21
Vested	(809,539)	6.57	(82,903)	15.65	—	—
Forfeited	(637)	15.65	—	—	—	—
Outstanding at December 31, 2022	3,145,957	$ 4.04	165,803	$ 15.65	248,706	$ 22.21

For Class A common stock:	Restricted Stock Shares	Restricted Stock Date Fair Value	Restricted Stock Units Shares	Restricted Stock Units Date Fair Value	Performance Stock Units Shares	Performance Stock Units Date Fair Value
Outstanding at December 31, 2022	3,145,957	$ 4.04	165,803	$ 15.65	248,706	$ 22.21
Granted	296,115	10.61	518,348	10.61	518,348	18.09
Vested	(1,695,234)	3.37	(82,903)	15.65	—	—
Forfeited	(38,484)	11.90	—	—	—	—
Outstanding at December 31, 2023	1,708,354	$ 5.66	601,248	$ 11.30	767,054	$ 19.43
For Class B common stock:						
Initial distribution of Class B awards - June 21, 2023	680,718		136,819		153,404	
Vested	(339,035)		(16,578)		—	
Outstanding at December 31, 2023	341,683		120,241		153,404	

The total fair value of awards vested was $19.7 million during 2023, $11.0 million during 2022, and $5.1 million during 2021, and $1.5 million during 2020. 2021.

Restricted Stock—We grant shares of restricted stock to certain senior executives, key employees and directors. These shares vest over approximately one to three and a half years from the date of grant. During the vesting period, the participants have voting rights and may receive dividends. Upon vesting, the restricted stock becomes unrestricted common shares. The fair value of the restricted stock on

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the date of the grant during 2022, which averaged $14.59 per share, is amortized ratably over the service period. At December 31, 2022 December 31, 2023, there was $5.0 million $3.2 million of total unrecognized compensation cost related to unvested restricted stock to be recognized over a weighted-average period of 0.8 1.4 years. The fair value of restricted stock awards that vested during 2022 2023 was $10.3 million. $14.6 million for Class A awards and $3.6 million for Class B awards. The fair value of the outstanding restricted stock awards was $27.7 million $29.3 million for Class A awards and $4.5 million for Class B awards based on the year-end 2022 2023 closing stock price. prices.

In December 2019, we entered into modification agreements with 14 executives and employees holding 1.4 million shares 110

Table of unvested restricted stock whereby the vesting periods for these share grants was extended an additional six months. In exchange for the modification, we made an additional restricted stock grant to each of these executives and employees. In all, we granted 22,000 additional restricted shares in the modification. Incremental compensation costs associated with these modifications totaled $0.8 million and was recognized during 2020. Contents

Restricted Stock Units—We grant shares of restricted stock units to certain senior executives and key employees. These share units vest ratably over approximately three years from the date of grant. During the vesting period, the participants have no voting rights and no dividend rights; however, participants are entitled to receive dividend equivalents, which shall be subject to the same conditions applicable to the units and payable at the time the units vest. Upon vesting and within 30 days thereafter, the recipient will receive one share of common stock for each stock unit.

The 248,706 grant date fair values of restricted stock units granted during 2022 are linked to the Company's common stock value which was fair valued on the date of grant at $15.65 per share and is recognized ratably over the service period. At December 31, 2022 December 31, 2023, there was $2.7 million $5.2 million of total unrecognized compensation cost related to unvested restricted stock units to be recognized over the next two weighted average period of 1.7 years. The fair value of restricted stock unit awards that vested during 2022 2023 was $0.7 million. $1.3 million for Class A awards and $0.2 million for Class B awards. The fair value of the outstanding restricted stock unit awards was $1.5 million $10.3 million for Class A awards and $1.6 million for Class B awards based on the year-end 2022 2023 closing stock price. prices.

Performance Stock Units—We grant shares of performance stock units to certain senior executives and key employees. These share units cliff-vest approximately three years from the date of grant based on the achievement of

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targeted performance levels related to pre-established relative total shareholder return goals. These performance stock units have the potential to be earned from 0% to 200% of target depending on actual results. During the vesting period, the participants have no voting rights and no dividend rights; however, participants are entitled to receive dividend equivalents, which shall be subject to the same conditions applicable to the units and payable at the time the units vest. Upon vesting and within 30 days thereafter, the recipient will receive one share of common stock for each stock unit.

The Company's 248,706 performance stock units were valued relative to the stock price performance of a peer group of companies, which was fair valued at $22.21 per share at the date of grant based on a Monte Carlo simulation. The fair value of the performance stock units on the date of the grant is recognized ratably over the service period. At December 31, 2022 December 31, 2023, there was $3.8 million $8.9 million of total unrecognized compensation cost related to unvested performance stock units to be recognized over the next two weighted average period of 1.7 years. The combined intrinsic value of the outstanding performance stock units for both classes, at target, was $2.2 million $15.2 million at December 31, 2022 December 31, 2023. The value of these awards if the performance period had ended on December 31, 2023 is estimated at approximately $27 million.

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In addition, performance stock units granted in 2022 were modified during the first quarter of 2023. Modifications to these awards were made up primarily of changes in the composition of the peer group as well as changes in the way relative total shareholder return is evaluated against the updated peer group. The modification resulted in incremental fair value of $1.2 million, which is recognized as expense over 2023 and 2024.

Performance stock units are accounted for as awards with a market condition since vesting depends on total shareholder return relative to a group of peer companies.

Taxes Related to Stock Awards—The Company routinely allows employees to surrender common stock to pay estimated taxes upon the vesting or exercise of stock-based compensation awards. The value of common stock tendered by employees is determined based on the price of the Company's common stock at the time of relinquishment. There were no other repurchases of common shares.

Dividends

On February 18, 2022, the Company announced that its Board of Directors approved an increase in its initial quarterly cash dividend to $5.0 million from the formerly approved $2.5 million that was declared and accrued in December 2021. Dividends in the amount of $5.0 million, or approximately $0.11 per share of common stock, were paid on March 15, 2022, to shareholders of record on March 1, 2022.

Dividends in the amount of $5.0 million $16.6 million, or approximately $0.11 $0.375 per share on an aggregated basis ($0.125 per share for three quarterly dividends), were declared and paid to holders of common stock or Class A common stock during 2023. On December 6, 2023, the Company announced that the Board of Directors declared a cash dividend on Class A common stock of $0.1375 per share to be paid on March 15, 2024 to shareholders of record on March 1, 2024. Dividends of $6.0 million were accrued in December 2023 for the cash dividend to be paid in March 2024.

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The Company also paid dividends to holders of Class B common stock during 2023 based on 20% of CORE royalty and infrastructure fees. Dividends in the amount of $1.5 million, or approximately $0.165 per share of Class B common stock, were paid on June 15, 2022, September 15, 2023 to shareholders of record on June 1, 2022 September 1, 2023.

Dividends in the amount of $5.0 million $2.2 million, or approximately $0.11 $0.249 per share of Class B common stock, were paid on September 15, 2022, December 15, 2023 to shareholders of record on September 1, 2022 December 1, 2023.

Dividends in the amount Refer to Note 15 for information regarding dividends declared for holders of $5.0 million, or approximately $0.11 per share of Class B common stock were paid on December 15, 2022, subsequent to shareholders the date of record on December 1, 2022.

On December 8, 2022, the Company announced that its Board of Directors declared a quarterly cash dividend of approximately $0.1250 per share of common stock. Dividends of $5.5 million were accrued in December 2022, and are payable on March 15, 2023, to shareholders of record on March 1, 2023. financial statements.

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For the full year 2023, the Company recognized $27.5 million of cash dividends declared against retained earnings for all classes of common stock, including $6.0 million of dividends declared in December 2023 to be paid in March 2024 and $1.2 million of forfeitable dividends subject to the vesting conditions of outstanding restricted stock units and performance stock units. For the full year 2023, the Company paid $25.8 million of cash dividends for both classes of common stock, including $5.5 million that were accrued at December 31, 2022.

For 2022, the Company recognized $23.1 million of cash dividends declared against retained earnings, or approximately $0.52 per share, including $5.5 million that were unpaid as of December 31, 2022. For the full year 2022, the Company paid $20.0 million of dividends, including $2.5 million that were accrued at December 31, 2021.

NOTE 10—COMMITMENTS AND CONTINGENCIES

Environmental Liabilities—Environmental liabilities are recognized when the expenditures are considered probable and can be reasonably estimated. Measurement of liabilities is based on currently enacted laws and regulations, existing technology and undiscounted site-specific costs. Generally, such recognition would coincide with a commitment to a formal plan of action. No amounts have been recognized for environmental liabilities.

Surety Bond—In accordance with state laws, we are required to post reclamation bonds to assure that reclamation work is completed. We also have a small amount of surety bonds that secure performance obligations. Bonds outstanding at December 31, 2022 December 31, 2023 totaled approximately $25.9 million $27.2 million.

Coal Leases and Associated Royalty Commitments—We lease coal reserves under agreements that require royalties to be paid as the coal is mined and sold. Many of these agreements require minimum annual royalties to be paid regardless of the amount of coal mined and sold. Total royalty expense was expenses were $35.0 million, $34.2 million, $18.5 million, and $11.8 million $18.5 million for the years ended December 31, 2022 December 31, 2023, 2021, 2022, and 2020, 2021, respectively. These agreements generally have terms running through exhaustion of all the mineable and merchantable coal covered by the respective lease. Royalties or throughput payments are based on a percentage of the gross selling price received for the coal we mine. Minimum

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royalty obligations under coal leases total $27.1 million $27.2 million and are broken down as follows: $3.3 million for 2023, 2024, $3.3 million for 2024, $3.4 million for 2025, $3.1 million $3.2 million for 2026, $2.9 million $3.2 million for 2027, $3.2 million for 2028, and $11.1 million $11.0 million thereafter. Please refer Refer to Note 12 for information regarding related party transactions.

Contingent Transportation Purchase Commitments—We secure the ability to transport coal through rail contracts and export terminals that are sometimes funded through take-or-pay arrangements. As of December 31, 2022 December 31, 2023, the Company's remaining commitments under take-or-pay arrangements expiring through March 31, 2024 totaled $5.1 million $20.2 million, the majority most of which are expected relates to be satisfied in one year. a five-year contract that was entered into during 2023 with a total remaining commitment of $20.0 million. The five-year contract, which runs from April 1, 2023 through March 31, 2028, includes an annual minimum commitment of $4.5 million. The level of these commitments will be reduced at a per ton rate as such rail and export terminal services are utilized against the required minimum tonnage amounts over the contract term stipulated in such rail and export terminal contracts. No amounts have been We recognized as $0.8 million of contingent liabilities at December 31, 2023 related to take-or-pay arrangements. the probable shortfall associated with our annual minimum commitment.

Litigation—From time to time, we are subject to various litigation and other claims in the normal course of business. No amounts have been accrued in the consolidated financial statements with respect to any matters.

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On November 5, 2018, one of our three raw coal storage silos that fed our Elk Creek plant experienced a partial structural failure. A temporary conveying system completed in late-November 2018 restored approximately 80% of our plant capacity. We completed a permanent belt workaround and restored the preparation plant to its full processing capacity in mid-2019. Our insurance carrier, Federal Insurance Company, disputed our claim for coverage based on certain exclusions to the applicable policy and, therefore, on August 21, 2019, we filed suit against Federal Insurance Company and Chubb INA Holdings, Inc. in Logan County Circuit Court in West Virginia seeking a declaratory judgment that the partial silo collapse was an insurable event and to require coverage under our policy. Defendants removed the case to the United States District Court for the Southern District of West Virginia, and upon removal, we substituted ACE American Insurance Company as a defendant in place of Chubb INA Holdings, Inc. The trial in the matter commenced on June 29, 2021, in Charleston, West Virginia.

On July 15, 2021, the jury returned a verdict in our favor for $7.7 million in compensatory contract damages and on July 16, 2021, made an additional award of $25.0 million for damages for wrongful denial of the claim under *Hayseeds, Inc.v. State Farm Fire & Cas.*, 177 W. Va. 323, 352 S.E. 2d 73 (W. Va. 1986), including inconvenience and aggravation. On August 12, 2021, the defendants filed a post-trial motion for judgment as a matter of law or in the alternative to alter or amend the judgment or for a new trial. The parties fully briefed the motion, and it stood submitted on August 31, 2021. On March 4, 2022, the court entered its memorandum opinion and order on the motion reducing the jury award to a total of $1.8 million, including pre-judgment interest, based largely on the court's decision to vacate and also vacated and set aside, in its entirety, the jury award of damages for inconvenience and aggravation.*Hayseeds* damages. The same day, the court entered the judgment in accordance with the memorandum opinion and order.

On April 1, 2022, we filed a notice of appeal with the U.S. Court of Appeals for the Fourth Circuit. On July 20, 2023, the court rendered a decision reinstating the jury's $7.7 million contract damages verdict. The matter has been fully briefed court further determined that we are entitled to attorney's fees in an amount to be determined on remand. Finally, the court held that we are entitled to *Hayseeds* damages for wrongful denial of the claim but remanded for a new trial on the amount of such damages after affirming that the original $25 million award was excessive. On August 3, 2023, the Defendants-Appellees filed a Petition of Rehearing and Rehearing *En Banc* with the Fourth Circuit. The petition was denied by order dated August 15, 2023. On August 29, 2023, the parties, court clarified that the amount of attorney's fees to be determined on remand included appellate fees. On September 8, 2023, the court entered its amended judgment, which awarded post-judgment interest on the previously awarded and reinstated verdict related to contract (compensatory) damages and the court heard oral argument Fourth Circuit thereafter issued its mandate on January 27, 2023 October 2, 2023. The matter is now pending before the court. District Court for a new trial on damages for inconvenience and aggravation as well as the court's determination and award of attorney's fees.

The defendants fully paid the portion of the judgment related to contract (compensatory) damages in the court's order and that portion of the matter is considered closed. The Company recognized a $7.8 million gain during 2023, which was recorded in *Other income (expense), net* on the Consolidated Statements of Operations. Of this amount, $2.0 million was included in *Insurance proceeds related to property, plant, and equipment* as part of investing activities on the Consolidated Statements of Cash Flows and the remaining amount was included in operating activities.

NOTE 11—REVENUES

Our revenue is derived from contracts for the sale of coal and is recognized when the performance obligations under the contracts are satisfied, which is at the point in time control is transferred to our customer. Generally, domestic sales contracts have terms of about one year and the pricing is typically fixed. Export sales have spot or term contracts, and pricing can be either a fixed price or a price derived against index-based pricing mechanisms. Sales completed with

delivery to an export terminal are reported as export revenue. Disaggregated information about our revenue is presented below:

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(In thousands)	2022	2021	2020	Year ended December 31, 2023	2022	2021
Coal Sales						
North American revenue	$ 328,322	$ 143,946	$ 119,981	$227,484	$328,322	$143,946
Export revenue, excluding Canada	237,366	139,448	48,934	466,040	237,366	139,448
Total revenue	$ 565,688	$ 283,394	$ 168,915	$693,524	$565,688	$283,394

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Fourth quarter 2023 revenue that can be derived from the Company's periodic filings includes a $1.3 million upward adjustment to revenue related to performance obligations that were satisfied in the previous quarter. Fourth quarter 2022 revenue that can be derived from the Company's periodic filings includes a $2.8 million downward adjustment to revenue related to performance obligations that were satisfied in the previous quarter. This adjustment was These adjustments were due to the true-up true-ups of the Company's previous estimate of certain estimates for provisional pricing provisions.

As of December 31, 2022 December 31, 2023, the Company had outstanding performance obligations of approximately 1.5 million 1.4 million tons for contracts with fixed sales prices averaging $202 $166 per ton excluding freight, which will generally be satisfied within the next year, and 0.7 million 2.1 million additional tons for contracts with index-based pricing mechanisms. Index-based The Company expects to satisfy approximately 88% of the committed tons in 2024 and the remainder in 2025. Variable amounts, including index-based prices, have not been estimated for the purpose of disclosing remaining performance obligations as permitted under the revenue recognition guidance when variable consideration is allocated entirely to a wholly unsatisfied performance obligation.

Sales into individual foreign countries equaling or exceeding 10% of our total revenues included Germany and Canada, each of which represented 14% of 2023 revenues, as well as Brazil, which represented 10% of 2023 revenues. Sales into Canada and South Africa at were 12% and 10%, respectively, of 2022 revenues. The Company used the final export destination of the goods as the basis for 2022. these disclosures.

NOTE 12—RELATED PARTY TRANSACTIONS

Mineral Lease and Surface Rights Agreements—Prior to the acquisition of Ramaco Coal, as discussed in Note 4, much of the coal reserves and surface rights that we controlled were acquired through a series of mineral leases and surface rights agreements with Ramaco Coal, who was a related party. Production royalties payable to Ramaco Coal in the amount of $0.4 million were included in accounts payable on the December 31, 2021 consolidated balance sheet. Royalties paid to Ramaco Coal in 2022 prior to the acquisition totaled $3.1 million. Royalties paid to Ramaco Coal in 2021 and 2020 totaled $5.7 million and $4.5 million, respectively.

Administrative Services—Also prior to the acquisition of Ramaco Coal, the Company and Ramaco Coal agreed to share the services of certain of each company's employees pursuant to a Mutual Service Agreement, dated December 22, 2017, and effective as of March 31, 2017. Each party will pay the other a fee on a quarterly basis for such services calculated as the annual base salary of each employee providing services multiplied by the percentage of time each employee spent providing services for the other party. Year-to-date charges to Ramaco Coal in 2022, prior to the acquisition, were $44 thousand. Charges to Ramaco Coal were $0.1 million in 2021 and $0.2 million in 2020.

Legal Services—Some of the professional legal services we receive are provided by Jones & Associates ("Jones"), a related party. Legal services paid incurred for Jones in 2023 and 2022 totaled zero and $0.8 million, respectively. Legal services payable to Jones were zero (paid in 2022 full in 2023) and 2021 totaled $0.8 million $0.6 million at December 31, 2023 and zero, respectively. December 31, 2022, respectively, and were included in *Accrued liabilities* on the Consolidated Balance Sheet.

Ramaco Coal Deferred Purchase Price—As part of the financing of the acquisition of Ramaco Coal, as discussed in Note 4, we incurred interest expense of $1.8 million in 2023 and $3.0 million in 2022. The outstanding principal balance of the Ramaco Coal Loan was zero and $40.0 million at December 31, 2023 and December 31, 2022 , respectively. Refer to Note 7 for additional information regarding the

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terms of the financing. In addition, the Company owed an additional $0.4 million to Yorktown Partners at December 31, 2023, in connection with the Ramaco Coal acquisition, which is included in *Accounts payable* on the Consolidated Balance Sheet.

Ramaco Foundation--The Company made a charitable cash contribution of $1.0 million during 2022 to the Ramaco Foundation, which was recognized in other*Other income (expense), net*, on the income statement. Consolidated Statement of Operations. The Ramaco Foundation is an unconsolidated not-for-profit organization whose board of directors includes several members of the Company's management and board of directors.

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Other Professional Services—The Company has also entered into professional services with three other related parties, which have been aggregated due to immateriality. Professional services incurred for these related parties were $0.3 million in 2023 and $0.1 million in 2022, respectively.

NOTE 13—INCOME TAXES

Ramaco Resources, Inc. is organized as a corporation under the laws of Delaware. Ramaco Resources, Inc. files a consolidated U.S. federal tax return with its wholly owned subsidiaries. All our operations are wholly within the United States, but our products are sold to customers worldwide.

Income tax expense consisted of the following:

	Years ended December 31,		
(In thousands)	2023	2022	2021
Current taxes:			
Federal	$ 2,817	$ 517	$ —
State	819	407	3
Current taxes	3,636	924	3
Deferred taxes:			
Federal	17,323	28,389	6,518
State	1,391	840	(1,874)
Deferred taxes	18,714	29,229	4,644
Provision for income tax expense, net	$ 22,350	$ 30,153	$ 4,647

The items accounting for differences between income taxes computed at the federal statutory rate and the provision recorded for income taxes were as follows:

	Years ended December 31,		
(In thousands)	2023	2022	2021
Income taxes computed at the federal statutory rate	$ 21,938	$ 30,701	$ 9,325
Effect of:			
State taxes, net of federal benefits	1,210	1,422	796
State tax rate changes, net of federal benefits	350	(546)	(2,274)
Percentage depletion	(1,717)	(3,314)	(3,363)
Stock-based compensation	(3,395)	(1,499)	(194)
162(m) compensation limitation	5,716	3,481	—
Foreign-derived intangible income deduction	(1,475)	—	—

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Other, net	(277)	(92)	357
Total	$ 22,350	$ 30,153	$ 4,647

During the current year, there was a significant increase in the foreign-derived intangible income deduction related to our worldwide sales. The amount of excess tax benefits for stock-based compensation and subsequently the impact of IRC Section 162(m) for covered employees increased in the current year due to stock exercises.

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Deferred tax assets and liabilities were as follows:

	December 31,	
(In thousands)	2023	2022
Deferred tax assets:		
Loss carryforwards U.S. - Federal/States	$ 1,801	$ 6,598
Asset retirement obligations	6,428	6,359
Accrued expenses	3,857	3,257
Stock-based compensation	2,916	2,249
Total deferred tax assets	15,002	18,463
Deferred tax liabilities:		
Property, plant, and equipment	(69,354)	(54,100)
Net deferred tax liabilities	$ (54,352)	$ (35,637)

During the current period, the federal net operating loss carryforwards were fully utilized. As of December 31, 2023, there were no federal net operating loss carryforwards remaining. Total state loss carryforwards were approximately $35 million. The Company's net operating loss carryforwards are not subject to statutory expiration.

No valuation allowance was recognized by the Company for deferred tax assets as of December 31, 2023 or December 31, 2022.

We are subject to federal, state, and local income taxes in the United States. Significant judgment is required in evaluating tax positions taken and determining the provision for income taxes. As of December 31, 2023, we do not have any unrecognized tax benefits. The tax years 2020 through 2022 remain subject to examination by the taxing authorities. We are not currently under examination by any taxing authorities.

Cash paid for income taxes totaled $15.5 million in 2022. The Company recognized an income tax receivable of $14.6 million included in prepaid expenses and other current assets at December 31, 2022. Cash paid for income taxes totaled $0.8 million for 2023 before consideration of refunds received. The Company received a refund of $11.8 million during 2023, which drove the decrease in prepaid expenses and other current assets on the balance sheet compared to December 31, 2022.

NOTE 14—EARNINGS (LOSS) PER SHARE

Earnings per share ("EPS") is not presented retrospectively for periods prior to the issuance of the tracking stock as the tracking stock was not a part of the Company's capital structure during those periods and the issuance of the tracking stock changes the common shareholders' relative residual interest in the Company. Therefore, EPS is presented for the Company's single class of common stock up to the time the tracking stock was issued. EPS is presented prospectively under the two-class method starting on the date of initial distribution of the tracking stock. Refer to Note 9 for information related to the Company's tracking stock.

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The computation of basic and diluted EPS is shown on the following page:

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NOTE 13—INCOME TAXES

Income tax expense (benefit) consisted of the following:

	Years ended December 31,		
(In thousands)	2022	2021	2020
Current taxes:			
Federal	$ 517	$ —	$ —
State	407	3	19
Current taxes	924	3	19
Deferred taxes:			
Federal	28,389	6,518	(3,164)
State	840	(1,874)	(339)
Deferred taxes	29,229	4,644	(3,503)
Provision for income tax expense (benefit), net	$ 30,153	$ 4,647	$ (3,484)

The items accounting for differences between income taxes computed at the federal statutory rate and the provision recorded for income taxes were as follows:

	Years ended December 31,		
(In thousands)	2022	2021	2020
Income taxes computed at the federal statutory rate	$ 30,701	$ 9,325	$ (1,762)
Effect of:			
State taxes, net of federal benefits	1,422	796	(253)
State tax rate changes, net of federal benefits	(546)	(2,274)	—
Percentage depletion	(3,314)	(3,363)	(714)
PPP Loan forgiveness	—	—	(1,773)
Stock-based compensation	(1,499)	(194)	473
162(m) compensation limitation	3,481	—	—
Other, net	(92)	357	545
Total	$ 30,153	$ 4,647	$ (3,484)

Deferred tax assets and liabilities were as follows:

	December 31,	
(In thousands)	2022	2021
Deferred tax assets:		
Loss carryforwards U.S. - Federal/States	$ 6,598	$ 15,975
Asset retirement obligations	6,359	5,175
Accrued expenses	3,257	744

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Stock-based compensation	2,249	2,331
Total deferred tax assets	18,463	24,225
Deferred tax liabilities:		
Depreciation & amortization	(54,100)	(30,631)
Net deferred tax liabilities	$ (35,637)	$ (6,406)

As of December 31, 2022, our federal net operating loss carryforwards were approximately $24 million. Total state loss carryforwards were approximately $32 million. The Company's net operating loss carryforwards have no statutory expiration.

Cash paid for income taxes totaled $15.5 million in 2022. The Company recognized an income tax receivable of $14.6 million included in prepaid expenses and other current assets at December 31, 2022.

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(In thousands, except per share amounts)	Years ended December 31,		
	2023	2022	2021
Earnings attribution			
Single class of common stock (through 6/20/2023) *	$ 31,382	$ 116,042	$ 39,759
Class A common stock (6/21/2023 - 12/31/2023)	44,663	—	—
Class A restricted stock awards (6/21/2023 - 12/31/2023)	1,897	—	—
Class B common stock (6/21/2023 - 12/31/2023)	3,498	—	—
Class B restricted stock awards (6/21/2023 - 12/31/2023)	144	—	—
Forfeitable dividends declared on unvested stock-based awards	729	—	—
Net income	$ 82,313	$ 116,042	$ 39,759

* Common stock and restricted stock participated in earnings 1:1 and are shown on a combined basis through 6/20/2023 consistent with historical presentation

	Jan. 1 - June 20,	Years ended December 31,	
	2023	2022	2021
EPS data for single class of common stock through 6/20/2023			
Numerator			
Net earnings	$ 31,382	$ 116,042	$ 39,759
Denominator			
Weighted average shares used to compute basic earnings per share *	44,344	44,164	43,964
Dilutive effect of stock option awards	381	532	293
Dilutive effect of restricted stock units	—	6	—
Dilutive effect of performance stock units	27	—	—
Weighted average shares used to compute diluted earnings per share	44,752	44,702	44,257
Earnings per common share (single class of common stock)			
Basic	$ 0.71	$ 2.63	$ 0.90
Diluted	$ 0.70	$ 2.60	$ 0.90

	June 21, 2023 - December 31, 2023	
	Class A	Class B
EPS data for dual-class common stock 6/21/2023 - 12/31/2023		

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Numerator		
Net earnings	$ 44,663	$ 3,498
Denominator		
Weighted average shares used to compute basic earnings per share **	42,115	8,428
Dilutive effect of stock option awards	482	111
Dilutive effect of restricted stock units	157	48
Dilutive effect of performance stock units	436	111
Weighted average shares used to compute diluted earnings per share	43,190	8,698
Earnings per common share (dual-class structure)		
Basic	$ 1.06	$ 0.42
Diluted	$ 1.03	$ 0.40

** Does not include unvested restricted stock, which averaged 1.8 million and 0.4 million for Class A and Class B, respectively, for the period June 21, 2023 through December 31, 2023

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NOTE 14—EARNINGS (LOSS) PER SHARE

The following table Unvested restricted stock awards have the right to receive nonforfeitable dividends on the same basis as common shares; therefore, unvested restricted stock is considered a calculation participating security for the purpose of calculating EPS. Historically, the Company has shown EPS for its common stock and unvested restricted stock on a combined basis since both instruments participate in net earnings on the same basis and the resulting EPS is typically the same. Starting under the two-class method, the Company reports separately the net earnings (loss) per basic allocated away from holders of Class A and diluted share: Class B common stock to holders of unvested restricted stock awards.

	Years ended December 31,		
(In thousands, except per share amounts)	**2022**	**2021**	**2020**
Numerator			
Net income (loss)	$ 116,042	$ 39,759	$ (4,907)
Denominator			
Weighted average shares used to compute basic earnings per share	44,164	43,964	42,460
Dilutive effect of stock option awards	532	293	—
Dilutive effect of restricted stock units	6		
Weighted average shares used to compute diluted earnings per share	44,702	44,257	42,460
Earnings (loss) per share			
Basic	$ 2.63	$ 0.90	$ (0.12)
Diluted	$ 2.60	$ 0.90	$ (0.12)

Unvested restricted stock units and performance stock units include forfeitable dividend rights that are subject to the vesting conditions of the underlying awards; therefore, these awards are not considered participating securities and should not be allocated undistributed earnings for the purpose of calculating EPS. However, dividends or dividend equivalents declared and charged to retained earnings for these awards reduce the amount of net earnings available for distribution to common stockholders and should be reflected as such under the two-class method.

For accounting purposes, Class B's participation rights are, in substance, discretionary based on the power of the Company's Board of Directors to add or modify expense allocation policies, redefine CORE assets, and redetermine CORE's per-ton usage fees at any time, in its

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sole discretion, without shareholder approval. Therefore, no amount of the Company's net earnings shall be allocated to Class B for the purpose of calculating EPS other than actual dividends declared during the period for the tracking stock. Refer to Note 9 for information regarding dividends declared on Class B common stock.

Diluted EPS was calculated using the treasury stock method for stock options and restricted stock units. For performance stock units, the awards were first evaluated under the contingently issuable shares guidance, which requires a determination as to whether shares would be issuable if the end of the reporting period were the end of the contingency period. For shares determined to be issuable under performance stock unit awards, the treasury stock method was then applied to determine the dilutive impact of the awards, if any. Unvested restricted stock awards are considered potential common shares as well as participating securities, as discussed previously, and were included in diluted EPS using the more dilutive of the treasury stock method or the two-class method. Since these awards share in dividends on a 1:1 basis with common shares, applying the treasury stock method would be antidilutive compared to the basic EPS calculation that allocates earnings to participating securities under the two-class method discussed previously.

Diluted EPS for 2022 excludes 248,706 the period from January 1, 2023 through June 20, 2023, the period for which a single class of target common stock existed, excluded all outstanding restricted stock units, or 684,151 units in total, because the effect would have been antidilutive under the treasury stock method. In addition, diluted EPS for the same period excluded outstanding performance stock units originally granted in 2022, or 248,706 units at target, based on the guidance for contingently issuable shares, which requires exclusion when based on current period results, the shares would not be issuable if the end of the reporting period were the end of the contingency period. Refer

For the period from June 21,2023 through December 31, 2023, the Company's ability to convert Class B common shares into Class A common shares, as discussed previously in Note 9, is a contingency that will not be reflected in the diluted EPS for additional information regarding performance stock unit awards. Class A under the if-converted method until such time that the required Board resolutions occur, if ever.

Diluted EPS for 2020 excludes 937,424 options to purchase our common 2022 excluded 248,706 of target performance stock because their effect would be anti-dilutive. units based on the guidance for contingently issuable shares discussed earlier.

NOTE 15—SUBSEQUENT EVENTS

Shortly after the balance sheet date, the Company repaid $20 million of the $25 million of borrowings under the Revolving Credit Facility using funds from current operations. At a later date, on February 15, 2023 On February 1, 2024, the Company entered into announced that the Second Amended and Restated Credit and Security Agreement, Board of Directors declared a cash dividend of $0.2416 per share of Class B common stock, which includes multiple lending parties and provides additional borrowing capacity compared will be payable on March 15, 2024 to shareholders of record on March 1, 2024.

In February 2024, the Company completed the purchase of an existing coal preparation plant, which will be relocated to the facility utilized in 2022. Company's Maben Complex. The new facility, which has a maturity date of February 15, 2026, provides an initial aggregate revolving commitment of $125.0 million as well as an accordion feature of $50 million subject to certain terms and conditions, including lender's consent. The aggregate revolving commitment had a borrowing base of $66.3 million at the closing date purchase price of the new facility after consideration of collateral and reserve requirements. plant is $3 million. The Company utilized the new facility to borrow an additional $20 million and used $10 million of the proceeds to pay down related-party debt associated with the acquisition of Ramaco Coal. The remaining availability under the new facility was $41.3 million at the closing date after outstanding borrowings of $25.0 million.

Revolving loans under the new facility bear interest at either the base rate plus 1.50% or the Secured Overnight Financing Rate plus 2.00%. The base rate equals the highest of the administrative agent's prime rate, the Federal Funds Effective Rate plus 0.5%, or 3%.

The terms of the new facility include covenants limiting the ability of the Company to incur additional indebtedness, make investments or loans, incur liens, consummate mergers and similar fundamental changes, make restricted payments, and enter into transactions with affiliates. The terms of the new facility also contain a financial covenant that requires the Company to maintain a fixed charge coverage ratio of not less than 1.10:1.00 calculated as of the last day of each fiscal quarter starting with the first quarter of 2023. The new facility also contains certain compensating balance requirements, which include that the Company maintain an average daily cash balance of $5 million, as determined on a monthly basis, to assure future credit availability.

* * * * * anticipates

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spending an additional $8 million in initial development capital expenditures related to the plant in 2024. These costs would include amounts related to the relocation, reassembly, and expansion of the facility at Maben.

* * * * *

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure

None.

Item 9A. Controls and Procedures. Procedures

Management's Evaluation of Disclosure Controls and Procedures. As required by Rule 13a-15(b) under the Exchange Act, we have evaluated, of December 31, 2023, our management, under the supervision and with the participation of our management, including our chief executive officer, who serves as our principal executive officer and chief principal financial officer, who serves as our principal financial officer, evaluated the effectiveness of our disclosure controls and procedures (as defined under Rule 13a-15(e) and 15d - 15(e) under pursuant to applicable Exchange Act rules. Based on this evaluation, management concluded that the Exchange Act), as of December 31, 2022. Our Company's disclosure controls and procedures are designed to provide as of December 31, 2023 were not effective at the reasonable assurance that the information required to be disclosed by us in reports that we file under the Exchange Act is accumulated and communicated to our management, including our chief executive officer and chief financial officer, level as appropriate to allow timely decisions regarding required disclosures, and is recorded, processed, summarized and reported within the time periods specified in the rules and forms a result of the SEC. Our chief executive officer and chief material weakness in internal control over financial officer concluded that, as of December 31, 2022, our disclosure controls and procedures were effective based on this evaluation. reporting disclosed below. The Company's remediation plan for the material weakness in internal control over financial reporting is also discussed below.

Management's Annual Report on Internal Control Over over Financial Reporting. Our management Management is responsible for establishing and maintaining adequate internal control over financial reporting. Management used the criteria described in *Internal Control-Integrated Framework(2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission ("COSO") to evaluate the effectiveness of the Company's internal control over financial reporting as defined of December 31, 2023. Based on this evaluation, management identified a material weakness related to a pervasive lack of sufficient documentation of accounting policies, procedures, and controls. This lack of sufficient documentation does not allow management to effectively assess its relevant risks and key controls to properly test for design and operating effectiveness. A material weakness is a control deficiency, or a combination of deficiencies, in Rule 13a-15(f) internal control over financial reporting such that there is a reasonable possibility that a material misstatement of the Exchange Act. our annual or interim financial statements will not be prevented or detected on a timely basis. Management has assessed the concluded that its internal control over financial reporting was ineffective as of December 31, 2023.

The effectiveness of our internal control over financial reporting as of December 31, 2022 based on criteria established December 31, 2023 has been audited by Cherry Bekaert, an independent registered public accounting firm, as stated in their report, which is included herein.

Internal Control—Integrated Framework (2013) Remediation Plan. issued by We are currently developing a plan of remediation to address this material weakness, which will include assessing, redesigning, and implementing modifications of our internal controls. We will not be able to fully remediate this material weakness until these steps have been completed and subsequent validation and testing of these internal controls have demonstrated their operating effectiveness over a sustained period of financial reporting cycles. Once the Committee of Sponsoring Organizations of remediation plan is fully developed, we will be implementing process, control, and documentation improvements to address the Treadway Commission. Management's assessment included evaluation above material weakness that include, but are not limited to, designing and implementing specific management review procedures to ensure completeness and accuracy of key financial reporting controls, process documentation, accounting and non-financial data utilized in our business; and implementing improved policies, procedures, and control activities over key financial data to ensure accuracy and completeness of this data as used in the Company's overall control environment. Our aforementioned management has concluded that, as of December 31, 2022, review procedures.

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Changes in Internal Control Over Financial Reporting. Except for the material weakness and remediation actions described above, there were no significant changes in our internal control over financial reporting was effective based on this assessment and these criteria.

Attestation Report of the Registered Public Accounting Firm. Our independent registered public accounting firm, MCM (PCAOB ID: 2276), has audited the effectiveness of during our internal control over financial reporting, as stated in their attestation report included in this Annual Report on Form 10-K.

Changes in Internal Control over Financial Reporting. fourthThere were no significant changes in our system of internal control over financial reporting (as defined in Rule 13a-15(f) under the Exchange Act) during the quarter ended December 31, 2022, that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

*Inherent Limitations on Effectiveness of Controls and Procedures.*We regularly review our system of internal control over financial reporting and make changes to our processes and systems to improve controls and increase efficiency, while ensuring that we maintain an effective internal control environment. Changes may include such activities as implementing new, more efficient systems, consolidating activities, and migrating processes.

Our senior members of management do not expect that our disclosure controls and procedures or our internal control over financial reporting will prevent all errors and all fraud. A control system, no matter how well designed and operated, can provide only reasonable, not absolute, assurance that the objectives of the control system are met. Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Item 9B. Other Information

None.

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Item 9B. Other Information

During the fourth quarter of 2023, none of the Company's directors or executive officers adopted, modified, or terminated a Rule 10b5-1 trading arrangement or a non-Rule 10b5-1 trading arrangement (each as defined in Item 408 of Regulation S-K under the Securities Exchange Act of 1934, as amended), except as follows:

On December 12, 2023, Jason Fannin, the Company's chief commercial officer, adopted a trading plan intended to satisfy the affirmative defense of Rule 10b5-1(c). The duration of the plan is from March 20, 2024 until August 15, 2024 and 155,993 shares of Class A common stock and 31,332 shares of Class B common stock may be sold pursuant to the plan.

Item 9C. Disclosures Regarding Foreign Jurisdiction that Prevent Inspections.

None.

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PART III

Item 10. Directors, Executive Officers and Corporate Governance

The information required by this Item is incorporated herein by reference to our Proxy Statement for the 2023 2024 Annual Meeting of Stockholders, which is expected to be filed with the SEC within 120 days after the close of our fiscal year.

Item 11. Executive Compensation

The information required by this Item is incorporated herein by reference to our Proxy Statement for the 2023 2024 Annual Meeting of Stockholders, which is expected to be filed with the SEC within 120 days after the close of our fiscal year.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

The information required by this Item is incorporated herein by reference to our Proxy Statement for the 2023 2024 Annual Meeting of Stockholders, which is expected to be filed with the SEC within 120 days after the close of our fiscal year.

Item 13. Certain Relationships and Related Persons Transactions

The information required by this Item is incorporated herein by reference to our Proxy Statement for the 2023 2024 Annual Meeting of Stockholders, which is expected to be filed with the SEC within 120 days after the close of our fiscal year.

Item 14. Principal Accountant Fees and Services

The information required by this Item is incorporated herein by reference to our Proxy Statement for the 2023 2024 Annual Meeting of Stockholders, which is expected to be filed with the SEC within 120 days after the close of our fiscal year.

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PART IV

Item 15. Exhibits and Financial Statement Schedules

(a) *The following documents are filed as part of this Annual Report*:

(1) Reports of Independent Registered Public Accounting Firms

Consolidated Balance Sheets as of December 31, 2022 December 31, 2023 and 2021 2022

Consolidated Statements of Operations for the Years Ended December 31, 2022 December 31, 2023, 2021, 2022, and 2020 2021

Consolidated Statements of Equity for the Years Ended December 31, 2022 December 31, 2023, 2021, 2022, and 2020 2021

Consolidated Statements of Cash Flows for the Years Ended December 31, 2022 December 31, 2023, 2021 2022 and 2020 2021

Notes to Consolidated Financial Statements

(2) Financial Statement Schedules. All schedules are omitted because they are not applicable or because the information is immaterial or disclosed elsewhere in the Consolidated Financial Statements and Notes thereto.

(b) Exhibits

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Exhibit Number	Description
2.1	Master Reorganization Agreement, dated February 1, 2017, by and among Ramaco Resources, Inc., Ramaco Development, LLC, Ramaco Merger Sub, LLC and the other parties named therein (incorporated by reference to Exhibit 2.1 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on February 7, 2017)
2.2	Purchase and Sale Agreement, dated February 23, 2022, by and among Ramaco Development, LLC, Ramaco Resources, Inc., Ramaco Coal Holdings, LLC, and Ramaco Coal, LLC (incorporated by reference to Exhibit 2.1 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the SEC on February 24, 2022)
2.3	Securities Purchase Agreement, dated as of August 8, 2022, between Ramaco Development, LLC and Appleton Coal LLC (incorporated by reference to Exhibit 10.1 to the Current Report on Form 8-K (File No. 001-38003) filed with the SEC on August 8, 2022
2.4	Asset Purchase Agreement, dated as of October 26, 2021, among Ramaco Resources, Inc., Coronado IV LLC, Buchanan Minerals, LLC and Buchanan Mining Company, LLC (incorporated by reference to Exhibit 10.1 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on October 26, 2021)
3.1	Second Amended and Restated Certificate of Incorporation of Ramaco Resources, Inc. (incorporated by reference to Exhibit 3.1 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on February 14, 2017 June 12, 2023)
3.2	Amended and Restated Bylaws of Ramaco Resources, Inc. (incorporated by reference to Exhibit 3.2 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on February 14, 2017)

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3.3	Amendment No. 1 to the Amended and Restated Bylaws of Ramaco Resources, Inc. (incorporated by reference to Exhibit 3.2 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on December 15, 2020)

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4.1	Form of Common Stock Certificate (incorporated by reference to Exhibit 4.1 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)

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4.2	Registration Rights Agreement, dated as of February 8, 2017, by and among Ramaco Resources, Inc. and the stockholders named therein (incorporated by reference to Exhibit 4.1 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on February 14, 2017)
4.3	Shareholders' Agreement, dated as of February 8, 2017, by and among Ramaco Resources, Inc., Yorktown Energy Partners IX, L.P., Yorktown Energy Partners X, L.P., Yorktown Energy Partners XI, L.P., Energy Capital Partners Mezzanine Opportunities Fund, LP, Energy Capital Partners Mezzanine Opportunities Fund A, LP, and ECP Mezzanine B (Ramaco IP), LP. (incorporated by reference to Exhibit 4.2 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on February 14, 2017)
*4.4	Description of Securities
4.5	Indenture, dated as of July 13, 2021, between Ramaco Resources, Inc. and Wilmington Savings Fund Society, FSB, as trustee (incorporated by reference to Exhibit 4.1 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on July 13, 2021)
4.6	First Supplemental Indenture, dated as of July 13, 2021, between Ramaco Resources, Inc. and Wilmington Savings Fund Society, FSB, as trustee (incorporated by reference to Exhibit 4.2 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on July 13, 2021)
4.7	Form of 9.00% Senior Note due 2026 (incorporated by reference to Exhibit 4.2.1 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on July 13, 2021)
†10.1	Ramaco Resources, Inc. Long-Term Incentive Plan (incorporated by reference to Exhibit 4.3 of the Company's Registration Statement on Form S-8 (File No. 333-215913) filed with the Commission on February 6, 2017)
10.2	Berwind Mutual Cooperation Agreement, dated August 20, 2015, by and between Ramaco Resources, LLC and Ramaco Central Appalachia, LLC (incorporated by reference to Exhibit 10.3 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)
10.3	Elk Creek Mutual Cooperation Agreement, dated August 20, 2015, by and between Ramaco Resources, LLC and Ramaco Central Appalachia, LLC (incorporated by reference to Exhibit 10.4 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)

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10.4	Indemnification Agreement, dated August 20, 2015, by and between Ramaco Coal, LLC and Ramaco Development, LLC (incorporated by reference to Exhibit 10.5 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)
10.5	RAM Mine Mutual Cooperation Agreement, dated August 20, 2015, by and between RAM Mining, LLC and Ramaco Northern Appalachia, LLC (incorporated by reference to Exhibit 10.6 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)
10.6	Promissory Note, dated August 31, 2016, by and between Ramaco Development, LLC, as maker, and Ramaco Coal, LLC, as noteholder (incorporated by reference to Exhibit 10.7 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)

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10.7	Corporate Guaranty, dated August 20, 2015, by and between Ramaco Coal, LLC, as guarantor, and RAMACO Development, LLC as oblige (incorporated by reference to Exhibit 10.8 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)
10.8	Corporate Guaranty, dated August 20, 2015, by and between RAMACO Development, LLC, as guarantor, and Ramaco Coal, LLC, as oblige (incorporated by reference to Exhibit 10.9 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)
10.9	Berwind Sublease Agreement, dated August 20, 2015, by and between Ramaco Central Appalachia, LLC and Ramaco Resources, LLC (incorporated by reference to Exhibit 10.10 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)
10.10	First Amendment to Berwind Lease Agreement and Sublease, dated February 2016, by and among Berwind Land Company, Ramaco Central Appalachia, LLC and Ramaco Resources, LLC (incorporated by reference to Exhibit 10.11 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)
10.11	Second Amendment to Berwind Sublease, dated August 31, 2016, by and between Ramaco Central Appalachia, LLC and Ramaco Resources, LLC (incorporated by reference to Exhibit 10.12 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)
10.12	Third Amendment to Berwind Lease Agreement and Consent to Sublease, dated December 19, 2017, by and between Berwind Land Company and Ramaco Central Appalachia, LLC (incorporated by reference to Exhibit 10.12 of the Company's Annual Report on Form 10-K (File No. 333-215913) filed with the Commission on February 20, 2020)
10.13	Elk Creek Coal Lease Agreement, dated August 20, 2015, by and between Ramaco Central Appalachia, LLC and Ramaco Resources, LLC (incorporated by reference to Exhibit 10.13 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)
10.14	Amendment No. 1 to Elk Creek Coal Lease Agreement, dated December 31, 2015, by and between Ramaco Central Appalachia, LLC and Ramaco Resources, LLC (incorporated by reference to Exhibit 10.14 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)
10.15	Amendment No. 2 to Elk Creek Coal Lease Agreement, dated March 31, 2016, by and between Ramaco Central Appalachia, LLC and Ramaco Resources, LLC (incorporated by reference to Exhibit 10.15 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)

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10.16 Amendment No. 3 to Elk Creek Coal Lease Agreement, dated August 31, 2016, by and between Ramaco Central Appalachia, LLC and Ramaco Resources, LLC (incorporated by reference to Exhibit 10.16 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)

10.17 Amendment No. 4 to Elk Creek Coal Lease Agreement, dated January 12, 2017, by and between Ramaco Central Appalachia, LLC and Ramaco Resources, LLC (incorporated by reference to Exhibit 10.17 of the Company's Annual Report on Form 10-K (File No. 333-215913) filed with the Commission on February 20, 2020)

10.18 Amendment No. 5 to Elk Creek Coal Lease Agreement, dated September 28, 2018, by and between Ramaco Central Appalachia, LLC and Ramaco Resources, LLC (incorporated by reference to Exhibit 10.18 of the Company's Annual Report on Form 10-K (File No. 333-215913) filed with the Commission on February 20, 2020)

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10.19 Amendment No. 6 to Elk Creek Coal Lease Agreement, dated December 21, 2018, by and between Ramaco Central Appalachia, LLC and Ramaco Resources, LLC (incorporated by reference to Exhibit 10.19 of the Company's Annual Report on Form 10-K (File No. 333-215913) filed with the Commission on February 20, 2020)

10.20 Amendment No. 7 to Elk Creek Coal Lease Agreement, dated February 1, 2019, by and between Ramaco Central Appalachia, LLC and Ramaco Resources, LLC (incorporated by reference to Exhibit 10.20 of the Company's Annual Report on Form 10-K (File No. 333-215913) filed with the Commission on February 20, 2020)

10.21 Elk Creek Surface Rights Lease Agreement, dated August 20, 2015, by and between Ramaco Central Appalachia, LLC and Ramaco Resources, LLC (incorporated by reference to Exhibit 10.17 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)

10.22 Amendment No. 1 to Elk Creek Surface Rights Lease Agreement, dated December 31, 2015, by and between Ramaco Central Appalachia, LLC and Ramaco Resources, LLC (incorporated by reference to Exhibit 10.18 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)

10.23 Amendment No. 2 to Elk Creek Surface Rights Lease Agreement, dated March 31, 2016, by and between Ramaco Central Appalachia, LLC and Ramaco Resources, LLC (incorporated by reference to Exhibit 10.19 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)

10.24 Amendment No. 3 to Elk Creek Surface Rights Lease Agreement, dated August 31, 2016, by and between Ramaco Central Appalachia, LLC and Ramaco Resources, LLC (incorporated by reference to Exhibit 10.20 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)

10.25 Mutual Services Agreement, dated December 22, 2017, by and between Ramaco Development, LLC and Ramaco Coal, LLC (incorporated by reference to Exhibit 10.23 of the Company's Annual Report on Form 10-K (File No. 001-38003) filed with the Commission on March 21, 2018)

10.26 NRP Sublease Agreement, dated August 19, 2015, by and between Ramaco Central Appalachia, LLC and Ramaco Resources, LLC (incorporated by reference to Exhibit 10.24 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)

10.27 Amendment No. 1 to NRP Sublease Agreement, dated August 31, 2016, by and between Ramaco Central Appalachia, LLC and Ramaco Resources, LLC (incorporated by reference to Exhibit 10.25 of the

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	Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)
10.28	Amended and Restated Lease Agreement, dated August 20, 2015, by and among Ramaco Northern Appalachia, LLC, RAM Farms, LLC, RAM Mining, LLC and RAMACO Mining, LLC (incorporated by reference to Exhibit 10.26 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)
10.29	Amendment No. 1 to Amended and Restated Lease Agreement, dated December 31, 2015, by and among Ramaco Northern Appalachia, LLC, RAM Farms, LLC and RAM Mining, LLC (incorporated by reference to Exhibit 10.27 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)

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10.30	Amendment No. 2 to Amended and Restated Lease Agreement, dated March 31, 2016, by and among Ramaco Northern Appalachia, LLC, RAM Farms, LLC and RAM Mining, LLC (incorporated by reference to Exhibit 10.28 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)
10.31	Amendment No. 3 to Amended and Restated Lease Agreement, dated August 31, 2016, by and among Ramaco Northern Appalachia, LLC, RAM Farms, LLC and RAM Mining, LLC (incorporated by reference to Exhibit 10.29 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)
†10.32	Ramaco Development, LLC 2016 Membership Unit Option Plan (incorporated by reference to Exhibit 10.30 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)
†10.33	Form of Ramaco Resources, Inc. Stock Option Notice and Agreement (incorporated by reference to Exhibit 10.31 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)
†10.34	Form of Amendment to Option Agreement (incorporated by reference to Exhibit 10.32 of the Company's Registration Statement on Form S-1 (File No. 333-215363) filed with the Commission on December 29, 2016)
†10.35	Indemnification Agreement (Randall Atkins) (incorporated by reference to Exhibit 10.1 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on February 14, 2017)
†10.36	Indemnification Agreement (Michael Bauersachs) (incorporated by reference to Exhibit 10.2 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on February 14, 2017)
†10.37	Indemnification Agreement (Mark Clemens) (incorporated by reference to Exhibit 10.3 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on February 14, 2017)

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†10.38	Indemnification Agreement (Patrick C. Graney) (incorporated by reference to Exhibit 10.4 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on February 14, 2017)

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†10.39	Indemnification Agreement (W. Howard Keenan, Jr.) (incorporated by reference to Exhibit 10.5 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on February 14, 2017)
†10.40	Indemnification Agreement (Trent Kososki) (incorporated by reference to Exhibit 10.6 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on February 14, 2017)
†10.41	Indemnification Agreement (Bryan H. Lawrence) (incorporated by reference to Exhibit 10.7 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on February 14, 2017)
†10.42	Indemnification Agreement (Tyler Reeder) (incorporated by reference to Exhibit 10.8 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on February 14, 2017)
†10.43	Indemnification Agreement (Marc Solochek) (incorporated by reference to Exhibit 10.9 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on February 14, 2017)

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†10.44	Indemnification Agreement (Richard M. Whiting) (incorporated by reference to Exhibit 10.10 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on February 14, 2017)
†10.45	Indemnification Agreement (Michael Windisch) (incorporated by reference to Exhibit 10.11 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on February 14, 2017)
†10.46	Indemnification Agreement (Bruce E. Cryder) (incorporated by reference to Exhibit 10.2 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on July 5, 2017)
†10.47	Indemnification Agreement (Christopher L. Blanchard) (incorporated by reference to Exhibit 10.1 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on December 29, 2017)
†10.48	Indemnification Agreement (Peter Leidel) (incorporated by reference to Exhibit 10.48 of the Company's Annual Report on Form 10-K (File No. 001 38003) filed with the Commission on February 20, 2020)
†10.49	Indemnification Agreement (Trent Kososki) (incorporated by reference to Exhibit 10.49 of the Company's Annual Report on Form 10-K (File No. 001 38003) filed with the Commission on February 20, 2020)

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†10.50	Indemnification Agreement (C. Lynch Christian, III) (incorporated by reference to Exhibit 10.50 of the Company's Annual Report on Form 10-K (File No. 001 38003) filed with the Commission on February 20, 2020)
†10.51	Indemnification Agreement (Mahmud Riffat) (incorporated by reference to Exhibit 10.51 of the Company's Annual Report on Form 10-K (File No. 001-38003) filed with the Commission on February 18, 2021)
†10.52	Indemnification Agreement (David E. K. Frischkorn, Jr.) (incorporated by reference to Exhibit 10.52 of the Company's Annual Report on Form 10-K (File No. 001-38003) filed with the Commission on February 18, 2021)
†10.53	Indemnification Agreement (E. Forrest Jones, Jr.) (incorporated by reference to Exhibit 10.53 of the Company's Annual Report on Form 10-K (File No. 001-38003) filed with the Commission on February 18, 2021)

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*†10.54	Indemnification Agreement (Aurelia Skipwith Giacometto) (incorporated by reference to Exhibit 10.54 of the Company's Annual Report on Form 10-K (File No. 001-38003) filed with the Commission on April 1, 2022)
†10.55	Form of Restricted Stock Agreement (incorporated by reference to Exhibit 10.3 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on April 21, 2020)
†10.56	Amendment to Restricted Stock Award Agreements, dated December 10, 2019, between the Company and Randall W. Atkins (incorporated by reference to Exhibit 10.1 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on December 13, 2019)
†10.57	Amendment to Restricted Stock Award Agreements, dated December 10, 2019, between the Company and Michael D. Bauersachs (incorporated by reference to Exhibit 10.2 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on December 13, 2019)
†10.58	Amendment to Restricted Stock Award Agreements, dated December 10, 2019, between the Company and Christopher L. Blanchard (incorporated by reference to Exhibit 10.1 of the Company's Current Report on Form 8-K/A (File No. 001-38003) filed with the Commission on December 16, 2019)

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†10.59	Amendment to Restricted Stock Award Agreements, dated December 10, 2019, between the Company and Jeremy R. Sussman (incorporated by reference to Exhibit 10.2 of the Company's Current Report on Form 8-K/A (File No. 001-38003) filed with the Commission on December 16, 2019)

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10.60	Credit and Security Agreement, dated November 22, 2019, by and among: (i) Key Equipment Finance, a division of Keybank National Association, as administrative agent, collateral agent, lender and issuer; (ii) such other lenders that are now or hereafter become a party thereto; and (iii) the Company, Ramaco Development, LLC, RAM Mining, LLC, Ramaco Coal Sales, LLC, Ramaco Resources, LLC and Ramaco Resources Land Holdings, LLC, as borrower (incorporated by reference to Exhibit 10.57 of the Company's Annual Report on Form 10-K (File No. 001-38003) filed with the Commission on February 20, 2020)
10.61	Promissory Note dated April 20, 2020 by Ramaco Resources, Inc., Ramaco Development, LLC, RAM Mining, LLC, Ramaco Coal Sales, LLC, Ramaco Resources, LLC and Ramaco Resources Land Holdings, LLC, as borrowers, and Key Equipment Finance, a Division of KeyBank National Association, as lender (incorporated by reference to Exhibit 10.1 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on April 21, 2020)
10.62	Promissory Note dated April 16, 2020 by Ramaco Resources, Inc. in favor of KeyBank National Association (incorporated by reference to Exhibit 10.2 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on April 21, 2020)
10.63	Ramaco Resources, Inc. Change in Control and Severance Plan, effective as of April 27, 2020 (incorporated by reference to Exhibit 99.1 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on April 28, 2020)
10.64	Separation and Consulting Agreement, dated December 31, 2020, by and between Ramaco Resources, Inc. and Michael D. Bauersachs (incorporated by reference to Exhibit 10.65 of the Company's Annual Report on Form 10-K (File No. 001-38003) filed with the Commission on February 18, 2021)
10.65	Amended and Restated Credit and Security Agreement, dated October 29, 2021, by and among Ramaco Resources, Inc., Ramaco Development, LLC, RAM Mining, LLC, Ramaco Coal Sales, LLC, Ramaco Resources, LLC and Ramaco Resources Land Holdings, LLC, as the borrowers, the lenders party thereto and KeyBank National Association, as the administrative agent (incorporated by reference to Exhibit 10.1 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on November 2, 2021)

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†10.66	First Amendment to the Ramaco Resources, Inc. Long-Term Incentive Plan. (incorporated by reference to Exhibit 10.1 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on February 2, 2022)
+10.67	Loan Agreement, dated as of September 23, 2022, between Ramaco Development, LLC and Investec Bank PLC (incorporated by reference to Exhibit 10.2 to the Company's Current Report on Form 8-K (File No. 001-38003) filed with the SEC on September 26, 2022)
+10.68	First Amendment to Amended and Restated Credit and Security Agreement, dated April 29, 2022, by and among Ramaco Resources, Inc., Ramaco Development, LLC, Ram Mining, LLC, Ramaco Coal Sales, LLC, Ramaco Resources, LLC, Ramaco Resources Land Holdings, LLC, and KeyBank National Association (incorporated by reference to Exhibit 10.1 of the Company's Quarterly Report on Form 10-Q (Filed No. 001-38003) filed with the Commission on August 9, 2022)

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+10.69	Second Amendment to Amended and Restated Credit and Security Agreement, dated September 23, 2022, by and among Ramaco Resources, Inc., Ramaco Development, LLC, Ram Mining, LLC, Ramaco Coal Sales, LLC, Ramaco Resources, LLC, Ramaco Resources Land Holdings, LLC, and KeyBank National Association (incorporated by reference to Exhibit 10.2 of the Company's Quarterly Report on Form 10-Q (File No. 001-38003) filed with the Commission on November 9, 2022)
+10.70	Second Amended and Restated Credit and Security Agreement, dated February 15, 2023, by and among Ramaco Resources, Inc., Ramaco Development, LLC, Ram Mining, LLC, Ramaco Coal Sales, LLC, Ramaco Resources, LLC, Ramaco Resources Land Holdings, LLC, Maben Coal LLC, Carbon Resources Development, Inc., Ramaco Coal, Inc. as borrowers, the lenders party thereto and KeyBank National Association, as agent, lender, swing line lender, and the issuer (incorporated by reference to Exhibit 10.1 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on February 17, 2023)
†10.71	Employment Separation Agreement, dated January 26, 2024, by and between the Company and Barkley J. Sturgill, Jr. (incorporated by reference to Exhibit 10.1 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on February 1, 2024)
16.1	Letter from Briggs & Veselka Co. to Securities and Exchange Commission dated January 21, 2022. (incorporated by reference to Exhibit 16.1 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on January 24, 2022)
16.2	Crowe LLP consent letter, dated April 20, 2022 (incorporated by reference to Exhibit 16.1 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on April 20, 2022)
16.3	Cherry Bekaert LLP consent letter, dated November 6, 2023 (incorporated by reference to Exhibit 16.1 of the Company's Current Report on Form 8-K (File No. 001-38003) filed with the Commission on November 6, 2023)
*21.1	Subsidiaries of Ramaco Resources, Inc.
*23.1	Consent of MCM CPAs & Advisors Cherry Bekaert LLP
*23.2	Consent of Weir International, Inc.
23.3	[Reserved]
*23.4	Consent of Crowe LLP
*23.5	Consent of Briggs & Veselka Co.

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*31.1	Certification of Chief Executive Officer pursuant to Section 302 of Sarbanes-Oxley Act of 2002
*31.2	Certification of Chief Financial Officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002

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**32.1	Certification of Chief Executive Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
**32.2	Certification of Chief Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
*95.1	Mine Safety Disclosure
*96.1	Mineral resource and reserve estimates at the Berwind Complex, dated March 9, 2023 April 4, 2023, with an effective date of December 31, 2022 (incorporated by reference to Exhibit 96.1 of Amendment No. 1 to the Company's Annual Report on Form 10-K/A (File No. 001-38003) filed with the Commission on April 7, 2023)
*96.2	Mineral resource and reserve estimates at the Knox Creek Complex, dated March 9, 2023 April 4, 2023, with an effective date of December 31, 2022 (incorporated by reference to Exhibit 96.2 of Amendment No. 1 to the Company's Annual Report on Form 10-K/A (File No. 001-38003) filed with the Commission on April 7, 2023)

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96.3	Mineral resource and reserve estimates at the Elk Creek Complex, dated November 22, 2022, with an effective date of December 31, 2021 (incorporated by reference to Exhibit 96.2 of Amendment No. 1 to the Company's Annual Report on Form 10-K/A (File No. 001-38003) filed with the Commission on January 10, 2023)
*97.1	Policy Relating to Recovery of Erroneously Awarded Compensation
*101	Interactive Data Files including the following information from the Annual Report on Form 10-K for the fiscal year ended December 31, 2022 December 31, 2023, formatted in inline extensible business reporting language ("Inline XBRL"): (i) Cover Page Interactive Data and (ii) the Financial Statements listed on the first page of Item 8. The financial information contained in the XBRL-related documents is "unaudited" and "unreviewed."
*104	Cover Page Interactive Data File (formatted in Inline XBRL and included in the Interactive Data Files submitted under Exhibit 101).

* Exhibit filed herewith.

** Exhibit furnished herewith.

† Management contract or compensatory plan or agreement.

+ Certain schedules and similar attachments have been omitted in reliance on Item 601(a)(5) of Regulation S-K.

The Company will provide, on a supplemental basis, a copy of any omitted schedule or attachment to the SEC or its staff upon request.

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SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

March 14, 2023 2024

By: /s/ Randall W. Atkins
Randall W. Atkins
Chairman, Chief Executive Officer and Director
(Principal Executive Officer)

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

March 14, 2023 2024

By: /s/ Randall W. Atkins
Randall W. Atkins
Chairman, Chief Executive Officer and Director
(Principal Executive Officer)

March 14, 2023 2024

By: /s/ Jeremy R. Sussman
Jeremy R. Sussman
Chief Financial Officer
(Principal Financial Officer)

March 14, 2023 2024

By: /s/ John C. Marcum
John C. Marcum
Chief Accounting Officer
(Principal Accounting Officer)

March 14, 2023 2024

By: /s/ Bryan H. Lawrence
Bryan H. Lawrence
Director

March 14, 2023 2024

By: /s/ Richard M. Whiting
Richard M. Whiting
Director

March 14, 2023 2024

By: /s/ Patrick C. Graney, III
Patrick C. Graney, III
Director

March 14, 2023 2024

By: /s/ C. Lynch Christian III
C. Lynch Christian III
Director

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March 14, 2023 2024

By: /s/ Peter Leidel
Peter Leidel

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Director

March 14, 2023 2024

By: /s/ Aurelia Skipwith Giacometto
Aurelia Skipwith Giacometto
Director

March 14, 2023 2024

By: /s/ David E. K. Frischkorn, Jr.
David E. K. Frischkorn, Jr.
Director

March 14, 2023 2024

By: /s/ E. Forrest Jones, Jr.
E. Forrest Jones, Jr.
Director

Exhibit 4.4

DESCRIPTION OF THE REGISTRANT'S SECURITIES
REGISTERED PURSUANT TO SECTION 12 OF THE SECURITIES
EXCHANGE ACT OF 1934

Ramaco Resources, Inc. (the "Company" or "Ramaco") has Class A common stock, par value $0.01 per share (the "Class A common stock") and Class B common stock, par value $0.01 per share (the "Class B common stock" and collectively with the Class A common stock, the "common stock") registered under Section 12 of the Securities Exchange Act of 1934, as amended. The following contains a description of our common stock, as well as certain related additional information. This description is a summary only and does not purport to be complete and is subject to and qualified by reference to the provisions of applicable law, the Company's Amended and Restated Certificate of Incorporation, as amended (the "Certificate"), and the Company's Amended and Restated Bylaws (the "Bylaws," and together with the Certificate, the "Charter Documents"), each of which is incorporated by reference as an exhibit to the Company's Annual Report on Form 10-K. For additional information, please read the Company's Charter Documents and the applicable provisions of the Delaware General Corporation Law (the "DGCL"). References to "we," "our" and "us" refer to the Company, unless the context otherwise requires. References to "stockholders" refer to holders of our common stock, unless the context otherwise requires.

General

Pursuant to the Certificate, we are authorized to issue 310,000,000 shares of capital stock, consisting of 260,000,000 225,000,000 shares of Class A common stock, 35,000,000 shares of Class B common stock, and 50,000,000 shares of preferred stock, par value $0.01 per share (the "preferred stock"). There are no issued and outstanding shares of preferred stock.

Description of Common Stock

Voting Rights

Holders of shares of Class A common stock and Class B common stock are entitled to one vote per share held of record on all matters to be voted upon by the stockholders. The holders of Class A common stock and Class B common stock do not have cumulative voting rights in the election of directors.

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Dividend Rights

Holders of shares of our Class A common stock are entitled to ratably receive dividends when and if declared by our board of directors out of funds legally available for that purpose, subject to any statutory or contractual restrictions on the payment of dividends and to any prior rights and preferences that may be applicable to any outstanding preferred stock.

Holders of shares of our Class B common stock are entitled to ratably receive a quarterly dividend tied to the financial performance of the CORE Assets, subject to the discretion of our board of directors, the requirements of applicable law, any statutory or contractual restrictions on the payment of dividends and to any prior rights and preferences that may be applicable to any outstanding preferred stock. The timing and amount of dividends declared in future periods will depend on, among other things, (a) our earnings, earnings outlook, production, processing and shipping levels, financial condition, cash flow, cash requirements and our outlook on current and future market conditions, (b) our overall liquidity, (c) the restrictive covenants in the Credit Agreement and any future debt instruments that we may enter into and (d) provisions of applicable law governing the dividends.

Any determination to declare a regular or special dividend, as well as the amount of any dividend that may be declared, will be based on the board of director's consideration of our financial position, earnings, earnings outlook, capital spending plans, outlook on current and future market conditions, alternative stockholder return methods such as share repurchases, and other factors that the board of directors considers relevant at that time.

Liquidation Rights

Upon our liquidation, dissolution, distribution of assets or other winding up, the holders of common stock are entitled to receive ratably the assets available for distribution to the stockholders after payment of liabilities and the liquidation preference of any of our outstanding shares of preferred stock. Holders of shares of our Class B common stock will not have any specific rights with respect to the CORE Assets.

Other Matters

The shares of Class A common stock have no preemptive or conversion rights and are not subject to further calls or assessment by us. There are no redemption or sinking fund provisions applicable to the Class A common stock. Our board of directors is permitted, in its sole discretion, to exchange all of the outstanding shares of Class B common stock into shares of Class A common stock based on an exchange ratio determined by obtained by dividing (I) the average market value of the Class B common stock over the 20-day trading period ending on the trading day preceding the date designated by the board of directors for the determination of the exchange ratio (the "Determination Date"), by (II) the average market value of the Class A common stock over the 20-day trading period ending on the trading day preceding the Determination Date. All outstanding shares of our common stock are fully paid and non-assessable.

Listing

Our common stock is traded on the NASDAQ Global Select Market under the symbol "METC."

Anti-Takeover Effects of Provisions of Our Certificate, Bylaws and Delaware Law

Some provisions of Delaware law, and our Charter Documents described below, contain provisions that could make the following transactions more difficult: acquisitions of us by means of a tender offer, a proxy contest or otherwise; or removal of our incumbent officers and directors. These provisions may also have the effect of preventing changes in our management. It is possible that these provisions could make it more difficult to accomplish or could deter transactions that stockholders may otherwise consider to be in their best interest or in our best interests, including transactions that might result in a premium over the market price for our shares.

These provisions, summarized below, are expected to discourage coercive takeover practices and inadequate takeover bids. These provisions are also designed to encourage persons seeking to acquire control of us to first negotiate with us. We believe that the benefits of increased protection and our potential ability to negotiate with the proponent of an unfriendly or unsolicited proposal to acquire

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or restructure us outweigh the disadvantages of discouraging these proposals because, among other things, negotiation of these proposals could result in an improvement of their terms.

Delaware Law

We will not be subject to the provisions of Section 203 of the DGCL, regulating corporate takeovers for so long as Yorktown Energy Partners IX, L.P., Yorktown Energy Partners X, L.P and Yorktown Energy Partners XI, L.P. (collectively, "Yorktown") and Energy Capital Partners Mezzanine Opportunities Fund, L.P., Energy Capital Partners Mezzanine Opportunities Fund A, LP and ECP Mezzanine B (Ramaco IP), LP (collectively, "ECP") and their respective affiliates own in the aggregate more than 15% of our outstanding common stock. In general, those provisions prohibit a Delaware corporation, including those whose securities are listed for trading on the NASDAQ, from engaging in any business combination with any interested stockholder for a period of three years following the date that the stockholder became an interested stockholder, unless:

- the transaction is approved by the board of directors before the date the interested stockholder attained that status;
- upon consummation of the transaction that resulted in the stockholder becoming an interested stockholder, the interested stockholder owned at least 85% of the voting stock of the corporation outstanding at the time the transaction commenced; or

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- on or after such time the business combination is approved by the board of directors and authorized at a meeting of stockholders by at least two-thirds of the outstanding voting stock that is not owned by the interested stockholder.

Amended and Restated Certificate of Incorporation and Bylaws

Provisions of our Charter Documents may delay or discourage transactions involving an actual or potential change in control or change in our management, including transactions in which stockholders might otherwise receive a premium for their shares, or transactions that our stockholders might otherwise deem to be in their best interests. Therefore, these provisions could adversely affect the price of our common stock.

Among other things, the Charter Documents:

- establish advance notice procedures with regard to stockholder proposals relating to the nomination of candidates for election as directors or new business to be brought before meetings of our stockholders. These procedures provide that notice of stockholder proposals must be timely given in writing to our corporate secretary prior to the meeting at which the action is to be taken. Generally, to be timely, notice must be received at our principal executive offices not less than 90 days nor more than 120 days prior to the first anniversary date of the annual meeting for the preceding year. The Bylaws specify the requirements as to form and content of all stockholders' notices. These

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requirements may preclude stockholders from bringing matters before the stockholders at an annual or special meeting;
- provide that all vacancies, including newly created directorships, may, except as otherwise required by law or, if applicable, the rights of holders of a series of preferred stock, be filled by the affirmative vote of a majority of directors then in office, even if less than a quorum;
- provide our board of directors the ability to authorize undesignated preferred stock. This ability makes it possible for our board of directors to issue, without stockholder approval, preferred stock with voting or other rights or preferences that could impede the success of any attempt to change control of us. These and other provisions may have the effect of deferring hostile takeovers or delaying changes in control or management of the Company;
- as long as Yorktown and ECP and their respective affiliates own or control the voting of more than 50% of the outstanding shares of our common stock:
  - provide that Yorktown and ECP, collectively, may designate up to seven directors depending on their percent ownership of our common stock;
  - provide that the authorized number of directors may be changed only by the affirmative vote of holders of not less than 50% in voting power of the then-outstanding shares of stock entitled to vote thereon;
  - provide that any action required or permitted to be taken at any annual meeting or special meeting of the stockholders of the Company may be taken by written consent;

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- provide that our Charter Documents may be amended by the affirmative vote of the holders of at least 50% of our then outstanding common stock;
- provide that special meetings of our stockholders may be called by the board of directors or our secretary at the request of the holders of a majority of our common stock; and
- provide that we renounce any interest in existing and future investments in other entities by, or the business opportunities of, Yorktown or ECP or any of their officers, directors, agents, stockholders, members, partners, affiliates and subsidiaries (other than our directors that are presented business opportunities in their capacity as our directors) and that they have no obligation to offer us those investments or opportunities; and
- provide that the Bylaws can be amended only with the approval of a majority of the board of directors and the affirmative vote of holders of not less than 50% in voting power of the then-outstanding shares of stock entitled to vote thereon.

- at any time after Yorktown and ECP and their respective affiliates no longer own or control the voting of more than 50% of the outstanding shares of our common stock:
  - provide that the authorized number of directors may be changed only by resolution of the board of directors;
- provide that any action required or permitted to be taken by the stockholders must be effected at a duly called annual or special meeting of stockholders and may not be effected by any consent in writing in lieu of a meeting of such stockholders, subject to the rights of the holders of any series of preferred stock with respect to such series;
- provide that our Charter Documents may be amended by the affirmative vote of the holders of at least two-thirds of our then outstanding common stock;
- provide that special meetings of our stockholders may only be called by the board of directors;
- provide for our board of directors to be divided into three classes of directors, with each class as nearly equal in number as possible, serving staggered three-year terms, other than directors which may be elected by holders of preferred stock, if any. This system of electing and removing directors may tend to discourage a third party from making a tender offer or otherwise attempting to obtain control of us, because it generally makes it more difficult for stockholders to replace a majority of the directors;
- provide that we renounce any interest in existing and future investments in other entities by, or the business opportunities of, Yorktown or ECP or any of their officers, directors, agents, stockholders, members, partners, affiliates and subsidiaries (other than our directors that are presented business opportunities in their capacity as our directors) and that they have no obligation to offer us those investments or opportunities; and
- provide that the Bylaws can be amended by the board of directors.

Forum Selection

Our Certificate provides that unless we consent in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware will, to the fullest extent permitted by applicable law, be the sole and exclusive forum for:

- any derivative action or proceeding brought on our behalf;
- any action asserting a claim of breach of a fiduciary duty owed by any of our directors, officers, employees or agents to us or our stockholders;
- any action asserting a claim against us or any director or officer or other employee of ours arising pursuant to any provision of the DGCL, our Certificate or our Bylaws; or
- any action asserting a claim against us or any director or officer or other employee of ours that is governed by the internal affairs doctrine, in each such case subject to such Court of Chancery having personal jurisdiction over the indispensable parties named as defendants therein.

Our Certificate also provides that any person or entity purchasing or otherwise acquiring any interest in shares of our capital stock will be deemed to have notice of, and to have consented to, this forum selection provision. Although we believe these provisions will benefit us by providing increased consistency in the application of Delaware law for the specified types of actions and proceedings, the provisions may have the effect of discouraging lawsuits against our directors, officers, employees and agents. The enforceability of similar exclusive forum provisions in other companies' certificates of incorporation has been challenged in legal proceedings, and it is possible that, in connection with one or more actions or proceedings described above, a court could rule that this provision in our Certificate is inapplicable or unenforceable. This exclusive forum provision does not apply to a cause of action brought under federal or state securities laws.

Transfer Agent and Registrar

The transfer agent and registrar for our common stock was American Stock Transfer & Trust Company, LLC. Effective February 10, 2023, the transfer agent and registrar for our common stock is Computershare, Inc.

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Description of Notes

Set forth below is a summary description of the material terms and provisions of our 9.00% Senior Notes due 2026 (the "Notes"), which does not purport to be complete. It is subject to and qualified in its entirety by reference to the indenture dated as of July 13, 2021 (the "base indenture") between the Company and Wilmington Savings Fund Society, FSB, as trustee (the "trustee"), as supplemented by the First Supplemental Indenture, dated as of July 13, 2021, between the Company and trustee (the "First Supplemental Indenture" and, together with the base indenture, the "indenture"), which are incorporated by reference as exhibits to the annual report on Form 10-K of which this Exhibit is a part.

Unless the context requires otherwise, all references to "we," "us," "our" and the "Company" in this "Description of Notes" refer solely to Ramaco Resources, Inc., the issuer of the Notes, and not to any of its subsidiaries. Capitalized terms that are used but not otherwise defined herein have the meanings assigned to them in the indenture, and those definitions are incorporated herein by reference. The following description is only a summary of certain provisions of the indenture and the Notes. The following summary does not purport to be complete and is subject to, and is qualified in its entirety by reference to, the indenture and to the Trust Indenture Act of 1939, as amended (the "Trust Indenture Act"), and to all of the provisions of the indenture and those terms made a part of the indenture by reference to the Trust Indenture Act.

General

The Notes:

- are our general unsecured, senior obligations;
- were issued in an aggregate principal amount of $34,500,000;
- will mature on July 30, 2026 unless earlier redeemed or repurchased, and 100% of the aggregate principal amount will be paid at maturity;

- will bear cash interest from July 13, 2021 at an annual rate of 9.00%, payable quarterly in arrears on January 30, April 30, July 30 and October 30 of each year, beginning on July 30, 2021, and at maturity;
- will be on July 30, 2023, became redeemable at our option, in whole or in part, at any time on or after July 30, 2023, at the prices and on the terms described under "—Optional Redemption" below;
- will be redeemable at our option, in whole, but not in part, at any time upon the occurrence of certain change of control events, at the prices and on the terms described under "—Optional Redemption Upon Change of Control" below;
- were issued in denominations of $25 and integral multiples of $25 in excess thereof;
- will not have a sinking fund;
- are listed on NASDAQ under the symbol "METCL"; and
- will be represented by one or more registered Notes in global form, but in certain limited circumstances may be represented by Notes in definitive form.

The indenture does not limit the amount of indebtedness that we or our subsidiaries may issue. The indenture does not contain any financial covenants and does not restrict us from paying dividends or issuing or repurchasing our other securities. Other than restrictions described under "—Covenants—Merger, Consolidation or Sale of Assets" below, the indenture does not contain any covenants or other provisions designed to afford holders of the Notes protection in the event of a highly leveraged transaction involving us or in the event of a decline in our credit rating as the result of a takeover, recapitalization, highly leveraged transaction or similar restructuring involving us that could adversely affect such holders.

We may from time to time, without the consent of the existing holders, issue additional Notes having the same terms as to status, redemption or otherwise (except the price to public, the issue date and, if applicable, the initial interest accrual date and the initial interest payment date) that may constitute a single fungible series with the Notes offered by this prospectus; provided that if any such additional Notes are not fungible with the Notes initially offered hereby for U.S. federal income tax purposes, such additional Notes will have one or more separate CUSIP numbers. For the avoidance of doubt, such additional Notes will still constitute a single series with all other Notes issued under the indenture for all purposes, including waivers, amendments, redemptions and offers to purchase.

Ranking

The Notes are senior unsecured obligations of the Company, and, upon our liquidation, dissolution or winding up, will rank (i) senior to the outstanding shares of our common stock, (ii) senior to any of our future subordinated debt, (iii) *pari passu* (or equally) with our future

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unsecured and unsubordinated indebtedness, (iv) effectively subordinated to any existing or future secured indebtedness (including indebtedness that is initially unsecured to which we subsequently grant security), to the extent of the value of the assets securing such indebtedness, and (v) structurally subordinated to all existing and future indebtedness of our subsidiaries, financing vehicles or similar facilities. See “Risk Factors—The Notes will be unsecured and therefore will be effectively subordinated to any secured indebtedness that we currently have or that we may incur in the future.”

The Notes will be obligations solely of the Company and will not be guaranteed by any of our subsidiaries. We derive substantially all of our operating income and cash flow from our investments in our subsidiaries. Claims of creditors of our subsidiaries generally will have priority with respect to the assets and earnings of such subsidiaries over the claims of our creditors, including holders of the Notes. As a result, the Notes will be effectively subordinated to creditors, including trade creditors and preferred stockholders, if any, other than us, of our subsidiaries. See “Risk Factors—The Notes will be structurally subordinated to the indebtedness and other liabilities of our subsidiaries.”

As of May 31, 2021, we had approximately $21.3 million of outstanding indebtedness (excluding the PPP Loan (as defined in this prospectus)), all of which was secured.

Interest

Interest on the Notes will accrue at an annual rate equal to 9.00% from and including July 13, 2021 to, but excluding, the maturity date or earlier acceleration or redemption and will be payable quarterly in arrears on January 30, April 30, July 30 and October 30 of each year, beginning on July 30, 2021 and at maturity, to the holders of record at the close of business on the immediately preceding January 15, April 15, July 15 and October 15 (and July 15 immediately preceding the maturity date), as applicable (whether or not a business day).

The initial interest period for the Notes will be was the period from and including July 13, 2021, to, but excluding, July 30, 2021, and subsequent interest periods will be the periods from and including an interest payment date to, but excluding, the next interest payment date or the stated maturity date, as the case may be. The amount of interest payable for any interest period, including interest payable for any partial interest period, will be computed on the basis of a 360-day year comprised of twelve 30-day months. If an interest payment date falls on a non-business day, the applicable interest payment will be made on the next business day and no additional interest will accrue as a result of such delayed payment.

“Business day” means, for any place where the principal and interest on the Notes is payable, each Monday, Tuesday, Wednesday, Thursday and Friday which is not a day in which banking institutions in New York or Wilmington, Delaware are authorized or obligated by law or executive order to close.

Optional Redemption

Except as described below and under “—Optional Redemption Upon Change of Control,” the Notes will were not be redeemable by us at our option prior to July 30, 2023.

The Notes may be redeemed for cash in whole or in part at any time at our option on or after July 30, 2023 and prior to maturity, at a price equal to 100% of their principal amount, plus accrued and unpaid interest to, but excluding, the date of redemption. In each case, redemption shall be upon notice not fewer than 10 days and not more than 60 days prior to the date fixed for redemption, except that redemption notices may be delivered more than 60 days prior to a redemption date if the notice is issued in connection with a defeasance of the Notes or a discharge of the indenture. Notices of redemption may be subject to satisfaction or waiver of one or more conditions precedent specified in the notice of redemption.

If less than all of the Notes are to be redeemed, the particular Notes to be redeemed will be selected not more than 45 days prior to the redemption date by the trustee from the outstanding Notes not previously called for redemption, by lot, or in the trustee’s discretion, on a pro-rata basis, provided that the unredeemed portion of the principal amount of any Notes will be in an authorized denomination (which will not be less than the minimum authorized denomination) for such Notes. The trustee will promptly notify us in writing of the Notes selected for redemption and, in the case of any Notes selected for partial redemption, the principal amount thereof to be redeemed.

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Beneficial interests in any of the Notes or portions thereof called for redemption that are registered in the name of DTC or its nominee will be selected by DTC in accordance with DTC's applicable procedures.

The trustee shall have no obligation to calculate any redemption price or any component thereof, and the trustee shall be entitled to receive and conclusively rely upon an officer's certificate delivered by the Company that specifies any redemption price.

Unless we default on the payment of the redemption price, on and after the date of redemption, interest will cease to accrue on the Notes called for redemption.

We may at any time, and from time to time, purchase Notes at any price or prices in the open market or otherwise.

Optional Redemption Upon Change of Control

The Notes may be redeemed for cash in whole but not in part at our option at any time within 90 days of the occurrence of a Change of Control, at a price equal to 100% of their principal amount, plus accrued and unpaid interest to, but excluding, the date of redemption. Redemption shall be upon notice not fewer than 10 days and not

more than 60 days prior to the date fixed for redemption. Notices of redemption may be subject to satisfaction or waiver of one or more conditions precedent specified in the notice of redemption.

A "Change of Control" will be deemed to have occurred at the time after the Notes are originally issued if:

(1) any "Person" (as such term is used in Sections 13(d) and 14(d) of the Exchange Act) is or becomes the "Beneficial Owner" (as defined in Rules 13d-3 and 13d-5 under the Exchange Act, except that for purposes of this clause (1) such Person shall be deemed to have "Beneficial Ownership" of all shares that any such Person has the right to acquire, whether such right is exercisable immediately or only after the passage of time), directly or indirectly, of more than 50.0% of the total voting power of the Voting Stock of the Company;

(2) the merger or consolidation of the Company with or into another Person or the merger of another Person with or into the Company, or the sale of all or substantially all the assets of the Company (determined on a consolidated basis) to another Person other than a transaction following which, in the case of a merger or consolidation transaction, holders of securities that represented 100.0% of the Voting Stock of the Company immediately prior to such transaction (or other securities into which such securities are converted as part of such merger or consolidation transaction) own directly or indirectly at least a majority of the voting power of the Voting Stock of the surviving Person in such merger or consolidation transaction immediately after such transaction and in substantially the same proportion as before the transaction;

(3) "Continuing Directors" (as defined below) cease to constitute at least a majority of the Company's board of directors; or

(4) if after the Notes are initially listed on the NYSE or another national securities exchange, the Notes fail, or at any point cease, to be listed on the NYSE or such other national securities exchange. For the avoidance of doubt, it shall not be a Change of Control if after the Notes are initially listed on the NYSE or another national securities exchange, such Notes are subsequently listed on a different national securities exchange and the prior listing is terminated.

"*Continuing Director*" means a director who either was a member of our board of directors on the issue date of the Notes or who becomes a member of our board of directors subsequent to that date and whose election, appointment or nomination for election by our stockholders is duly approved by a majority of the continuing directors on our board of directors at the time of such approval by such election or appointment.

"*Voting Stock*" of any specified Person as of any date means the Capital Stock of such Person that is at the time entitled to vote generally in the election of the Board of Directors of such Person.

Events of Default

Holders of our Notes will have rights if an Event of Default occurs in respect of the Notes and is not cured, as described later in this subsection. The term "Event of Default" in respect of the Notes means any of the following:

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- we do not pay interest on any Note when due, and such default is not cured within 30 days;
- we do not pay the principal of the Notes when due and payable;
- we breach any covenant or warranty in the indenture with respect to the Notes and such breach continues for 60 days after we receive a written notice of such breach from the trustee or the holders of at least 25% of the principal amount of the Notes; and
- certain specified events of bankruptcy, insolvency or reorganization occur and remain undischarged or unstayed for a period of 90 days.

The trustee may withhold notice to the holders of the Notes of any default, except in the payment of principal or interest, if the trustee in good faith determines the withholding of notice to be in the interest of the holders of the Notes.

Each year, we will furnish to the trustee a written statement of certain of our officers certifying that to their knowledge we are in compliance with the indenture and the Notes, or else specifying any default, its status and what actions we are taking or propose to take with respect thereto.

Remedies if an Event of Default Occurs

If an Event of Default has occurred and is continuing, the trustee or the holders of not less than 25% of the outstanding principal amount of the Notes may declare the entire principal amount of the Notes, together with accrued and unpaid interest, if any, to be due and payable immediately by a notice in writing to us and, if notice is given by the holders of the Notes, the trustee. This is called an "acceleration of maturity." If the Event of Default occurs in relation to our filing for bankruptcy or certain other events of bankruptcy, insolvency or reorganization occur, the principal amount of the Notes, together with accrued and unpaid interest, if any, will automatically, and without any declaration or other action on the part of the trustee or the holders, become immediately due and payable.

At any time after a declaration of acceleration of the Notes has been made by the trustee or the holders of the Notes and before any judgment or decree for payment of money due has been obtained by the trustee, the holders of a majority of the outstanding principal of the Notes, by written notice to us and the trustee, may rescind and annul such declaration and its consequences if (i) we have paid or deposited with the trustee all amounts due and owed with respect to the Notes (other than principal that has become due solely by reason of such acceleration) and certain other amounts, and (ii) any other Events of Default have been cured or waived.

At our election, the sole remedy with respect to an Event of Default due to our failure to comply with certain reporting requirements under the Trust Indenture Act or under "—Covenants—Reporting" below, for the first 180 calendar days after the occurrence of such Event of Default, consists exclusively of the right to receive additional interest on the Notes at an annual rate equal to (1) 0.25% for the first 90 calendar days after such default and (2) 0.50% for calendar days 91 through 180 after such default. On the 181st day after such Event of Default, if such violation is not cured or waived, the trustee or the holders of not less than 25% of the outstanding principal amount of the Notes may declare the principal, together with accrued and unpaid interest, if any, on the Notes to be due and payable immediately. If we choose to pay such additional interest, we must notify the trustee and the holders of the Notes by certificate of our election at any time on or before the close of business on the first business day following the Event of Default and we shall deliver to the trustee an officer's certificate (upon which the trustee may rely conclusively) to that effect stating (i) the amount of such additional interest that is payable and (ii) the date on which such additional interest is payable. Unless and until the trustee receives such a certificate, the trustee may assume without inquiry that no such additional interest is payable and the trustee shall not have any duty to verify our calculations of additional interest.

Before a holder of the Notes is allowed to bypass the trustee and bring a lawsuit or other formal legal action or take other steps to enforce such holder's rights relating to the Notes, the following must occur:

- such holder must give the trustee written notice that the Event of Default has occurred and remains uncured;
- the holders of at least 25% of the outstanding principal of the Notes must have made a written request to the trustee to institute proceedings in respect of such Event of Default in its own name as trustee;
- such holder or holders must have offered to the trustee indemnity satisfactory to the trustee against the costs, expenses and liabilities to be incurred in compliance with such request;
- the trustee for 60 days after its receipt of such notice, request and offer of indemnity has failed to institute any such proceeding; and

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- no direction inconsistent with such written request has been given to the trustee during such 60-day period by holders of a majority of the outstanding principal of the Notes.

No delay or omission in exercising any right or remedy will be treated as a waiver of that right, remedy or Event of Default.

The holders of a majority in principal amount of the outstanding Notes may waive any default or Event of Default and its consequences, except defaults or Events of Default regarding payment of principal, premium, if any, or interest, unless we have cured the default or Event of Default in accordance with the indenture. Any waiver shall cure the default or Event of Default.

Subject to the terms of the indenture, if an Event of Default occurs and continues, the trustee is under no obligation to exercise any of its rights or powers under the indenture at the request or direction of any of the holders, unless such holders have offered the trustee security or indemnity satisfactory to the trustee. The holders of a majority in principal amount of the outstanding Notes will have the right to direct the time, method and place of conducting any proceeding for any remedy available to the trustee, or exercising any trust or power conferred on the trustee, with respect to the Notes, provided that:

- the direction so given by the holder is not in conflict with any law or the indenture, nor does it subject the trustee to a risk of personal liability in respect of which the trustee has not received indemnification satisfactory to it in its sole discretion against all losses, liabilities and expenses caused by taking or not taking such action; and
- the trustee may take any other action deemed proper by the trustee which is not inconsistent with such direction.

A holder of the Notes will have the right to institute a proceeding under the indenture or to appoint a receiver or trustee, or to seek other remedies only if:

- the holder has given written notice to the trustee of a continuing Event of Default;
- the holders of at least 25% in aggregate principal amount of the then-outstanding Notes have made written request to the trustee to institute proceedings in respect of such Event of Default in its own name as trustee under the indenture, and such holders have offered security or indemnity satisfactory to the trustee to institute the proceeding as trustee; and
- the trustee does not institute the proceeding, and does not receive from the holders of a majority in aggregate principal amount of the outstanding Notes other conflicting directions within 60 days after the notice, request and offer.

These limitations do not apply to a suit instituted by a holder if we default in the payment of the principal, premium, if any, or interest on, the Notes.

Book-entry and other indirect holders of the Notes should consult their banks or brokers for information on how to give notice or direction to or make a request of the trustee and how to declare or cancel an acceleration of maturity.

Waiver of Defaults

The holders of not less than a majority of the outstanding principal amount of the Notes may on behalf of the holders of all Notes waive any past default with respect to the Notes other than (i) a default in the payment of principal or interest on the Notes when such payments are due and payable (other than by acceleration as described above), or (ii) in respect of a covenant that cannot per the terms of the indenture be modified or amended without the consent of each holder of Notes.

Covenants

In addition to standard covenants relating to payment of principal and interest, maintaining an office where payments may be made or securities can be surrendered for payment, payment of taxes by us and related matters, the following covenants will apply to the Notes.

Merger, Consolidation or Sale of Assets

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The indenture provides that we will not merge or consolidate with or into any other person (other than a merger of a wholly owned subsidiary into us), or sell, transfer, lease, convey or otherwise dispose of all or substantially all our property in any one transaction or series of related transactions unless:

- we are the surviving entity or the entity (if other than us) formed by such merger or consolidation or to which such sale, transfer, lease, conveyance or disposition is made will be a corporation or limited liability company organized and existing under the laws of the United States of America, any state thereof or the District of Columbia;
- the surviving entity (if other than us) expressly assumes, by supplemental indenture in form reasonably satisfactory to the trustee, executed and delivered to the trustee by such surviving entity, the due and punctual payment of the principal of, and premium, if any, and interest on, all the Notes outstanding, and the due and punctual performance and observance of all the covenants and conditions of the indenture to be performed by us;
- immediately after giving effect to such transaction or series of related transactions, no default or Event of Default has occurred and is continuing; and
- in the case of a merger where the surviving entity is other than us, we or such surviving entity will deliver, or cause to be delivered, to the trustee, an officers' certificate and an opinion of counsel, each stating that such transaction and the supplemental indenture, if any, in respect thereto, comply with this covenant and that all conditions precedent in the indenture relating to such transaction have been complied with; provided that in giving an opinion of counsel, counsel may rely on an officers' certificate as to any matters of fact, including as to the satisfaction of the preceding bullet.

The surviving entity (if other than us) will succeed to, and be substituted for, and may exercise every right and power of, the Company under the Notes and the indenture, and the Company will automatically and unconditionally be released and discharged from its obligations under the Notes and the indenture.

Reporting

If, at any time, we are not subject to the reporting requirements of Sections 13 or 15(d) of the Exchange Act to file any periodic reports with the SEC, we agree to furnish to holders of the Notes and the trustee, for the period of time during which the Notes are outstanding, our audited annual consolidated financial statements, within 90 days of our fiscal year end, and unaudited interim consolidated financial statements, within 45 days of our fiscal quarter end (other than our fourth fiscal quarter). All such financial statements will be prepared, in all material respects, in accordance with GAAP, as applicable.

The posting or delivery of any such information, documents and reports to the trustee is for informational purposes only and the trustee's receipt of such shall not constitute constructive notice of any information contained therein or determinable from information contained therein, including the Company's compliance with any of the covenants under the indenture (as to which the trustee is entitled to rely exclusively on an officer's certificate). The trustee shall have no duty to review or analyze reports, information and documents delivered to it. Additionally, the trustee shall not be obligated to monitor or confirm, on a continuing basis or otherwise, the Company's compliance with the covenants or with respect to any reports or other documents filed with any protected online data system or participate on any conference calls.

Modification or Waiver

There are three types of changes we can make to the indenture and the Notes:

Changes Not Requiring Approval

We can make certain changes to the indenture and the Notes without the specific approval of the holders of the Notes. This type is limited to clarifications and certain other changes that would not adversely affect holders of the Notes in any material respect and include changes:

- to evidence the succession of another corporation, and the assumption by the successor corporation of our covenants, agreements and obligations under the indenture and the Notes;
- to add to our covenants such new covenants, restrictions, conditions or provisions for the protection of the holders of the Notes, and Notes;
- to make the occurrence, or the occurrence and continuance, of a default in any of such additional covenants, restrictions, conditions or provisions an Event of Default;

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- to modify, eliminate or add to any of the provisions of the indenture to such extent as necessary to effect the qualification of the indenture under the Trust Indenture Act, and to add to the indenture such other provisions as may be expressly permitted by the Trust Indenture Act, excluding however, the provisions referred to in Section 316(a)(2) of the Trust Indenture Act;
- to cure any ambiguity or to correct or supplement any provision contained in the indenture or in any supplemental indenture which may be defective or inconsistent with other provisions;
- to secure the Notes;
- to evidence and provide for the acceptance and appointment of a successor trustee and to add or change any provisions of the indenture as necessary to provide for or facilitate the administration of the trust by more than one trustee;
- to establish the form or terms of Securities; and
- to make provisions in regard to matters or questions arising under the indenture, so long as such other provisions do not materially affect the interest of any other holder of the Notes.

Changes Requiring Approval of Each Holder

We cannot make certain changes to the Notes without the specific approval of each holder of the Notes. The following is a list of those types of changes:

- changing the stated maturity of the principal of, or any installment of interest on, any Note;
- reducing the principal amount or rate of interest of any Note;
- changing the place of payment where any Note or any interest is payable;
- impairing the right to institute suit for the enforcement of any payment on or after the date on which it is due and payable;
- reducing the percentage in principal amount of holders of the Notes whose consent is needed to modify or amend the indenture; and
- reducing the percentage in principal amount of holders of the Notes whose consent is needed to waive compliance with certain provisions of the indenture or to waive certain defaults.

Changes Requiring Majority Approval

Any other change to the indenture and the Notes would require the approval by holders of not less than a majority in aggregate principal amount of the outstanding Notes.

Consent from holders to any change to the indenture or the Notes must be given in writing. The consent of the holders of the Notes is not necessary under the indenture to approve the particular form of any proposed amendment. It is sufficient if such consent approves the substance of the proposed amendment.

Further Details Concerning Voting

The amount of Notes deemed to be outstanding for the purpose of voting will include all Notes authenticated and delivered under the indenture as of the date of determination except:

- Notes cancelled by the trustee or delivered to the trustee for cancellation;
- Notes for which we have deposited with the trustee or paying agent or set aside in trust money for their payment or redemption and, if money has been set aside for the redemption of the Notes, notice of such redemption has been duly given pursuant to the indenture to the satisfaction of the trustee;

- Notes held by the Company, its subsidiaries or any other entity which is an obligor under the Notes, unless such Notes have been pledged in good faith and the pledgee is not the Company, an affiliate of the Company or an obligor under the Notes;
- Notes which have undergone full defeasance, as described below; and
- Notes which have been paid or exchanged for other Notes due to such Notes loss, destruction or mutilation, with the exception of any such Notes held by bona fide purchasers who have presented proof to the trustee that such Notes are valid obligations of the Company.

We will generally be entitled to set any day as a record date for the purpose of determining the holders of the Notes that are entitled to vote or take other action under the indenture, and the trustee will generally be entitled to set any day as a record date for the purpose of determining the holders of the Notes that are entitled to join in the giving or making of any Notice of Default, any declaration of acceleration of maturity of the Notes, any request to institute proceedings or the reversal of such declaration. If we or the trustee set a record date for a vote or other action to be taken by the holders of the Notes, that vote or action can only be taken by persons who are holders of the Notes on the record date and, unless otherwise specified, such vote or action must take place on or prior to the 180th day

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after the record date. We may change the record date at our option, and we will provide written notice to the trustee and to each holder of the Notes of any such change of record date.

Discharge

The indenture will provide that we can elect to be discharged from our obligations with respect to the Notes, except for specified obligations, including obligations to:

- register the transfer or exchange of the Notes;
- replace stolen, lost or mutilated Notes;
- maintain paying agencies; and
- hold monies for payment in trust.

In order to exercise our rights to be discharged, we must (i) deposit with the trustee money or U.S. government obligations, or a combination thereof, sufficient (to the extent of any U.S. government obligations, in the opinion of a nationally recognized firm of independent public accountants, investment bank or appraisal firm, to generate enough cash to make interest, principal and any other applicable payments on the Notes on the applicable due date) to pay all the principal of, any premium and interest on, the Notes on the dates payments are due, (ii) deliver irrevocable instructions to the trustee to apply the deposited cash and/or U.S. government obligations toward the payment of the Notes at maturity or on the redemption date, as the case may be, and (iii) deliver an officer's certificate and opinion of counsel to the trustee stating that all conditions precedent under the indenture relating to the satisfaction and discharge of the indenture have been complied with.

"*U.S. government obligations*" means securities that are (1) direct obligations of the United States for the payment of which its full faith and credit is pledged, or (2) obligations of a person controlled or supervised by and acting as an agency or instrumentality of the United States, the payment of which is unconditionally guaranteed as a full faith and credit obligation by the United States, which in either case, are not callable or redeemable by the issuer thereof and shall also include a depository receipt issued by a bank (as defined in Section 3(a)(2) of the Securities Act) as custodian with respect to any such U.S. government obligations or a specific payment of principal of or interest on any such U.S. government obligations held by such custodian for the account of the holder of such depository receipt; provided that (except as required by law) such custodian is not authorized to make any deduction from the amount payable to the holder of such depository receipt from any amount received by the custodian in respect of the U.S. government obligations or the specific payment of principal of or interest on the U.S. government obligations evidenced by such depository receipt.

Defeasance

The following defeasance provisions will be applicable to the Notes. "Defeasance" means that, by irrevocably depositing with the trustee an amount of cash denominated in U.S. dollars and/or U.S. government obligations sufficient to pay all principal and interest, if any, on the Notes when due and satisfying any additional conditions

noted below, we will be deemed to have been discharged from our obligations under the Notes. In the event of a "covenant defeasance," upon depositing such funds and satisfying similar conditions discussed below we would be released from certain covenants under the indenture governing the Notes. The consequences to the holders of the Notes would be that, while they would no longer benefit from certain covenants under the indenture, and while the Notes could not be accelerated for any reason, the holders of the Notes nonetheless would be guaranteed to receive the principal and interest owed to them.

Covenant Defeasance

Under the indenture, we have the option to take the actions described below and be released from some of the restrictive covenants under the indenture under which the Notes were issued. This is called "covenant defeasance." In that event, holders of the Notes would lose the protection of those restrictive covenants but would gain the protection of having money and government securities set aside in trust to repay the Notes. In order to achieve covenant defeasance, the following must occur:

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- we must irrevocably deposit or cause to be deposited with the trustee as trust funds for the benefit of all holders of the Notes cash, U.S. government obligations or a combination of cash and U.S. government obligations sufficient, without reinvestment, in the opinion of a nationally recognized firm of independent public accountants, investment bank or appraisal firm, to generate enough cash to make interest, principal and any other applicable payments on the Notes on their various due dates;
- we must deliver to the trustee an opinion of counsel stating that under U.S. federal income tax law, we may make the above deposit and covenant defeasance without causing holders to be taxed on the Notes differently than if those actions were not taken;
- we must deliver to the trustee an officers' certificate stating that the Notes, if then listed on any securities exchange, will not be delisted as a result of the deposit;
- no default or Event of Default with respect to the Notes has occurred and is continuing, and no defaults or Events of Defaults related to bankruptcy, insolvency or organization occurs during the 90 days following the deposit;
- the covenant defeasance must not cause the trustee to have a conflicting interest within the meaning of the Trust Indenture Act;
- the covenant defeasance must not result in a breach or violation of, or constitute a default under, the indenture or any other material agreements or instruments to which we are a party;
- the covenant defeasance must not result in the trust arising from the deposit constituting an investment company within the meaning of the Investment Company Act of 1940, as amended (the "Investment Company Act"), unless such trust will be registered under the Investment Company Act or exempt from registration thereunder; and
- we must deliver to the trustee an officers' certificate and an opinion of counsel stating that all conditions precedent with respect to the covenant defeasance have been complied with.

Full Defeasance

If there is a change in U.S. federal income tax law, we can legally release ourselves from all payment and other obligations on the Notes if we take the following actions below:

- we must irrevocably deposit or cause to be deposited with the trustee as trust funds for the benefit of all holders of the Notes cash, U.S. government obligations or a combination of cash and U.S. government obligations sufficient, without reinvestment, in the opinion of a nationally recognized firm, of independent public accountants, investment bank or appraisal firm, to generate enough cash to make interest, principal and any other applicable payments on the Notes on their various due dates;
- we must deliver to the trustee an opinion of counsel confirming that there has been a change to the current U.S. federal income tax law or an Internal Revenue Service ruling that allows us to make the above deposit without causing holders to be taxed on the Notes any differently than if we did not make the deposit;

- we must deliver to the trustee an officers' certificate stating that the Notes, if then listed on any securities exchange, will not be delisted as a result of the deposit;
- no default or Event of Default with respect to the Notes has occurred and is continuing and no defaults or Events of Defaults related to bankruptcy, insolvency or organization occurs during the 90 days following the deposit;
- the full defeasance must not cause the trustee to have a conflicting interest within the meaning of the Trust Indenture Act;
- the full defeasance must not result in a breach or violation of, or constitute a default under, the indenture or any other material agreements or instruments to which we are a party;
- the full defeasance must not result in the trust arising from the deposit constituting an investment company within the meaning of the Investment Company Act unless such trust will be registered under the Investment Company Act or exempt from registration thereunder; and
- we must deliver to the trustee an officers' certificate and an opinion of counsel stating that all conditions precedent with respect to the full defeasance have been complied with.

In the event that the trustee is unable to apply the funds held in trust to the payment of obligations under the Notes by reason of a court order or governmental injunction or prohibition, then those of our obligations discharged under the full defeasance or covenant defeasance will be revived and reinstated as though no deposit of funds had occurred, until such time as the trustee is permitted to apply all funds held in trust under the procedure described above to the payment of obligations under the Notes. However, if we make any payment of principal or interest on the Notes to the holders, we will have the right to receive such payments from the trust in the place of the holders.

Counsel may rely on an officers' certificate as to any matters of fact in giving an opinion of counsel in connection with the full defeasance or covenant defeasance provisions.

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Listing

The Notes are listed on NASDAQ under the symbol “METCL.”

Governing Law

The indenture and the Notes will be governed by and construed in accordance with the laws of the State of New York.

Global Notes; Book-Entry Issuance

The Notes are issued in the form of one or more global certificates, or “Global Notes,” registered in the name of The Depository Trust Company, or “DTC.” DTC has informed us that its nominee is Cede & Co. and Cede & Co. is thus the initial registered holder of the Notes. No person that acquires a beneficial interest in the Notes is entitled to receive a certificate representing that person’s interest in the Notes except as described herein. Unless and until definitive securities are issued under the limited circumstances described below, all references to actions by holders of the Notes will refer to actions taken by DTC upon instructions from its participants, and all references to payments and notices to holders will refer to payments and notices to DTC or Cede & Co., as the registered holder of these securities.

DTC has informed us that it is a limited-purpose trust company organized under the New York Banking Law, a “banking organization” within the meaning of the New York Banking Law, a member of the Federal Reserve System, a “clearing corporation” within the meaning of the New York Uniform Commercial Code, and a “clearing agency” registered pursuant to the provisions of Section 17A of the Exchange Act. DTC holds and provides asset servicing for over 3.5 million issues of U.S. and non-U.S. equity issues, corporate and municipal debt issues, and money market instruments from over 100 countries that DTC’s participants, or “Direct Participants,” deposit with DTC. DTC also facilitates the post-trade settlement among Direct Participants of sales and other securities transactions in deposited securities through electronic computerized book-entry transfers and pledges between Direct Participants' accounts. This eliminates the need for physical movement of securities certificates. Direct Participants include both U.S. and non-U.S. securities brokers and dealers, banks, trust companies, clearing

corporations and certain other organizations. DTC is a wholly owned subsidiary of The Depository Trust & Clearing Corporation, or “DTCC.”

DTCC is the holding company for DTC, National Securities Clearing Corporation and Fixed Income Clearing Corporation, all of which are registered clearing agencies. DTCC is owned by the users of its regulated subsidiaries. Access to the DTC system is also available to others such as both U.S. and non-U.S. securities brokers and dealers, banks, trust companies and clearing corporations that clear through or maintain a custodial relationship with a Direct Participant, either directly or indirectly (“Indirect Participants” and, together with Direct Participants, “Participants”). DTC has an S&P rating of AA+ and a Moody’s rating of Aaa. The DTC Rules applicable to its participants are on file with the SEC. More information about DTC can be found at www.dtcc.com.

Purchases of the Notes under the DTC system must be made by or through Direct Participants, which will receive a credit for the Notes on DTC’s records. The ownership interest of each actual purchaser of each Note, or the “Beneficial Owner,” is in turn to be recorded on the Direct and Indirect Participants’ records. Beneficial Owners will not receive written confirmation from DTC of their purchase. Beneficial Owners are, however, expected to receive written confirmations providing details of the transaction, as well as periodic statements of their holdings, from the Direct or Indirect Participant through which the Beneficial Owner entered into the transaction. Transfers of ownership interests in the Notes are to be accomplished by entries made on the books of Direct and Indirect Participants acting on behalf of Beneficial Owners. Beneficial Owners will not receive certificates representing their ownership interests in the Notes, except in the event that use of the book-entry system for the Notes is discontinued.

To facilitate subsequent transfers, all Notes deposited by Direct Participants with DTC are registered in the name of DTC’s partnership nominee, Cede & Co., or such other name as may be requested by an authorized representative of DTC. The deposit of the Notes with DTC and their registration in the name of Cede & Co. or such other DTC nominee do not effect any change in beneficial ownership. DTC has no knowledge of the actual Beneficial Owners of the Notes; DTC’s records reflect only the identity of the Direct Participants to whose accounts the Notes are credited, which may or may not be the Beneficial Owners. The Direct and Indirect Participants will remain responsible for keeping account of their holdings on behalf of their customers.

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Conveyance of notices and other communications by DTC to Direct Participants, by Direct Participants to Indirect Participants, and by Direct Participants and Indirect Participants to Beneficial Owners will be governed by arrangements among them, subject to any statutory or regulatory requirements as may be in effect from time to time.

Redemption notices will be sent to DTC. If less than all of the Notes are being redeemed, DTC's practice is to determine by lot the amount of the interest of each Direct Participant in the Notes to be redeemed.

Neither DTC nor Cede & Co. (nor any other DTC nominee) will consent or vote with respect to the Notes unless authorized by a Direct Participant in accordance with DTC's applicable procedures. Under its usual procedures, DTC mails an Omnibus Proxy to us as soon as possible after the record date. The Omnibus Proxy assigns Cede & Co.'s consenting or voting rights to those Direct Participants to whose accounts the Notes are credited on the record date (identified in a listing attached to the Omnibus Proxy).

Redemption proceeds, distributions and interest payments on the Notes will be made to Cede & Co., or such other nominee as may be requested by an authorized representative of DTC. DTC's practice is to credit Direct Participants' accounts upon DTC's receipt of funds and corresponding detail information from us or the applicable trustee or depositary on the payment date in accordance with their respective holdings shown on DTC's records. Payments by Participants to Beneficial Owners will be governed by standing instructions and customary practices, as is the case with the Notes held for the accounts of customers in bearer form or registered in "street name," and will be the responsibility of such Participant and not of DTC nor its nominee, the applicable trustee or depositary, or us, subject to any statutory or regulatory requirements as may be in effect from time to time. Payment of redemption proceeds, distributions and interest payments to Cede & Co. (or such other nominee as may be requested by an authorized representative of DTC) is the responsibility of us or the applicable trustee or depositary. Disbursement of such payments to Direct Participants will be the responsibility of DTC, and disbursement of such payments to the Beneficial Owners will be the responsibility of Direct Participants and Indirect Participants.

The information in this section concerning DTC and DTC's book-entry system has been obtained from sources that we believe to be reliable, but we take no responsibility for the accuracy thereof.

None of the Company, the trustee, any depositary, or any agent of any of them will have any responsibility or liability for any aspect of DTC's or any participant's records relating to, or for payments made on account of, beneficial interests in a Global Note, or for maintaining, supervising or reviewing any records relating to such beneficial interests.

Termination of a Global Note

If a Global Note is terminated for any reason, interest in it will be exchanged for certificates in non-book-entry form as certificated securities. After such exchange, the choice of whether to hold the certificated Notes directly or in street name will be up to the investor. Investors must consult their own banks or brokers to find out how to have their interests in a Global Note transferred on termination to their own names, so that they will be holders of the Notes. See "—Form, Exchange and Transfer of Certificated Registered Securities."

Payment and Paying Agents

We will pay interest to the person listed in the trustee's records as the owner of the Notes at the close of business on the record date for the applicable interest payment date, even if that person no longer owns the Note on the interest payment date. Because we pay all the interest for an interest period to the holders on the record date, holders buying and selling the Notes must work out between themselves the appropriate purchase price. The most common manner is to adjust the sales price of the Notes to prorate interest fairly between buyer and seller based on their respective ownership periods within the particular interest period.

Payments on Global Notes

We will make payments on the Notes so long as they are represented by Global Notes in accordance with the applicable policies of the depositary in effect from time to time. Under those policies, we will make payments directly to the depositary, or its nominee, and not to any indirect holders who own beneficial interest in the Global Notes. An indirect holder's right to those payments will be governed by the rules and practices of the depositary and its participants.

Payments on Certificated Securities

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In the event the Notes become represented by certificates, we will make payments on the Notes as follows. We will pay interest that is due on an interest payment date by check mailed on the interest payment date to the holder of the Note at his or her address shown on the trustee's records as of the close of business on the record date. We will make all payments of principal by check or wire transfer at the office of the trustee in the contiguous United States and/or at other offices that may be specified in the indenture or a notice to holders against surrender of the Note.

Payment When Offices Are Closed

If any payment is due on the Notes on a day that is not a business day, we will make the payment on the next day that is a business day. Payments made on the next business day in this situation will be treated under the indenture as if they were made on the original due date. Such payment will not result in a default under the Notes or the indenture, and no interest will accrue on the payment amount from the original due date to the next day that is a business day.

Book-entry and other indirect holders should consult their banks or brokers for information on how they will receive payments on the Notes.

Form, Exchange and Transfer of Certificated Registered Securities

Notes in physical, certificated form will be issued and delivered to each person that DTC identifies as a beneficial owner of the related Notes only if:

- DTC notified us at any time that it is unwilling or unable to continue as depositary for the Global Notes;
- DTC ceases to be registered as a clearing agency under the Securities Exchange Act of 1934, as amended; or
- an Event of Default with respect to such Global Note has occurred and is continuing.

Holders may exchange their certificated securities for Notes of smaller denominations or combined into fewer Notes of larger denominations, as long as the total principal amount is not changed and as long as the denomination is equal to or greater than $25.

Holders may exchange or transfer their certificated securities at the office of the trustee. We have appointed the trustee to act as our agent for registering the Notes in the name of holders transferring Notes. We may at any time designate additional transfer agents or rescind the designation of any transfer agent or approve a change in the office through which any transfer agent acts.

Holders will not be required to pay a service charge for any registration of transfer or exchange of their certificated securities, but they may be required to pay any tax or other governmental charge associated with the registration of transfer or exchange. The transfer or exchange will be made only if our transfer agent is satisfied with the holder's proof of legal ownership.

If we redeem any of the Notes, we may block the transfer or exchange of those Notes selected for redemption during the period beginning 15 days before the day we deliver the notice of redemption and ending on the day of such delivery, in order to determine or fix the list of holders. We may also refuse to register transfers or exchanges of any certificated Notes selected for redemption, except that we will continue to permit transfers and exchanges of the unredeemed portion of any Note that will be partially redeemed.

About the Trustee

Wilmington Savings Fund Society, FSB is the trustee under the indenture and the principal paying agent and registrar for the Notes. The trustee may resign or be removed with respect to the Notes provided that a successor trustee is appointed to act with respect to the Notes.

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Subsidiaries of Ramaco Resources, Inc.

Entity	State of Formation
Ramaco Development, LLC	Delaware
Ram Mining, LLC	Delaware
Ramaco Coal Sales, LLC	Delaware
Ramaco Resources, LLC	Delaware
Ramaco Resources Land Holdings, LLC	Delaware
Ramaco Coal, Inc.	Delaware
Maben Coal, LLC	Delaware
Carbon Resources Development, Inc.	West Virginia
Ramaco Coal, LLC	Delaware
Ramaco Royalty, LLC	Wyoming
Ramaco Royalty Company, LLC	Delaware
Ramaco Royalty GP, LLC	Delaware
Ramaco Royalty Development, LLC	Delaware
Ramaco Royalty, LP	Delaware
Ramaco Wyoming Coal Co., LLC	Wyoming
Ram Farms, LLC	Delaware
Brook Mining, LLC	Wyoming
Ramaco Northern Appalachia, LLC	Delaware
Ramaco Power, LLC	Wyoming
Ramaco iCam, LLC	Wyoming
Sheridan IPARK, LLC	Wyoming
Wyoming IPARK, LLC	Wyoming
Ramaco Carbon, LLC	Wyoming
Camp Life Sciences, Inc.	Delaware
Carbon Advanced Chemicals, Inc.	Delaware
Carbon Advanced Materials, LLC	Wyoming
Ramaco 3D, LLC	Wyoming
Carbon Holdings Intellectual Properties, LLC	Wyoming
Carbon Advanced Building, Inc.	Delaware
Carbon Advanced Materials, Inc.	Delaware
Carbon Advanced Pitch, Inc.	Delaware
Ramaco Realty, LLC	Wyoming
Carbon Advanced Materials & Products, Inc.	Delaware

Exhibit 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM **Consent of Independent Registered Public Accounting Firm**

We hereby consent to the incorporation by reference in the Registration Statement No. 333-215913 Statements on Form S-8 S-3s (File Nos. 333-261228 and Registration Statement 333-274324), Form S-1 (File No. 333-261228 on 333-267152), Form S-3 S-8s (File Nos. 333-215913 and 333-265384) of our report dated March 14, 2024, with respect to our audits of the consolidated financial statements of Ramaco Resources, Inc. of our report dated March 14, 2023 relating to the consolidated financial statements (the “Company”), and the effectiveness of Ramaco Resources, Inc.'s the Company's

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internal control over financial reporting, appearing in this the Annual Report on Form 10-K. 10-K as of and for the year ended December 31, 2023, and to reference to us under the heading “Experts” in such registration statements.

/s/ MCM CPAs & Advisors Cherry Bekaert LLP

Louisville, Kentucky
March 14, 2023 2024

Exhibit 23.2

CONSENT OF WEIR INTERNATIONAL, INC.

With respect to the SEC filings by Ramaco Resources, Inc. (the “Company”), including but not limited to its Annual Report on Form 10-K for the year ended December 31, 2022 December 31, 2023, Weir International, Inc., as independent mining engineers and geologists, hereby consents to the use of information contained in the Technical Report Summaries for each of the Berwind and Knox Creek Complexes, dated March 9, 2023 April 4, 2023, and incorporation by reference of such information in the Company’s Registration Statements on Form S-8 (File No. 333-265384 and File No. 333-215913) and Form S-3 (File No. 333-261228). We also consent to the reference to Weir International, Inc. in those filings and any amendments thereto.

WEIR INTERNATIONAL, INC.

/s/ Fran X. Taglia

Fran X. Taglia
President

March 14, 2023 2024

Exhibit 23.4

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the incorporation by reference in Registration Statement No. Nos. 333-215913 and 333-265384 on Form S-8 and Registration Statement No. Nos. 333-261228 and 333-274324 on Form S-3 of Ramaco Resources, Inc. of our report dated March 31, 2022 relating to the consolidated financial statements for the year ended December 31, 2021, appearing in this Annual Report on Form 10-K.

/s/ Crowe LLP

Houston, Texas
March 14, 2023

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Exhibit 23.5

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the incorporation by reference in the Registration Statements on Form S-8 (No. 333-215913) and Form S-3 (No. 333-261228) of Ramaco Resources, Inc. of our report dated February 18, 2021, with respect to the consolidated statements of operations, equity, and cash flows of Ramaco Resources, Inc. for the year ended December 31, 2020, which report appears in this Annual Report on Form 10-K.

/s/ Briggs & Veselka Co.

Houston, Texas
March 14, 2023 2024

Exhibit 31.1

Certification of Chief Executive Officer
Pursuant to Rule 13a-14(a) and Rule 15d-14(a)
of the Securities Exchange Act of 1934, as amended

I, Randall W. Atkins, certify that:

1. I have reviewed this Annual Report on Form 10-K for the year ended December 31, 2022 December 31, 2023 of Ramaco Resources, Inc. (the "registrant");

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   a. Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   b. Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   c. Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

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d. Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

a. All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

b. Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 14, 2023 March 14, 2024

/s/ Randall W. Atkins
Randall W. Atkins
Chairman and Chief Executive Officer

Exhibit 31.2

Certification of Chief Financial Officer
Pursuant to Rule 13a-14(a) and Rule 15d-14(a)
of the Securities Exchange Act of 1934, as amended

I, Jeremy R. Sussman, certify that:

1. I have reviewed this Annual Report on Form 10-K for the year ended December 31, 2022 December 31, 2023 of Ramaco Resources, Inc. (the "registrant");

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

a. Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

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b. Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

c. Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

d. Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

a. All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

b. Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 14, 2023 March 14, 2024

/s/ Jeremy R. Sussman
Jeremy R. Sussman
Chief Financial Officer

Exhibit 32.1

Certification of
Chief Executive Officer
Pursuant to 18 U.S.C. Section 1350 as Adopted Pursuant to Section 906 of the
Sarbanes Oxley Act of 2002

In connection with the Annual Report on Form 10-K for the year ended December 31, 2022 December 31, 2023 of Ramaco Resources, Inc. (the "Company"), as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Randall W. Atkins, Chief Executive Officer of the Company, hereby certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that, to my knowledge:

(1) the Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and

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(2) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

,,
Date: March 14, 2023 March 14, 2024

/s/ Randall W. Atkins
Randall W. Atkins
Chairman and Chief Executive Officer

Exhibit 32.2

Certification of
Chief Financial Officer
Pursuant to 18 U.S.C. Section 1350 as Adopted Pursuant to Section 906 of the
Sarbanes Oxley Act of 2002

In connection with the Annual Report on Form 10-K for the year ended December 31, 2022 December 31, 2023 of Ramaco Resources, Inc. (the "Company"), as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Jeremy R. Sussman, Chief Financial Officer of the Company, hereby certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that, to my knowledge:

(1) the Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and

(2) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: March 14, 2023 March 14, 2024

/s/ Jeremy R. Sussman
Jeremy R. Sussman
Chief Financial Officer

Exhibit 95.1

Federal Mine Safety and Health Act Information

We work to prevent accidents and occupational illnesses. We have in place health and safety programs that include extensive employee training, safety incentives, drug and alcohol testing and safety audits. The objectives of our health and safety programs are to provide a safe work environment, provide employees with proper training and equipment and implement safety and health rules, policies and programs that foster safety excellence.

Our mining operations are subject to extensive and stringent compliance standards established pursuant to the Federal Mine Safety and Health Act of 1977 (the "Mine Act"). Mine Safety and Health Administration ("MSHA") monitors and rigorously enforces compliance with these standards, and our mining operations are inspected frequently. Citations and orders are issued by MSHA under Section 104 of the Mine Act for violations of the Mine Act or any mandatory health or safety standard, rule, order or regulation promulgated under the Mine Act.

Section 1503(a) of the Dodd-Frank Wall Street Reform and Consumer Protection Act (the "Dodd-Frank Act") and Item 104 of Regulation S-K requires issuers to include in periodic reports filed with the U.S. Securities and Exchange Commission certain information relating to citations or orders for violations of standards under the Mine Act. We present information below regarding certain mining safety and health violations, orders and citations, issued by MSHA and related assessments and legal actions and mine-related fatalities with respect to our coal mining operations. In evaluating this information, consideration should be

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given to factors such as: (i) the number of violations, orders and citations will vary depending on the size of the coal mine, (ii) the number of violations, orders and citations issued will vary from inspector to inspector and mine to mine, and (iii) violations, orders and citations can be contested and appealed, and in that process, are often reduced in severity and amount, and are sometimes dismissed.

The following tables include information required by the Dodd-Frank Act and Item 404 of Regulation S-K for the current year. The mine data retrieval system maintained by MSHA may show information that is different than what is provided herein. Any such difference may be attributed to the need to update that information on MSHA's system and/or other factors. The tables below do not include any orders or citations issued to independent contractors at our mines.

Mine or Operating Name / MSHA Identification Number	*Section 104(a) S&S Citations(1)*	*Section 104(b) Orders(2)*	*Section 104(d) Citations and Orders(3)*	*Section 110(b)(2) Violations(4)*	*Section 107(a) Orders(5)*	*Total Dollar Value of MSHA Assessments Proposed (in thousands) (6)*	*Section 104(a) S&S Citations(1)*	*Section 104(b) Orders(2)*	*Section 104(d) Citations and Orders(3)*	*Section 110(b)(2) Violations(4)*	*Section 107(a) Orders(5)*	*Total Dollar Value of MSHA Assessments Proposed (in thousands)(6)*
Active Operations												
Eagle Seam Deep Mine - 46-09495	16	0	3	0	0	$ 133.7	7	0	0	0	0	$ 101.425
Coal Creek Prep Plant (VA) - 44-05236	1	0	0	0	0	$ 1.0						
Elk Creek Prep Plant - 46-02444	5	1	0	0	0	$ 4.1						
Stonecoal Branch Mine No. 2 - 46-08663	31	0	0	0	0	$ 136.2	9	1	0	0	0	$ 40.104
No. 2 Gas Deep Mine - 46-09541							17	0	0	0	0	$ 16.296
Michael Powellton Deep Mine – 46-09602							3	0	0	0	0	$ 61.294
Crucible Deep Mine - 46-09614							6	0	0	0	0	$ 13.003
Ram Surface Mine No. 1 - 46-09537	4	0	0	0	0	$ 5.4	5	0	0	0	0	$ 5.342
Highwall Miner No. 1 - 46-09219	0	0	0	0	0	$ 0.4	0	0	0	0	0	$ 1.939
Elk Creek Prep Plant - 46-02444							10	0	0	0	0	$ 4.051
Maben Surface Mine - 46-09637							0	0	0	0	0	$ 0.000
Highwall Miner No. 2 - 46-09638							0	0	0	0	0	$ 0.000

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Berwind Deep Mine - 46-09533	27	0	4	0	1	$	92.0	9	0	0	0	0	$	11.905			
No. 2 Gas Deep Mine - 46-09541	12	0	0	0	0	$	33.9										
Triad No. 2 - 46-09628	6	0	0	0	0	$	2.5										
Triad Poca 4 Seam Deep Mine - 46-09591	17	0	0	0	0	$	80.3										
Big Creek Surface Mine - 44-07162	1	0	0	0	0	$	0.3										
Laurel Fork - 46-09084	14	0	0	0	0	$	12.6	11	0	0	0	0	$	24.881			
Jawbone Mine No. 1 - 44-07369	10	0	0	0	1	$	4.7	22	0	1	0	0	$	22.002			
Triad No. 2 - 46-09628								3	0	0	0	0	$	34.287			
Big Creek Surface Mine - 44-07162								0	0	0	0	0	$	0.000			
HWM No. 3 - 15-19557								0	0	0	0	0	$	0.000			
Coal Creek Prep Plant (VA) - 44-05236								0	0	0	0	0	$	0.286			
Berwind Prep Plant - 46-05449	0	0	0	0	0	$	1.3	0	0	0	0	0	$	1.892			
Michael Powellton Deep Mine – 46-09602	31	0	2	0	0	$	27.2										
Crucible Deep Mine - 46-09614	12	0	0	0	0	$	9.9										
Triple S – HWM No. 3	0	0	0	0	0	$	0.0										

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Mine or Operating Name / MSHA Identification Number	Total Number of Mining Related Fatalities	Received Notice of Pattern of Violations Under Section 104(e) (yes/no)(7)	Legal Actions Pending as of Last Day of Period	Legal Actions Initiated During Period	Legal Actions Resolved During Period	Total Number of Mining Related Fatalities	Received Notice of Pattern of Violations Under Section 104(e) (yes/no)(7)	Legal Actions Pending as of Last Day of Period	Legal Actions Initiated During Period	Legal Actions Resolved During Period
Active Operations										
Eagle Seam Deep Mine - 46-09495	0	No	14	33	43	0	No	13	12	0
Coal Creek Prep Plant (VA) - 44-05236	0	No	0	0	0					
Elk Creek Prep Plant - 46-02444	0	No	0	0	0					
Stonecoal Branch Mine No. 2 - 46-08663	0	No	9	24	38	0	No	7	5	3
No. 2 Gas - 46-09541						0	No	6	3	0
Michael Powellton Deep Mine - 46-09602						0	No	2	0	0
Crucible Deep Mine - 46-09614						0	No	1	1	3
Ram Surface Mine No. 1 - 46-09537	0	No	0	0	3	0	No	2	0	0
Highwall Miner No. 1 - 46-09219	0	No	0	0	0	0	No	0	0	0
Elk Creek Prep Plant - 46-02444						0	No	0	0	1
Maben Surface Mine - 46-09637						0	No	0	0	0
Highwall Miner No. 2 - 46-09638						0	No	0	0	0
Berwind Deep Mine - 46-09533	1	No	0	9	11	0	No	12	8	3

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No. 2 Gas - 46-09541	0	No	0	2	8													
Triad No. 2 - 46-09628	0	No	0	0	0													
Triad Poca 4 Seam Deep Mine - 46-09591	0	No	0	4	12													
Big Creek Surface Mine - 44-07162	0	No	0	0	0													
Laurel Fork - 46-09084	0	No	0	0	0				0	No			30		15	10		
Jawbone Mine No. 1 - 44-07369	0	No	0	0	0	0	No						18		18	0		
Berwind Prep Plant – 46-05449	0	No	0	0	0													
Michael Powellton Deep Mine - 46-09602	0	No	6	6	0													
Crucible Deep Mine – 46-09614	0	No	0	0	0													
Triple S – HWM No. 3	0	No	0	0	0													
Triad No. 2 - 46-09628									0	No			10		8	8		
Big Creek Surface Mine - 44-07162						0	No						0		0	0		
HWM No. 3 - 15-19557						0	No						0		0	0		
Coal Creek Prep Plant (VA) - 44-05236						0	No						0		0	0		
Berwind Prep Plant - 46-05449						0	No						0		0	0		

The number of legal actions pending before the Federal Mine Safety and Health Review Commission as of December 31, 2022 December 31, 2023, that fall into each of the following categories is as follows:

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Mine or Operating Name / MSHA Identification Number	Contests of Citations and Orders	Contests of Proposed Penalties	Complaints for Compensation	Complaints of Discharge / Discrimination / Interference	Applications for Temporary Relief	Appeals of Judge's Ruling	Contests of Citations and Orders	Contests of Proposed Penalties	Complaints for Compensation	Comp Disc Discrim Inter
Active Operations										
Eagle Seam Deep Mine - 46-09495	14	0	0	0	0	0	0	13	0	
Coal Creek Prep Plant (VA) - 44-05236	0	0	0	0	0	0				
Elk Creek Prep Plant - 46-02444	0	0	0	0	0	0				
Stonecoal Branch Mine No. 2 - 46-08663	9	0	0	0	0	0	0	7	0	
No. 2 Gas - 46-09541							0	6	0	
Michael Powellton Deep Mine - 46-09602							0	2	0	
Crucible Deep Mine - 46-09614							0	1	0	
Ram Surface Mine No. 1 - 46-09537	0	0	0	0	0	0	0	2	0	
Highwall Miner No. 1 - 46-09219	0	0	0	0	0	0	0	0	0	
Elk Creek Prep Plant - 46-02444							0	0	0	
Maben Surface - 46-09637							0	0	0	
Highwall Miner No. 2 - 46-09638							0	0	0	
Berwind Deep Mine - 46-09533	0	0	0	0	0	0	0	12	0	
No. 2 Gas - 46-09541	0	0	0	0	0	0				
Triad No. 2 - 46-09628	0	0	0	0	0	0				

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(5) Mine Act Section 107(a) orders are for alleged conditions or practices which could reasonably be expected to cause death or serious physical harm before such condition or practice can be abated and result in orders of immediate withdrawal from the area of the mine affected by the condition.

(6) Amounts shown include assessments proposed by MSHA on all citations and orders, including those citations and orders that are not required to be included within the above chart.

(7) Mine Act Section 104(e) written notices are for an alleged pattern of violations of mandatory health or safety standards that could significantly and substantially contribute to a coal mine safety or health hazard.

Exhibit 96.1

Technical Report Summary
Berwind Complex
Prepared for Ramaco Resources, Inc.

Notice

Weir International, Inc. (WEIR) was retained by Ramaco Resources, Inc. (Ramaco) to prepare this Technical Report Summary (TRS) related to Ramaco's Berwind Complex. This report provides a statement of Ramaco's coal reserves and resources at its Berwind 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, 2022.

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 Berwind Complex coal reserve and resource estimates as of December 31, 2022.

Qualified Person: /s/ Weir International, Inc.

Date: March 9, 2023

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

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Technical Report Summary
Berwind Complex
Prepared for Ramaco Resources, Inc.

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6.3 Stratigraphic Column and Cross section 28

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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 Berwind 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.

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1.1 PROPERTY DESCRIPTION 97.1

The Berwind Complex is located approximately 80 miles south of Charleston, West Virginia; 100 miles west of Roanoke, Virginia; 60 miles northeast of Kingsport, Tennessee; and 160 miles east/southeast of Lexington, Kentucky in the vicinity of 37.22 degrees North Latitude and 81.67 degrees West Longitude on the World Geodetic System (WGS 84) reference coordinate system. The complex includes areas in Buchanan and Tazewell Counties, Virginia and McDowell County, West Virginia. The Berwind Complex is within the Southwest Virginia and Southern West Virginia coal fields of the Central Appalachia Coal Producing (CAPP) Region of the United States (see Figure 1.1-1). As can be seen on Figure 1.1-1, the acquisition of the Amonate Property in late 2021 added significant acreage to the Berwind Complex.**RamacoResources,Inc.**

The Berwind Complex consists of approximately 62,500 acres of owned and leased coal holdings. Approximately 52 percent of this acreage is in West Virginia and 48 percent is in Virginia. Currently, there are currently three active mines within the complex. The Berwind No. 1 Deep Mine is not currently operating, but is expected to resume production in April 2023.

Active Mines:**Dodd-FrankRestatementRecoupmentPolicy**

1.

- Triad No. 2 Deep Mine in the Pocahontas 6 and 5 seams (the Pocahontas 5 Seam is also taken when in close enough proximity to the main Pocahontas 6 Seam)
- Laurel Fork Deep Mine in the Pocahontas 3 Seam
- Triple S Highwall Mine in the Pocahontas 5 Seam

Evaluation of other prospective mining sites within the Berwind Complex is an on-going activity for Ramaco, as there are many opportunities to add additional mining operations.

Graphic

Figure 1.1-1 General Location Map**Introduction**

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1.2 GEOLOGICAL SETTING AND MINERALIZATION

The upper coal seams of interest within the Berwind Complex belong to the Norton Formation in Virginia of Early Pennsylvanian Age, which is stratigraphically equivalent to the Lower Kanawha and New River formations in southwestern West Virginia. The lower coal seams of interest belong to the Pocahontas Formation of the Pottsville Group (Lower Pennsylvanian). The depositional setting for these seams is complex and thought to be upper delta plain, with subsidence

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controlling the sedimentation rate. The Lower Pennsylvania (Pottsville) sedimentary strata of the coal-bearing rocks of the Pocahontas Formation rest uncomformably on the Mississippian Bluestone Formation of the Mauch Chunk Group.

1.3 EXPLORATION

Drilling has served as the primary form of exploration on the Berwind Complex. In addition to coal-specific exploration drillholes, data from degasification, coal bed methane, and water wells were also implemented to build the geological model. This model was built using a total of 4,188 exploration drillholes and covers the Berwind Complex, as well as the Knox Creek Complex. Approximately 1,900 of these drillholes are within the Berwind Complex.

In addition to exploration drillholes, coal seam outcrop measurements, in-mine measurements, and survey points taken from mine maps of previous operations were considered. A total of 194 seam outcrop measurements, 356 mine measurements, and 887 survey points were used in the geological model, as a supplement to the exploration drillholes.

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 are acceptable and that these analytical 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 initial leases in 2011. 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 Berwind Complex that can be relied upon to accurately estimate coal resources and reserves.

1.4 DEVELOPMENT AND OPERATIONS

The Berwind Complex currently has three active mines. The three active mines consist of one surface mine with a highwall miner, and two underground room and pillar mines, which use continuous miners for coal production. Ramaco began production of metallurgical coal at the complex in 2017. A majority of the underground mines will implement retreat mining, which typically results in mining recovery of 50 to 80 percent. Contour mining has an average mining recovery of approximately 90 percent, and the highwall mine has an average mining recovery of approximately 40 percent.

The Berwind Complex is mining several seams and seam splits, including the Pocahontas 6, Pocahontas 5, Pocahontas 4, and Pocahontas 3 (in descending order).

Historical coal production from the Berwind Complex, in accordance with the Mine Safety and Health Administration (MSHA) statistics, is summarized in Table 1.4-1 as follows:

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Table 1.4-1 Berwind Complex Historical Production

Year	Clean Tons Produced (000)
2018	80,923
2019	188,241
2020	147,330
2021	180,588
2022	416,578

The current Berwind Complex Life-of-Mine (LOM) Plan projects mining through 2049, an expected mine life for the complex of 27 years. Ramaco projects total annual production to be approximately 0.9 million clean tons until a second super-section is started in the Berwind No. 1 Deep Mine in 2027. After 2027, average annual production is projected to be 1.2 million clean tons through 2040 when the Berwind No. 1 Deep Mine is nearing end of mine life. After this, the single-section Laurel Fork Deep Mine is currently planned to operate into 2049, at an average annual rate of approximately 307 thousand clean tons per year. However, 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 Berwind Preparation Plant. The Berwind Preparation Plant was initially built in 1955 and commissioned in 1957. Ramaco refurbished the preparation plant in 2021 and 2022 based on a design by Ramsey Industrial, with current ROM processing capacity of 600 tons per hour.

The Berwind Complex produces high quality, mid and low volatile metallurgical coal. Historically, the market for metallurgical coal from the Berwind Complex has been for both domestic metallurgical coal consumers and the global seaborne metallurgical coal market.

1.5 MINERAL RESERVE AND RESOURCE ESTIMATE

The Berwind Complex coal resources, as of December 31, 2022, 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, 2022

			In-Place Resources (000 Tons)				Coal Quality (Raw Dry Basis)	
Seam	Area (Acres)	Average Coal Thickness (Ft)	Measured	Indicated	Total	Inferred	Ash (%)	Relative Density (Lbs/CF)
Red Ash 2	2,420	3.5	15,740	—	15,740	—	8.3	86.48
Tiller	2,210	3.8	11,230	—	11,230	—	22.4	92.68
Greasy Creek 2	675	2.3	3,325	—	3,325	—	30.6	97.27

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Pocahontas 11	1,295	3.1	8,030	—	8,030	—	22.6	91.73
Pocahontas 10	2,055	2.8	11,075	—	11,075	—	15.9	87.94
Pocahontas 9-2	5,513	3.2	33,226	45	33,271	—	17.0	86.95
Pocahontas 9-1	5,145	3.0	9,700	15,920	25,620	4,495	17.0	88.61
Pocahontas 6	1,411	2.7	8,303	—	8,303	—	38.1	101.74
Pocahontas 5	7,655	3.0	41,755	1,512	43,267	—	11.4	85.44
Pocahontas 4	6,609	4.5	50,233	6,683	56,916	—	18.2	88.96
Pocahontas 3	22,457	3.0	122,493	8,482	130,975	—	16.2	88.02
Squire Jim	42,670	3.2	243,471	37,734	281,205	—	25.0	94.39
Total	100,115	3.2	558,581	70,376	628,957	4,495	20.4	91.06

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 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, producing primarily metallurgical mid and low volatile coal product realizing an average sales price of $169 per ton at a cash cost of $101 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 Board of resources Directors (the "Board") of Ramaco Resources, Inc. (the "Company") has determined that it is in the best interests of the Company to reserves at adopt a policy providing for the Berwind Complex considers recoupment by the design Company of certain Incentive-Based Compensation paid to Executives Officers in the case of a mine plan accommodating Restatement (as defined below) (the "Policy"). In such case, the planned mining equipment Company (a) may recoup the Incentive-Based Compensation that was paid or that vested 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 Clean Recoverable Coal Reserve Tonnage and Quality Estimate, as of December 31, 2022

Mine / Seam	Product Quality	Total Area (Acres)	Average Seam Thickness (Ft)	Clean Recoverable Reserve (000 Tons)			Ash (%)	Average Coal Quality (Raw Dry Basis) Relative Density (Lbs/CF)
				Proven	Probable	Total		
Berwind No. 1 Deep Mine Pocahontas 4	Low Vol	7,116	4.2	16,897	26	16,923	23.7	92.82

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Laurel Fork Deep Mine Pocahontas 3	Mid Vol	2,536	3.7	6,188	22	6,210	10.6	84.32
Triad No. 2 Deep Mine Pocahontas 6	Low Vol	130	3.5	237	—	237	38.1	101.74
Pocahontas 5	Low Vol	21	2.5	22	—	22	50.1	109.24
Triple S Highwall Mine Pocahontas 5	Low Vol	128	3.1	141	37	178	11.1	84.89
Total		9,931	4.0	23,485	85	23,570	20.3	89.98

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 low and mid volatile metallurgical coal product at an average sales price of $169 per ton and cash cost of $101 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 Berwind Complex LOM Plan. Specifically, plans were evaluated using discounted cash flow analysis, incorporating annual revenue projections for the Berwind 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 2022 United States dollars. WEIR's study was conducted on an un-levered basis, excluding costs associated with (b) may cancel 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 Berwind 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 $405.7 million for the Berwind 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)	50,717
Clean Tons Produced (000s)	23,607
Preparation Plant Yield (%)	46.5

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Tons Sold (000s)	23,584
	($ Per Ton)
Coal Sales Realization	168.87
Direct Cash Costs	100.67
Non-cash Costs	9.41
Total Cost of Sales	110.08
Profit / (Loss)	58.79
EBITDA	68.26
CAPEX	9.77

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 Berwind Complex NPV is most sensitive to changes in coal sales prices and operating costs. 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 Virginia Department of Energy (VDE) and West Virginia Department of Environmental Protection (WVDEP), numerous baseline studies outstanding 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.

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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. Similar filings are required in Virginia through the VDE. The Berwind Complex has been issued mining permits and associated NPDES permits by the WVDEP and the VDE as shown in Table 1.7.-1 as follows:

Table 1.7-1 Berwind Complex Mining and NPDES Permits

Property Description	Permit Number	State	Permitted Surface Area (Acres)	Issue Date	Current Status	NPDES Permit No.
Amonate Auger No. 1	S-4005-01	WV	50.35	9/6/2001	Active	WV0049751
Amonate No. 31 Mine	U-0209-83	WV	22.00	11/14/1983	Idle	WV0049751
Berwind Preparation Plant and Refuse	O-0150-83	WV	282.41	11/14/1983	Active	WV0049751
Amonate Impoundment	1302370	VA	75.00	4/18/2022	Active	0082251
Berwind Deep Mine No. 1	U-3008-16	WV	34.58	6/26/2017	Active	WV1028952
Berwind Deep Mine No. 1	1202294	VA	—	5/20/2019	Active	0082294
Berwind Poca 6 Seam Deep Mine	U-5007-21	WV	8.23	4/14/2022	New	WV1028952
Dry Fork Mine	1402369	VA	40.73	4/18/2022	Idle	0082153
Laurel Fork Mine (Harvest Time No. 6)	U-4004-11	WV	7.12	11/20/2012	Active	WV1024281
Laurel Fork Mine (Harvest Time No. 6)	1202367	VA	—	4/12/2022	Active	0082155
Vica Deep Mine (Hiope No. 7)	U-0012-84	WV	11.91	1/17/1984	Idle	WV0021687
Squire Jim Deep Mine No. 1	U-3004-18	WV	8.83	8/31/2020	Idle	WV1029088
Squire Jim Deep Mine No. 2	U-4003-04	WV	7.31	10/17/2005	Idle	WV1021222
Squire Jim Deep Mine No. 2	1202366	VA	—	4/11/2022	Idle	0082154
Squire Jim Deep Mine No. 4	U-4013-08	WV	8.25	12/4/2009	Idle	WV1023837
Triad Pocahontas 4 Prospect	P-3009-21	WV	9.10	9/8/2022	Closed	N/A
Triad Pocahontas 4 Deep Mine	U-5004-19	WV	6.63	3/2/2020	MinedOut	WV1028952
Triad 2 Pocahontas 6 Deep Mine	P-3001-23	WV	5.98	2/16/2023	Active	N/A
Triple S Highwall Mine (Auger II)	S-4004-03	WV	221.53	11/21/2003	Inactive	WV1021141
Vica Deep Mine	U-0011-85	WV	2.34	2/25/1985	Phase 2	WV1005685
Vica Deep Mine (Hiope No. 7)	1202364	VA	—	Pending	Phase 2	0082100
Total			802.30			

As of December 31, 2022, Ramaco estimated an ARO reclamation liability of $4.9 million for its disturbed permit acreage, which is covered with a total bond amount of $3.6 million.

Ramaco currently employs approximately 210 personnel at the Berwind Complex and is projected to have maximum employment of 257 personnel through its Berwind Complex LOM Plan. The Berwind 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.

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Ramaco's environmental citations issued by the WVDEP and VDE are typical of similar citations issued to other operators in southern West Virginia and Southwestern Virginia. 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 Berwind 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 basically has full mineral control through current leases for all existing and planned mines included in the Berwind Complex LOM plan. There are approximately 62 acres out of 5,877 acres of the mine plan layout that are not currently controlled by Ramaco (1 percent uncontrolled). These tracts do not threaten the overall LOM plans. As similar for most mines, such uncontrolled tracts are either negotiated in time, or plans are modified to mine around any adverse tracts.

The coal resource and coal reserve estimates and supporting Preliminary Feasibility Study were prepared in accordance with Regulation S-K 1300 requirements. There are 629.0 million in-place tons of measured and indicated coal resources, exclusive of reserves, and 23.6 million tons of proven and probable clean recoverable underground mineable coal reserves within the Berwind Complex, as of December 31, 2022. Reasonable prospects for economic extraction

were established through the development of a Preliminary Feasibility Study relative to the Berwind 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.

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WEIR assessed that the risks associated with the economic mineability of the Berwind 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: unearned Incentive-Based Compensation.

2.

- 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 Definitions INTRODUCTION

2.1 REGISTRANT

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

The Berwind Complex is located approximately two miles from the town of Berwind, West Virginia, 80 miles south of Charleston, West Virginia; 100 miles west of Roanoke, Virginia; 60 miles northeast of Kingsport, Tennessee; and 160 miles east/southeast of Lexington, Kentucky. The Berwind Complex is located in McDowell County, West Virginia, and Buchanan, and Tazewell Counties, Virginia (see Figure 1.1-1).

2.2 TERMS OF REFERENCE AND PURPOSE

This TRS was prepared specifically for Ramaco's Berwind Complex. The reserves and resources at the Berwind 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, qualities, 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.

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For the Berwind 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 TRS includes summary detail of a Preliminary Feasibility Study conducted relative to the Berwind 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.

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- Site visits by WEIR Qualified Persons (QPs) on November 30, 2021, and January 27, 2023.
- Interviews between WEIR personnel and Ramaco personnel including:
  - Ø Senior V.P., General Counsel and Secretary
  - Ø Director of Financial Reporting and Accounting
  - Ø Chief Operating Officer
  - Ø Contract Geologist
  - Ø V.P. of Safety
  - Ø V.P. of Surface Mining Operations
  - Ø V.P. of Underground Mining Operations
  - Ø Mine Managers
- Historical production, productivity, staffing levels, operating costs, capital expenditures, and coal sales revenue provided by Ramaco.
- LOM Plan 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 and VDE.
- Current and projected mine plans, including production, productivity, operating costs, and capital expenditures required to sustain projected levels of production for the Berwind 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 Berwind Complex on November 30, 2021 and January 27, 2023. 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

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- Marketing
- Environmental and Compliance
- Risks and Uncertainties

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

- Mine surface operations including office, maintenance, and warehouse facilities
- Berwind Preparation Plant, stockpiles, and rail loadout facilities
- Mine operations
  - Ø Berwind No. 1 Pocahontas 3 and 4 Deep Mines
  - Ø Triad Pocahontas 4 Deep Mine
  - Ø Triad No. 2 Pocahontas 6 and 5 Deep Mine Face-up and facilities
  - Ø Triple S Pocahontas 5 Highwall Mine
  - Ø Laurel Fork Pocahontas 3 Deep Mine Face-up and facilities
- Berwind's Refuse Disposal Facility

Based on WEIR's inspections of the Berwind Complex, the mines, preparation plant and associated infrastructure 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 TECHNICAL REPORT SUMMARY

This TRS is an update to the Berwind Complex TRS dated November 22, 2022. Approximately 30,000 acres of fee coal property was added to the Berwind Complex through purchase of the Coronado Global Resource Amonate Property. This purchase was completed in December 2021. The purchase also included a coal handling and preparation plant. Ramaco's mines within the Berwind Complex will no longer utilize the Knox Creek Preparation Plant. Further, coal produced from within the Big Creek Property will continue to be processed at the Knox Creek Preparation Plant, references to references to the Big Creek Property were removed from this revised TRS and are included in a new TRS for Ramaco's Knox Creek Complex. The changes noted above were determined by Ramaco to warrant the preparation of this updated TRS.

3.0 PROPERTY DESCRIPTION

3.1 PROPERTY LOCATION

The town of Berwind, West Virginia is located approximately two miles northeast of the central area of the Berwind Complex. The Berwind Complex is generally located approximately 80 miles south of Charleston, West Virginia; 100 miles west of Roanoke, Virginia; 60 miles northeast of Kingsport, Tennessee; and 160 miles east/southeast of Lexington, Kentucky at 37.22 degrees North Latitude and 81.67 degrees West Longitude on the WGS 84 reference coordinate system. The comprised properties are fairly remote containing scattered rural residences and some small towns.

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The Berwind Complex is within the Southern West Virginia and Southwest Virginia Coal Fields of the CAPP Region of the United States (see Figure 1.1-1). The USGS 7.5-minute quadrangle map sheets are Jewell Ridge, Richlands, War, Amonate, Pounding Mill, Gary, Tazewell North, and Tiptop.

3.2 PROPERTY AREA

The Berwind Property consists of approximately 62,500 acres of leased coal holdings located in McDowell County, West Virginia and Buchanan and Tazewell Counties, Virginia. Ramaco obtained the initial lease for this property in 2015 and commenced mine operations in 2017.

The Berwind Property's surface facilities are located within the Berwind Property's permit area, near the central area of the southern boundary of the permit. The surface facilities include a mine office, bath house, and parking lot near the Berwind No. 1 Pocahontas 3 Deep Mine. The Berwind coal handling and preparation plant facility is adjacent to and east of the surface facilities.

Currently, there are three active mines on the Berwind property:

- Laurel Fork Pocahontas 3 Deep Mine
- Triad No. 2 Deep Mine
- Triple S Surface and Highwall Mine

In addition to the active mines, the Berwind No. 1 Pocahontas 4 Deep Mine is idle, within plans to be reactivated in April 2023.

Ramaco started operations at the Berwind No. 1 Pocahontas 4 Deep Mine in 2017 and idled the mine in mid-July 2022 due to an ignition. An investigation by MSHA suggests the ignition was caused by lightning that struck a pilot hole for a new shaft. The final MSHA report on this incident has not yet been released. Ramaco currently has control of the mine, however, some regulatory steps remain before operations can be re-started.

The Triad Pocahontas 4 Deep Mine commenced operation in 2021 and depleted its reserves in 2022. There is an additional permitted mine, Squire Jim No. 1 Deep Mine, which does not yet have a scheduled startup date.

Amonate Property
In December 2021, Ramaco completed the acquisition of the Amonate Property located adjacent to its existing Berwind Property. The acquisition of this Amonate Property from Coronado Global Resources involved approximately 30,250 acres and includes approximately 401 million tons of low and mid volatile in-place resources, several permitted mining operations, and a preparation plant. The reserves within the Amonate Property acquisition are included in this TRS and are now part of the Berwind Complex.

Ramaco supplied copies of deeds and lease agreements, and property control maps to WEIR related to properties for which mineral and/or surface property are controlled by Ramaco. WEIR reviewed this information and found no property

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boundary disputes or other concerns that would signal concern over future mining operations or development potential.

3.3 PROPERTY CONTROL

Ramaco's Berwind Complex coal holdings over the 62,500 acres consist of both leases and fee simple coal properties. Approximately 52 percent of the holdings are leased from the Berwind Land Company (BLC), with the original lease executed in August 2015. Fee simple coal makes up the remaining 48 percent of coal holdings. Approximately 844 acres (1.4 percent) within the Berwind Complex are uncontrolled mineral properties.

Within the Berwind Complex, leases typically apply to specific seams, or a vertical range of seams. Therefore, the seams controlled often vary from lease to lease for specific areas across the complex. Table 3.3-1 below shows the various property control contracts.

Table 3.3-1 Berwind Complex Property Control

Area	Document Type	Quantity
Original Berwind Property	Coal Leases/Coal Subleases	63
	Deeds	340
	Mutual Cooperation Agreement	1
	Right of Way	1
	Right of Entry	1
	Assignments	2
Amonate Acquisition	Assignment of Leases	4
	Special Warranty Deed	2
	Easement	1
	Railroad Permit	1

3.4 MINERAL CONTROL

The Original Berwind Property mineral control is detailed in Table 3.4-1 below and has not changed from the previous TRS:

Table 3.4-1 Berwind Complex Mineral Control

			Mineral Control	
Area	File Number	Document Type	Seams	Expiration Date (1)
Original Berwind Property				
	15	Coal Lease	Poca 4, Poca 3 and Squire Jim Only	8/17/2030 Extensions of 1 year until all coal exhausted
	16	Coal Sublease	Poca 4, Poca 3 and Squire Jim Only	8/17/2025 Extensions of 5 year until all coal exhausted
	17	Mutual Cooperation Agreement		N/A
	18	Coal Lease	Poca 5 and Above	2/26/2025 With an additional 10 year term, then extensions of 1 year until all coal exhausted

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Amonate Acquisition Property

1	Special Warrenty Deed	Poca 5, Poca 3	NA
2	Assignment of Leases	Squire Jim Only	Shall continue until all mineable coal has been removed
3	Assignment of Leases	Squire Jim Only	Shall continue until all mineable coal has been removed
4	Special Warrenty Deed	Varies	NA
5	Assignment of Leases	Varies	Varies
6	Partial Assignment of Leases	All coal below drainage	6/1/2025 Extensions of 10 years, not to excedd 20 years
19	Coal Sublease	Same as Base Lease	11/11/2022 Extensions of 1 year until all coal exhausted

(1) Expiration dates on leases can be extended

For mineral control detail on the Amonate Property, refer to Figure 3.4-1 below. It should be noted that the Amonate Property Squire Jim Seam Lease, shown on Figure 3.4-1 is in addition to the coal leases described above in Table 3.4-1.

Graphic

Figure 3.4-1 Coal Control Map

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3.5 SIGNIFICANT PROPERTY ENCUMBRANCES AND PERMIT STATUS

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

A list of Ramaco's permits for the Berwind 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 Berwind Complex Permit Status

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Property Description	Permit Number	State	Permitted Surface Area (Acres)	Issue Date	Current Status	NPDES Permit No.
Amonate Auger No. 2	S-4004-03	WV	222	11/21/2003	Inactive	WV1021141
Amonate No. 31 Mine	U-0209-83	WV	22	11/14/1983	Idle	WV0049751
Berwind Preparation Plant	P-0590-00	WV	282	11/14/1983	Active	WV0049751
Berwind Refuse Facility	O-5006-20	WV	388	10/21/2022	Active	
Berwind Refuse Facility	1011220	VA	75	4/18/2022	Active	
Berwind Deep Mine No. 1	U-3008-16	WV	35	6/26/2017	Active	WV1028952
Berwind Deep Mine No. 1	1202294	VA	—	5/20/2019	Active	N/A
Berwind Poca 6 Seam Deep Mine	U-5007-21	WV	8	4/14/2022	New	WV1028952
Dry Fork Mine	1011217	VA	41	4/18/2022	Idle	N/A
Laurel Fork Pocahontas 3 Deep Mine	U-4004-11	WV	7	11/20/2012	Active	WV1024281
Laurel Fork Pocahontas 3 Deep Mine	1011219	VA	—	4/12/2022	Active	N/A
Hiope No. 7 Deep Mine	U-0012-84	WV	12	1/17/1984	Idle	WV0021687
Squire Jim Deep Mine No. 1	U-3004-18	WV	9	8/31/2020	Idle	WV1029088
Squire Jim Deep Mine No. 2	U-4003-04	WV	7	10/17/2005	Idle	WV1021222
Squire Jim Deep Mine No. 2	1011218	VA	—	4/11/2022	Idle	N/A
Squire Jim Deep Mine No. 4	U-4013-08	WV	8	12/4/2009	Idle	WV1023837
Triad Pocahontas 4 Prospect	P-3009-21	WV	6	9/8/2022	Closed	N/A
Triad Pocahontas 4 Deep Mine	U-5004-19	WV	7	3/2/2020	MinedOut	WV1028952
Triad 2 Pocahontas 6 Deep Mine	P-3001-23	WV	6	2/16/2023	Active	
Triple S Highwall Mine	S-4005-01	WV	50	9/6/2001	Active	WV0049751
Vica Deep Mine	U-0011-85	WV	2	2/25/1985	Idle	WV1005685
Vica Deep Mine	1202364	VA	—	Pending		N/A
Total			1,187			

3.6 SIGNIFICANT PROPERTY FACTORS AND RISKS

Given Ramaco's controlled interests at the Berwind Complex, which relate in part to property that is held by others and leased to Ramaco, WEIR assesses that there are no significant issues affecting access to the coal interests, or Ramaco's ability to execute its mine plans.

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

3.7 ROYALTY INTEREST

Within the Berwind Complex, Ramaco holds no material royalty or similar interest in property which is owned or operated by another party.

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

4.1 TOPOGRAPHY, ELEVATION, AND VEGETATION

The Berwind Complex is in the southwestern part of the Appalachian Plateau Province directly north and adjacent to the Valley and Ridge Province. It is in the Cumberland Mountain zone of the Appalachian Plateau. The terrain is mountainous, steep, and rugged with elevations ranging from approximately 1,120 feet above Mean Sea Level (MSL) along the valley bottoms to over 4,040 feet above MSL along the ridges, averaging 2,230 feet. The landscapes are well-dissected with dendritic drainage systems. There are no major rivers in the area, however, there are numerous small creeks throughout the complex. The Dry Fork, Jacobs Fork, Indian Creek, and War Creek rivers, all tributaries of the Tug Fork River of the Ohio River watershed, traverse the complex. Topography and other features of the area are shown on Figure 7.5-1.

The Berwind Complex consists mostly of unmanaged forestland and scattered pastureland. The forestland consists of typical trees for this area of the Appalachians, with Oak/Hickory as the dominant forest-type group and a lesser percentage of the Maple/Beech/Birch forest-type group.

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 mine permit areas.

4.2 PROPERTY ACCESS

The primary access road to the properties is US Route 460, a four-lane highway, located south of the Berwind Complex. From US Route 460, Virginia Route 637 and connecting West Virginia Routes 9 and 11 can be used to access the Berwind Complex to the north.

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The Norfolk Southern (NS) Railroad passes through and has a rail spur to facilities within the Berwind Complex. The NS Railroad provides rail service in the area extending from Amonate, Virginia northward through Berwind, West Virginia (see Figure 1.1-1).

The nearest airport is the Tri-Cities Airport (TRI), which is located in Bristol, Tennessee, approximately 90 miles from Berwind, West Virginia. The Yeager International Airport (CRW) in Charleston, West Virginia, is located 120 miles from Berwind, West Virginia.

The surrounding waterways are not navigable for commercial traffic. The closest barge docking area is approximately 70 miles to the north of the complex on the Kanawha River, south of Charleston, West Virginia.

4.3 CLIMATE AND OPERATING SEASON

The climate associated with the Berwind 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 Berwind Complex currently operate year-round, regardless of weather conditions.

4.4 INFRASTRUCTURE

Power

Electrical power for the Berwind Preparation Plant and mines on the Berwind Complex is provided by American Electric Power (AEP). AEP's average industrial price is approximately 10 cents per kWh, which is slightly higher than the U.S. national average industrial price of 8.63 cents per kWh (EIA.gov statistics, December 2022).

Water

Water for mining and coal processing operations is provided by a combination of extraction from abandoned underground mine pools and from settling ponds located on the surface. Individual mine sites use purchased potable water. The Berwind mine offices and preparation plant obtain potable water from on-site wells. Ramaco has on-site water treatment facilities as well.

Personnel

The area surrounding the Berwind Complex has a long history of coal mining and attracting mining personnel with qualified skills has not been an issue for Ramaco thus far. The Berwind Complex is projected to employ a maximum of 257 personnel over the LOM Plan. The Berwind Complex operations employed approximately 210 personnel at the end of December 2022. The hourly labor force remains non-union and no change in this labor arrangement is anticipated in the near term.

Supplies

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

5.0 HISTORY

5.1 PREVIOUS OPERATIONS

The Berwind Complex and surrounding area has an extensive history of coal mining, primarily by underground mining 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 Virginia Department of Mines Minerals and Energy, the USGS, and the MSHA. Mining within the Berwind Complex began in the early 1900s. There have been many different mine operators both large and small in the region since then.

Areas of the Berwind Property have been previously surface and underground mined. Within the Berwind Property, mining has occurred in seams above the Pocahontas No. 4 Seam in some reserve areas, notably in the Pocahontas 11 Seam (also locally known as the War Creek or Beckley Seam). Previously mined out areas on the property were provided to WEIR by Ramaco, however, WEIR has not verified, nor field checked these previously mined out areas.

The Amonate Property has had many ownership exchanges. Records indicate that coal was first produced on the property by Pocahontas Fuel Company beginning in 1926 and through the 1940s. A predecessor of Consolidation Coal Company acquired the property in 1956 and resumed operations in 1975. Coronado acquired the property from CONSOL in 2016. Ramaco acquired the property from Coronado in late 2021. Prior to Ramaco, no production had occurred in this area since 2012.

5.2 PREVIOUS EXPLORATION AND DEVELOPMENT

Prior to Ramaco's control of the property in 2021, previous exploration included 4,821 holes drilled within or in proximity to both Ramaco's Berwind and Knox Creek Complexes. Previous exploration activity dates back prior to 1910. A list of 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 exploration drilling records are not fully available in original form.

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Table 5.2-1 Previous Exploration

Company	Drill Holes	Drilled Footage	Year Drilled
Anker Coal Group, Inc.	57	25,087	Unknown
Consol Energy, Inc.	3,474	4,497,009	1970s-1980s
Georgia-Pacific	31	39,355	Unknown
Harmon Coal Company	1	750	Unknown
Island Creek Coal Coampany	70	114,561	Unknown
Jewell Ridge Coal Company	241	125,314	1960s-1990s
Jewell Smokeless Coal Corporation	473	221,931	1940s-2013
New River & Pocahontas Consolidated	73	50,287	1910s-Unknown
Olga Mining Company	22	17,434	Unknown
Paramont Coal Company Virginia, LLC	9	3,828	Unknown
Permac, Inc.	19	7,029	Unknown
Pocahontas Fuel Company, Inc.	25	18,649	Unknown
Republic Steel Corporation	98	47,738	Unknown
United Coal Company	126	53,973	Unknown
US Steel Corporation	1	617	Unknown
West Virginia Geological & Economic Survey	2	9	Unknown
Unknown	99	5,688	Unknown
Total	4,821	5,229,258	

As can be seen in Table 5.2-1, Ramaco's Berwind and Knox Creek Complexes have a rich history of coal exploration. It should be noted that Consol Energy, Inc. has an exceptionally large number of drillholes because of its substantial participation in the natural gas industry in the area.

Organizing significantly large amount of data requires performing tasks such as; 1) removing drillhole duplicates (especially where companies change drillhole names to match their own naming conventions), 2) resolving multiple copies of drillholes "shared" between companies (i.e. different companies own different seams over the same area and agree to "share" drillhole data, but delete the data for their seams before sharing), 3) resolving localized seam naming differences, and 4) resolving different coordinate systems. These are significant (and on-going) tasks for Ramaco. WEIR's review of Ramaco's current drillhole database is highly complementary based on the results of its work to date on these matters. Based upon thorough review of Ramaco's compilation of this historical drilling data, it is WEIR's opinion that this historical data is reliable for use in generating an accurate geological and quality model for the Berwind Complex.

6.0 GEOLOGICAL SETTING, MINERALIZATION, AND DEPOSIT

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6.1 REGIONAL, LOCAL, AND PROPERTY GEOLOGY

6.1.1 Regional Geology

The uppermost coal seams of interest (Jawbone and Tiller seams) within the Berwind Complex belong to the Norton Formation in Virginia of Early Pennsylvanian Age, which is stratigraphically equivalent to the Lower Kanawha and New River formations in southwestern West Virginia. The lower and primary coal seams of interest (Pocahontas and Squire Jim seams) belong to the Lee Formation of the Pottsville Group (Lower Pennsylvanian). The depositional setting for these seams is complex and thought to be upper delta plain, with subsidence controlling the sedimentation rate. The Lower Pennsylvania (Pottsville) sedimentary strata of the coal-bearing rocks of the Pocahontas Formation rest uncomformably on the Mississippian Bluestone Formation of the Mauch Chunk Group.

The Norton and Lee Formations (Virginia nomenclature) encompass the Berwind Complex, which additionally is within the western margin of the folded and faulted Central Appalachian Basin, with deformation occurring during the Alleghany (post-Permian) Orogeny. The Dry Fork Anticline is a regionally persistent fold, which extends from Buchanan County, Virginia to Mercer County, West Virginia. The anticline passes through the center of the complex and plunges to the southwest. North of the Dry Fork Anticline, coal beds dip at approximately one degree to the northwest, while to the south, seams dip one to two degrees toward the Boissevain Fault to the south/southwest.

The coalbeds of the Norton Formation are interbedded with sandstones, shales, siltstones, and underclays. The sandstones are light gray, very fine to coarse grained, thin bedded to massive, and crossbedded, and 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 of interest within the Berwind Complex are in the Southwest Virginia Coal Field and the Southern Coal Field in West Virginia. These coal seams are known for very high calorific value (Btu/lb) and high through low-volatile metallurgical coal characteristics, with high fluidity, low ash content, and low sulfur content.

The Boissevain and Middle Creek faults are major northeast/southwest trending thrust faults, which pass through the southern boundary of the Berwind Complex and basically cut off resources to the south. The strata on the southeast side of the fault has been thrust upward, relative to the strata on the northern side, along a plane which is, in most places, inclined at approximately 45 degrees. Along much of the length of the fault, the strata have been overturned, and the fault offset is over 200 feet. The Boissevain and Middle Creek faults parallel the Richlands Fault, another large thrust fault to the south of the property, where Mississippian Age strata have been thrust above the Pennsylvanian coal-bearing formations. No mining has occurred south of the Boissevain and Middle Creek faults, within or near the complex.

The Canebrake Fault is a northwest/southeast trending fault, with an offset of approximately 200 feet based on evaluation of drillhole information. The upthrown side is to the north of the fault. Underground mining in the Red Ash Seam has occurred on both sides of the fault. This fault passes across the Berwind Complex near its center.

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6.1.3 Property Geology

The primary coal seams of interest on the Berwind Property, in descending stratigraphic order, are the Tiller, Pocahontas No. 6, Pocahontas No. 5, Pocahontas No. 4, Pocahontas No. 3 and Squire Jim. All of the coal seams of interest outcrop on the property. The Canebrake Fault passes through the Berwind Property, however, it is not anticipated to adversely affect mining activities.

6.2 MINERAL DEPOSIT TYPE AND GEOLOGICAL MODEL

The Berwind Complex resource area is a relatively flat lying, sedimentary deposit of Pennsylvanian Age. The 34 coal seams in the Lee Formation and the overlying Norton Formation (Virginia nomenclature) account for approximately 3,000 feet of geologic section. For internal planning, Ramaco models these seams from exploration results 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. 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. 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 Berwind Complex. Cross sections related to the Berwind Complex can be found on Figure 6.3-2.

Figure 6.3-1 Berwind Stratigraphic Column

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Figure 6.3-2 Berwind Stratigraphic Sections

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Graphic

7.0 EXPLORATION

7.1 NON-DRILLING EXPLORATION

Drilling has served as the primary form of exploration within the Berwind Complex. In addition to exploration drillholes, seam outcrop measurements, in-mine measurements, and survey points taken from mine maps of previous operations were considered. A total of 194 seam outcrop measurements, 356 mine measurements, and 887 survey points were

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incorporated in modeling the deposit. Data from degasification, coal bed methane, and water wells were also incorporated in the geological model, including a total of 4,188 drillholes.

7.2 DRILLING

Ramaco's exploration activities involve rotary and continuous core drilling performed by competent contract drilling companies. 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 which is stored and evaluated as needed. 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 in consideration for re-drilling. The successful acquisition of accurate geophysical logs for holes with poor core recovery play an important role in the decision to re-drill, since improvements in lithology recognition in geophysical logging has significantly improved over the years.

Once recovered, all core samples are boxed, photographed, and stored. Coal seam core samples are sent to laboratories for quality analyses. Caliper, density, gamma, and resistivity 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	Drilled Footage	Rotary	Core	Drill Hole Header	Geophysical Logs	Downhole Deviation Log	Geologist's Log	Driller's Log	Lab Analyis Certificates
BL Series	2021-2022	59	47,347	45	14	59	28	—	59	59	5
BL Series	2015-2021	67	46,378	28	39	67	66	—	37	28	17
		126	93,725	73	53	126	94		96	87	22

Referring to the drilling programs outlined in Table 7.2-1, the BL (Berwind) series of drillholes are intended both for in-fill drilling on the complex and to better establish boundaries of previously mined areas. 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
- Each drillhole to be logged using geophysical methods if physically possible
- Geologist to compare field geologist's logs to the e-log data

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- 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, and having had several technical discussions with Ramaco's geologists on results, 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 19 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 for the complex 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 Berwind 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 Berwind Complex is provided on Figure 7.5-1.

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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 typically performed by Marshall Miller & Associates of Bluefield, Virginia. Coal quality analyses are typically performed by Precision Testing Laboratory, Inc. of Beckley, West Virginia.

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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, since 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. (Precision) located in Beckley, West Virginia beginning in 2016. Also certified by the ANSI National Accreditation Board, Precision performs all the coal analyses to ASTM standards. 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 drillhole data from prior property owners. The quality data from other laboratories appears to be valid and appropriate to include in this study based upon available documentation and consistency of the data between the different sources.

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8.3 QUALITY CONTROL PROCEDURES AND QUALITY ASSURANCE

As ANSI certified laboratories, both SGS and Precision have in-house quality control and assurance procedures. Both are a well-known and respected providers of coal quality analysis 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 Berwind 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 Berwind Complex, which included Excel spreadsheets, driller's log, field geologist's logs, core photographs, 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:

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- 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 that may impact reserve and resource estimates relate to discrepancies in original data entry, and may include:

- Incorrect drillhole coordinates (including elevation)
- Mislabeled drillhole lithology
- Unnoticed erroneous quality analyses where duplicate analyses were not requested
- Excessive 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, 81 drillholes were excluded from the drillhole database due to various reasons.

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 some of the 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 SGS 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 2016. 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 Berwind Complex that can be relied upon to estimate coal resources and reserves to an accuracy that is acceptable for this report's specified standards.

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10.0 MINERAL PROCESSING AND METALLURGICAL TESTING

10.1 MINERAL PROCESSING TESTING AND ANALYTICAL PROCEDURES

Daily clean coal samples are taken to ensure specifications are met for each clean coal shipment. The testing is performed by SGS on samples obtained from various conveyor and stockpile locations prior to shipping clean coal products. Proximate and oxidation analyses are performed on the samples. Train and sublot samples include all petrographic and rheology analyses for each individual customer specification.

In addition to the clean product samples, individual circuit samples are performed routinely on both the tailings and product to ensure proper recovery or the presence of misplaced material. 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 to help ensure proper coal and non-coal separations are occurring throughout the preparation plant processing 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 Berwind Complex area exhibits homogeneous characteristics and does not show any substantial variations in mineralization types or styles that would adversely affect processing or saleability 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

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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 quality 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 Berwind Preparation Plant processes ROM coal at specific gravities ranging from 1.50 to 1.65, depending on customer specifications, in order to produce saleable metallurgical coal products.

The Berwind Preparation Plant commenced operating in November 2022, after refurbishment. Historical preparation plant recovery from November 2022 through January 2023, based on plant belt scale records, is summarized in Table 10.4-1 as follows:

Table 10.4-1 Historical Preparation Plant Recovery

	Nov 2022	Dec 2022	Jan 2023	Average
Raw Tons Processed	103,333	123,001	153,229	126,521
Clean Tons Processed	40,280	36,218	48,226	41,575
Plant Recovery (%)	39.0	29.4	31.5	32.9

The Berwind Preparation Plant historical (2022) and projected LOM Plan preparation plant recovery is shown on Figure 10.4-1.

Figure 10.4-1 Preparation Plant Recovery

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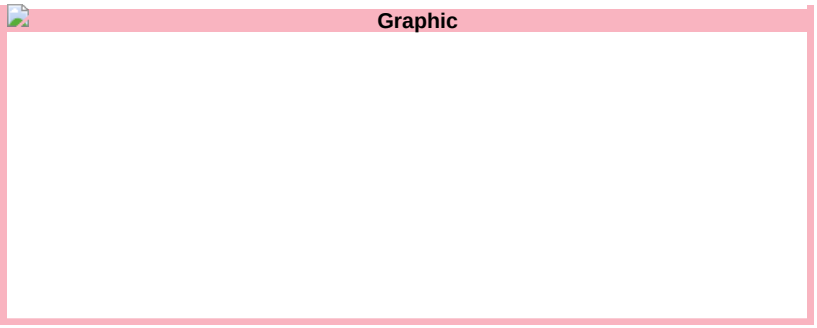

Preparation plant recovery and saleable product quality are expected to track closely with the modeled recovery from raw coal analysis, once adjusted for out of seam dilution (OSD) mined by the surface and underground mines.

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, 2022, 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).

In addition to the currently active mines, there are numerous other resource areas within the Berwind Complex which Ramaco may plan and/or permit at a future date.

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.

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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 4,290 drillholes, 4,188 holes of which are included in the geological model.

In-mine seam thickness and floor measurement from previous operations' mine maps were provided in tabular file format. These mine measurements included 356 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 625 drillholes was provided for the Berwind Complex. Of the 625 drillholes, 558 holes were used in the quality model. 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.

- Analyses were not performed at the appropriate wash specific gravity

Geological Model

The Berwind Complex geological model was developed 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 50 feet by 50 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. WEIR investigated significant collar elevation discrepancies. Most differences are due to original drillhole locations being covered with burden or being subsequently mined. Drillholes for which such discrepancies could not be resolved were not used in the model.

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 150 feet by 150 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

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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

Ninety-eight (98) coal seams (including seam splits) were modeled for the Berwind Complex. A summary of drillhole statistics for the 19 seams that WEIR considered to have economic potential for the Berwind Complex are shown in Table 11.1-2. These statistics involve the 1,900 drillholes, out of the total 4,188, that can be allocated to the Berwind Complex versus the Knox Creek Complex.

Table 11.1-2 Drillhole Statistics

SEAM CODE	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)
RED2	Red Ash 2	No	74	3.4	06DGBU9	0.4	J-564	9.5	1.60
TL22	Tiller 2-2	No	131	1.8	J-642-10	0.2	27-B	7.0	0.93
TL12	Tiller 1-2	No	173	1.9	06DGS54	0.1	74AM16	7.1	0.91
GCK2	Greasy Creek 2	No	461	2.1	75KC12	0.1	07AV150	8.4	1.45
MHP2	Middle Horsepen 2	No	771	1.9	76AI9	0.0	80B65	6.4	0.49
P114	114 Pocahontas 11	No	680	2.9	78A229	0.0	GPPC-010	12.0	1.16
P102	102 Pocahontas 10	No	488	1.5	78A229	0.0	01DGTA16	6.4	1.01
PO92	Pocahontas No. 9-2	No	860	2.2	78AM160	0.0	84AM167	8.6	1.41
PO91	Pocahontas No. 9-1	Yes	456	1.9	05DGTA64	0.1	78A224	8.3	1.55
PO62	Pocahontas No. 6-2	Yes	698	1.5	AM14	0.0	BL21-18R	7.7	1.11
PO53	Pocahontas No. 5-3	Yes	671	1.3	05DGTA61	0.1	AM6	6.3	0.60
PO51	Pocahontas No. 5-1	Yes	719	2.1	02DGTA52	0.1	07B2	8.0	1.26
PO4R	Pocahontas No. 4 Rider	Yes	433	1.0	BL21-36R	0.0	88-AM-197	4.4	0.48
PO42	Pocahontas No. 4-2	Yes	723	3.2	B67	0.1	84AM171	8.6	2.00
PO33	Pocahontas No. 3-3	Yes	41	0.9	78AM141	0.0	04DGP55	2.2	0.64
PO32	Pocahontas No. 3-2	Yes	676	2.6	PCP-077	0.0	77B15	11.0	1.59

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SQJ4	Squire Jim 4	Yes	189	0.5	10AM220	0.1	AM15	2.5	0.37
SQJ3	Squire Jim 3	Yes	365	0.6	AM14	0.0	09CNXTA184	4.7	0.56
SQJ2	Squire Jim 2	Yes	492	2.8	11DGX58	0.1	77AM132	9.0	1.03

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

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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 Berwind 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 Berwind Complex are as follows:

- Resources were estimated as of December 31, 2022.
- 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, and where stripping ratio exceeds 20:1, were excluded from the resource estimate.
- Tonnage outside of current LOM plans, 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 (pounds per cubic foot) is based on apparent specific gravity data from analyses of dill hole samples 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, 2022, 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, 2022

			In-Place Resources (000 Tons)				Coal Quality (Raw Dry Basis)	
Seam	Area (Acres)	Average Coal Thickness (Ft)	Measured	Indicated	Total	Inferred	Ash (%)	Relative Density (Lbs/CF)
Red Ash 2	2,420	3.5	15,740	—	15,740	—	8.3	86.48
Tiller	2,210	3.8	11,230	—	11,230	—	22.4	92.68
Greasy Creek 2	675	2.3	3,325	—	3,325	—	30.6	97.27
Pocahontas 11	1,295	3.1	8,030	—	8,030	—	22.6	91.73
Pocahontas 10	2,055	2.8	11,075	—	11,075	—	15.9	87.94

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Pocahontas 9-2	**5,513**	**3.2**	**33,226**	**45**	**33,271**	**—**	**17.0**	**86.95**
Pocahontas 9-1	**5,145**	**3.0**	**9,700**	**15,920**	**25,620**	**4,495**	**17.0**	**88.61**
Pocahontas 6	**1,411**	**2.7**	**8,303**	**—**	**8,303**	**—**	**38.1**	**101.74**
Pocahontas 5	**7,655**	**3.0**	**41,755**	**1,512**	**43,267**	**—**	**11.4**	**85.44**
Pocahontas 4	**6,609**	**4.5**	**50,233**	**6,683**	**56,916**	**—**	**18.2**	**88.96**
Pocahontas 3	**22,457**	**3.0**	**122,493**	**8,482**	**130,975**	**—**	**16.2**	**88.02**
Squire Jim	**42,670**	**3.2**	**243,471**	**37,734**	**281,205**	**—**	**25.0**	**94.39**
Total	**100,115**	**3.2**	**558,581**	**70,376**	**628,957**	**4,495**	**20.4**	**91.06**

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 primarily metallurgical low and mid volatile coal product realizing a sales price of $169 per ton at a cash cost of $101 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 Berwind Complex.

Ramaco's forecasted Berwind Complex FOB mine coal sales prices are $168.91 per ton in 2023, $168.90 in 2024, $168.54 in 2025 and thereafter $166.56 to $177.00 per ton through 2049. Ramaco's sales price projections conform to published forward price curves for coal of similar quality to that of the Berwind 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. In summary, capital expenditure costs are projected to average $9.77 per ton over the Berwind Complex LOM Plan, compared to the actual average Berwind Complex capital expenditure cost of $153.43 per ton from 2018 through 2022. The period from 2018 through 2022 included high development capital and low production for the Berwind No. 1 Mine and high capital expenditures for refurbishing the Berwind Preparation Plant.

Operating cash costs are discussed in further detail in Section 18.2. In summary, operating cash costs are projected to average $100.67 per ton over the Berwind Complex LOM Plan, compared to actual average Berwind Complex operating cost of $114.98 per ton from 2018 through 2022. The historical costs were elevated as a result of development of the thinner Pocahontas 3 Seam to access the Pocahontas No. 4 Seam at the Berwind No. 1 Pocahontas 4 Deep Mine.

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Total projected capital expenditures and operating cost of $110.43 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 with 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 Berwind Complex.

11.4 MINERAL RESOURCE CLASSIFICATION

Mineral Resource estimates prepared for the Berwind Complex are based on the 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

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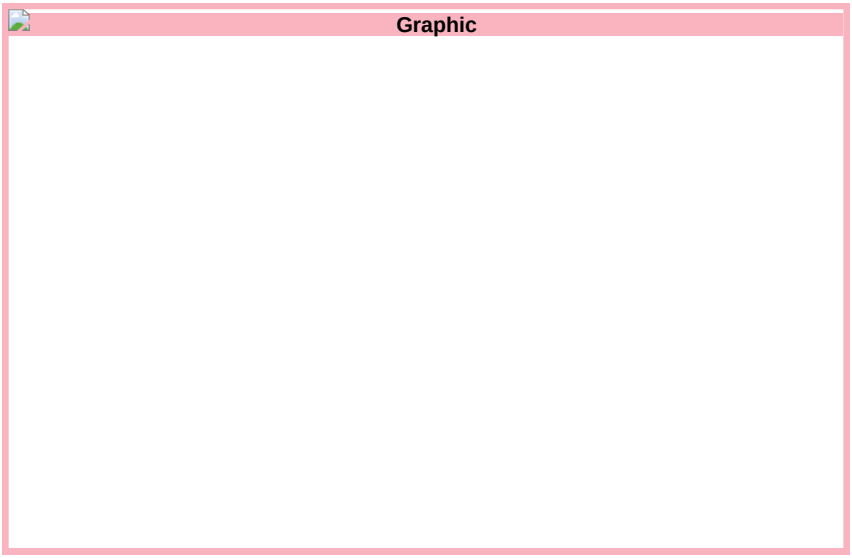
resource or an inferred mineral resource, a measured mineral resource may be converted to a proven mineral reserve or to a probable mineral reserve.

Geostatistical methods were applied to drillhole and mine measurement coal thickness data for four primary seams at the Berwind Complex to develop variogram ranges (radii) used for resource classification. Figure 11.4-1 illustrates the variogram for the Tiller No. 1 Seam, containing 649 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 for the Jawbone No. 1, Pocahontas No. 4, and Tiller No.1 and No. 2 seams at the B. Variographic ranges were similar in each seam, demonstrating seam thickness continuity over 9,000 feet in each case. Theoretical ranges estimated for Measured (to 3,000 feet) and Indicated (to 9,200 feet) resources in the analysis demonstrates the spatial continuity of mineable coal seam thickness at the Berwind Complex.

Figure 11.4-1 Variogram Model Tiller No. 1 Seam Thickness



Technical Report Summary
Berwind Complex
Prepared for Ramaco Resources, Inc.
Graphic

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Table 11.4-1 Theoretical Variogram Ranges

Variogram	Figure	Sample Count	Measured Range (Ft)	Indicated Range (Ft)
Jawbone No. 1 Seam	1	1,290	2,250	6,800
Pocahontas No. 4 Seam	2	865	7,300	22,000
Tiller No. 1 Seam	3	649	3,050	9,200
Tiller No. 2 Seam	4	702	4,800	14,500

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 Berwind Complex.

Table 11.4-2 Statistics for Composited Drillhole Samples

Quality Parameter	Number of Samples	Total Sample Length (Ft)	Minimum Value	Maximum Value	Average Value
Audibert-Arnu Maximum Dialation (%)	116	314	0	300	188
Composition Balance Index	48	135	0.51	7.63	5.38
Free Swell Index	374	1,020	3.1	9	8.6
Gieseler Maximum Fluidity (DDPM)	219	586	1	30,000	9,457
HGI	17	60	94	105	99
Inerts (%)	61	169	8.2	36.3	25.8
Raw Ash (%)	357	984	2.7	62.1	20.4
In-Place Relative Density	925	2,585	1.27	1.96	1.44
Reflectance (ROMAX, %)	112	323	1.2	1.71	1.45
Rank	48	135	0.6	7.0	4.7
Stability Index	99	289	42.0	65.0	55.7
Coal Oxidation by Light Transmittance (%)	17	60	97.0	99.0	97.7
Ash (%)	809	2,223	2.0	19.1	5.9
BTU/lb	507	1,361	12,509	15,505	14,627
Sulfur (%)	803	2,206	0.37	3.50	0.85
Volatiles (%)	721	1,983	15.5	37.4	26.2
Yield (%)	923	2,582	10.4	100.0	74.8

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

Within the Measured and Indicated classifications, 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 four coal 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:

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- Measured: 0 - 3,000 feet (based on 905 observations informing estimate of coal thickness within this range)
- Indicated: 3,000 - 9,200 feet (based on 905 observations informing estimate of coal thickness within this range)
- Inferred: greater than 9,200 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 Berwind Complex. In summary,

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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 Berwind Complex. The spatial continuity of all seams with resource attributes at the Berwind 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 Berwind 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 the risk for bad floor conditions from the presence of underclays.

The consistency of the seams within the complex 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.

A large percentage (approximately 99 percent) coal deeds and leases in planned mining area have been secured by Ramaco at the Berwind Complex and WEIR finds no high risks associated with these coal deeds and leases. Resources that exist in currently unplanned mining areas are well situated for potential mining as the total size of the uncontrolled areas are not significant in comparison to the total acres in potential mining areas.

Risk is also associated with volatility of coal market prices. Significant variations in operating costs, capital expenditures, productivity, and coal sales prices could impact the economic mineability of the Berwind Complex.

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 Berwind Complex.

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12.0 MINERAL RESERVE ESTIMATES

12.1 KEY ASSUMPTIONS, PARAMETERS, AND METHODS

The conversion of resources to reserves at the Berwind Complex considers the effects of projected dilution and associated loss of product coal quality, projected coal sales prices, operating costs, regulatory compliance requirements, and mineral control. These factors all 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's 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 50 to 80 percent mining recovery of coal.

The Berwind 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 Berwind Complex.

Based on WEIR's review and evaluation of the Berwind 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 Berwind Complex:

- Reserves were estimated as of December 31, 2022.
- Underground mining recovery of 50 to 80 percent (dependent on the extent of retreat mining that can be performed), surface mining recovery of 90 percent, and highwall mining recovery of 40 percent.
- 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, in areas where such depth could be achieved. Areas where a minimum of 400 feet of penetration depth could not

be achieved, as a result of any site-specific boundary limitations including extent of underground mining, were excluded from the reserve classification.

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- 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 Berwind Complex LOM plans.

12.2 ESTIMATES OF MINERAL RESERVES

The coal reserves that represent the economically viable tonnage controlled by Ramaco at the Berwind Complex, based on the coal reserve estimate methodology described, are shown in Table 12.1-3 as follows:

Table 12.1-3 Clean Recoverable Coal Reserve Tonnage and Quality Estimate, as of December 31, 2022

Mine / Seam	Product Quality	Total Area (Acres)	Average Seam Thickness (Ft)	Clean Recoverable Reserve (000 Tons)			Ash (%)	Average Coal Quality (Raw Dry Basis) Relative Density (Lbs/CF)
				Proven	Probable	Total		
Berwind No. 1 Deep Mine Pocahontas 4	Low Vol	7,116	4.2	16,897	26	16,923	23.7	92.82
Laurel Fork Deep Mine Pocahontas 3	Mid Vol	2,536	3.7	6,188	22	6,210	10.6	84.32
Triad No. 2 Deep Mine Pocahontas 6	Low Vol	130	3.5	237	—	237	38.1	101.74
Pocahontas 5	Low Vol	21	2.5	22	—	22	50.1	109.24
Triple S Highwall Mine Pocahontas 5	Low Vol	128	3.1	141	37	178	11.1	84.89
Total		9,931	4.0	23,485	85	23,570	20.3	89.98

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 low and mid volatile metallurgical coal product at a sales price of $169 per ton and cash cost of $101 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

12.3 ESTIMATES OF RESERVE CUT-OFF GRADE

The seams within the Berwind Complex display consistent quality attributes representative of high-quality metallurgical coal. Current mine plans involve low to mid volatile products. One significant variable regarding cost considerations 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 Berwind Complex, and the

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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.

In summary, based on Ramaco's Berwind Complex historical and consistent saleable coal product quality, current coal sales contract specifications, and the projected coal quality that has been modeled, WEIR does not foresee any deviations that would adversely affect future coal sales.

12.4 MINERAL RESERVE CLASSIFICATION

WEIR prepared the Berwind 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 1300 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 Berwind Complex, Measured Resources were converted to Proven Reserves and Indicated Resources were converted to Probable Reserves.

12.5 COAL RESERVE QUALITY AND SALES PRICE

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Berwind 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												
Mine/Seam	Ash (%)	Relative Density (Lbs/CF)	Ash (%)	Sulfur (%)	Volatile Matter	Calorific Value (Btu/lb.)	Theoretical Plant Yield (%)	Audibert-Arnu Maximum Dilation (%)	Composition Balance Index	Calculated Stability Index	Fluidity DDPM	Free Swell Index	Hardgrove Grindability Index	Total Inerts (%)	Reflectance ROMAX (%)
Berwind No. 1 Deep Mine															
Pocahontas No. 4 Rider	24.5	93.36	6.6	0.70	20.3	14,665	67.1	105	4.69	59.4	836	8.7	98	20.4	1.51
Pocahontas No. 4-2	23.6	92.73	6.2	0.65	20.3	14,719	67.8	89	4.73	58.4	658	8.7	99	24.0	1.50
Average	23.7	92.82	6.3	0.66	20.3	14,712	67.7	91	4.72	58.6	683	8.7	99	23.5	1.50
Laurel Fork Deep Mine															
Pocahontas No. 3-2	10.6	84.32	5.8	0.71	23.2	14,817	87.6	142	5.54	56.9	614	7.9	96	26.3	1.52
Triad No. 2 Deep Mine															
Pocahontas No. 6-2	38.1	101.74	5.4	0.93	20.1	14,957	54.0	ND	ND	ND	ND	ND	ND	ND	ND
Pocahontas No. 5-3	50.1	109.24	7.7	0.85	19.9	14,480	46.8	ND	ND	ND	ND	ND	ND	ND	ND
Average	39.5	102.58	5.6	0.92	20.1	14,904	53.2	—	—	—	—	—	—	—	—
Triple S Highwall Mine															
Pocahontas No. 5-1	11.1	84.89	7.5	0.73	20.0	14,573	88.9	46	2.38	58.7	296	9.0	103	25.5	1.43
Berwind Complex Average	20.9	91.04	6.2	0.67	20.9	14,736	72.0	104	4.82	57.9	1,005	8.5	98	24.1	1.50

ND=No Data

The average quality for the reserve tons shows that the Berwind Complex ranges from a high quality low volatile to a high quality mid volatile metallurgical coal product, all which possess good coking properties. The range of dry washed volatile matter is between 19.9 and 23.2 percent, with an average of 20.9 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

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parameters such as ROMAX, Free Swelling Index, Audibert-Arnu Maximum Dilation, and Gieseler Fluidity indicate high quality metallurgical grade coal products.

Ramaco's forecasted Berwind Complex FOB mine coal sales prices are $168.91 per ton in 2023, $168.90 in 2024, $166.56 in 2025 and thereafter $166.56 to $177.00 per ton through 2049. Ramaco's sales price projections conform to published forward price curves for coal of similar quality to that of the Berwind Complex. The sales price is further supported in Section 16.0 of this report.

12.6 RISK AND MODIFYING FACTORS

Due to the relatively high continuity of the coal seams within the Berwind 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 Berwind Complex have good 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 visits, and has sufficient capacity to attain projected levels of productivity and production. This further contributes to the Berwind Complex being a relatively low risk operation. As previously noted, mineral rights have been acceptably secured 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, WEIR does not anticipate significant deviation of product recovery in the future. For deep mines, aerial recovery is based on the pillar size that has been designed for the operation, which is dependent on depth of cover and overlying rock strength and quality. The pillar design is mostly intended to provide safe operation of the primary coal extraction efforts. WEIR utilized an average mining recovery of 50 percent for the Berwind Complex continuous miners for first mining and an additional 30 percent mining recovery for retreat mining. This is consistent with typical 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, productivity, and coal sales prices could impact the economic mineability of the Berwind Complex. Economic analyses and associated sensitivities are further detailed in Section 19.0.

13.0 MINING METHODS

The underground mining method at the Berwind 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 approximately 80 percent. Due to lack of surface structures within the complex, retreat mining is planned for

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the majority of the underground mining areas. 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 deep mining is proposed within 50 feet of gas wells.

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 Berwind 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 Berwind 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, realizing 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 and VDE 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 and VDE permits. No mining is proposed within 50 feet of the gas wells. No protection is proposed for the surface gas lines 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 Ramaco's surface mining operations, standing highwall configurations are not substantial enough 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 ACPS analysis and 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

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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.

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 Berwind Complex. WEIR notes that to date, Ramaco has not experienced any significant stability problems at its Berwind Complex mines. Based on WEIR's experience in the coal 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 Berwind Complex is regionally within the Virginia Big Sandy River Basin and Upper Guyandotte River watershed of West Virginia. The Clinch River, to the south of the complex, is the primary hydrological feature in the local area and is a tributary of the Tennessee 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 Norton Formation in the region 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.

A 1993 study conducted by the USGS in cooperation with the VDE in the immediate vicinity further supports this and suggests that the primary aquifers with significant horizontal flow in the area are due to relatively shallow fracture flow systems. Coal seams also act in horizontal flow systems typically resulting in discharge as springs or seeps on hill slopes, or recharge of coal seams at depth. The study found that as depth increases beyond 100 feet, hydraulic conductivity significantly decreases for strata other than coal. This results in little deep regional ground-water flow.

Due to the rural nature of the area, there are several cooperative and private water wells on and adjacent to the Berwind Complex. There are also structures that utilize the 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 are and 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.

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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 Berwind 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 Berwind 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 Berwind 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 mining 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, VDEP, 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

Berwind No. 1 Pocahontas 4 Deep Mine

Two continuous miners operate in a supersection at this mine. Supersections are continuous miner sections with split ventilation that allows the operation of two continuous miners on the section, which significantly enhances continuous miner section productivity. Access is provided via slope from the Berwind No. 1 Pocahontas 3 Deep Mine, which will remain inactive for an undetermined period of time. Ramaco commenced production at the Berwind No. 1 Pocahontas 4 Deep Mine in late 2021 after completion of the slope. The mine is currently idle but is expected to be reactivated in April 2023, and will add two additional supersections to mine reserves acquired in the Amonate acquisition. Approximately 33 personnel are currently employed.

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Laurel Fork Pocahontas 3 Deep Mine

This mine was previously known as Harvest Time No. 6 Deep Mine and produces coal from the Pocahontas 3 Seam. Ramaco commenced production at this mine in the First Quarter 2022. There is one supersection currently operating at this mine, which currently employs approximately 51 personnel.

Triad No. 2 Deep Mine

This is a single-section continuous miner operation in the Pocahontas No 6 and 5 seams. Ramaco commenced production at this mine in the Fourth Quarter 2022. This mine currently employs approximately 55 personnel and a belt conveyor is being installed to transport the ROM coal to the Berwind Preparation Plant.

Triad Pocahontas 4 Deep Mine

The Tria Pocahontas 4 Deep Mine depleted its reserves in 2022, although there are still approximately 16 personnel involved in site decommissioning.

Triple S Highwall Miner Mine

A Superior highwall miner operates in the Pocahontas No. 5 Seam at this mine and Ramaco is in the process of submitting a permit revision to add area and contour mining to the existing permitted area. There are approximately 14 Ramaco personnel employed at this mine. Ramaco currently employs a contractor to clean the bench in front of the highwall miner. This bench was previously contour mined prior to Ramaco operations at Triple S. This bench was also previously auger mined to relatively short lengths compared to the capability of the Superior highwall miner.

Prior to highwall mining with the Superior machine, Ramaco backfills the old auger holes with a low strength grout to help ensure that there is no subsidence after their highwall mining activities. This backfilling of old auger holes is required by MSHA. The Superior highwall miner cuts are planned at approximately 800 feet in length at full seam thickness, and an 11 feet cut width. Planned highwall miner penetration lengths started out less than planned due to operational difficulties through the old augered areas, however, Ramaco promptly made adjustments and has since been successfully achieving the planned 800 feet cut lengths.

Actual clean coal production attained by the Berwind Complex for 2018 through 2022 is shown in Table 13.3.1-1 as follows:

Table 13.2.1-1 Berwind Complex Historical Clean Production

Mine	2018	2019	2020	2021	2022	Average
	Clean Tons					
Berwind No. 1 Pocahontas 4 Deep Mine	80,923	188,241	147,330	16,868	134,097	113,492
Laurel Fork Pocahontas 3 Deep Mine	—	—	—	—	79,090	79,090
Triad No. 2 Deep Mine	—	—	—	—	37,621	37,621

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Triad Pocahontas 4 Deep Mine	—	—	—	163,720	141,870	152,795
Triple S	—	—	—	—	23,900	23,900
Berwind Complex Total	80,923	188,241	147,330	180,588	416,578	202,732

Actual and projected ROM and clean coal production, and preparation plant yield for the each of the mines for the first 20 years of the Berwind Complex LOM Plan are shown in Table 13.2.1-2 as follows:

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

	2022 (1)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
ROM Tons (000)											
Berwind No. 1											
Pocahontas 4 Deep Mine	244	454	1,398	1,485	1,892	2,176	2,179	2,238	2,309	2,235	2,207
Laurel Fork Pocahontas 3											
Deep Mine	157	499	519	513	481	418	399	410	342	218	302
Triad No. 2 Deep Mine	71	717	—	—	—	—	—	—	—	—	—
Triad Pocahontas 4 Deep											
Mine	268	—	—	—	—	—	—	—	—	—	—
Triple S	197	364	89	—	—	—	—	—	—	—	—
Total	936	2,034	2,006	1,998	2,373	2,595	2,577	2,648	2,652	2,452	2,509
Clean Tons (000)											
Berwind No. 1											
Pocahontas 4 Deep Mine	134	159	537	626	735	1,130	1,109	1,008	978	982	1,002
Laurel Fork Pocahontas 3											
Deep Mine	79	226	208	217	240	200	215	213	143	65	54
Triad No. 2 Deep Mine	38	259	—	—	—	—	—	—	—	—	—
Triad Pocahontas 4 Deep											
Mine	142	—	—	—	—	—	—	—	—	—	—
Triple S	83	152	63	—	—	—	—	—	—	—	—
Total	475	796	808	843	975	1,330	1,324	1,221	1,121	1,046	1,055
Preparation Plant Yield (%)											
Berwind No. 1											
Pocahontas 4 Deep Mine	55.1	35.0	38.4	42.2	38.8	51.9	50.9	45.1	42.3	43.9	45.4
Laurel Fork Pocahontas 3											
Deep Mine	50.3	45.3	40.2	42.3	49.9	47.7	53.8	52.0	41.8	29.8	17.8
Triad No. 2 Deep Mine	53.0	36.2	—	—	—	—	—	—	—	—	—
Triad Pocahontas 4 Deep											
Mine	53.0	—	—	—	—	—	—	—	—	—	—
Triple S	41.9	41.8	70.3	—	—	—	—	—	—	—	—
Average	50.8	39.2	40.3	42.2	41.1	51.3	51.4	46.1	42.3	42.7	42.1

(1) 2022 Actual

13.2.2 Expected Mine Life

Individual mines at the Berwind Complex typically have expected mine lives varying from two years and beyond, with 10 years an approximate average. Because the mines are being

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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 mining at the complex progresses, future mines will be planned and scheduled as necessary to meet internal Ramaco goals as they align with market conditions. 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 for the various mine plans are shown on Figures 13.5-1 through 13.5-4.

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

- Gas Wells
  - Ø State Permit required to mine within 500 feet of a well
  - Ø MSHA Permit required to mine within 150 feet of a well
  - Ø Active Well barrier - tangent of 15 degrees x depth of cover or 50 feet, whichever is greater
  - Ø Inactive Well barrier - tangent of 5 degrees x depth of cover or 50 feet, whichever is greater
  - Ø Plugged Wells - mine-through is allowed with acquisition of proper State and MSHA Permits

- Pillar Size
  - Ø 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.
  - Ø ARMPS stability factor of 1.5 or greater for all other room and pillar development.

- Depth of Cover
  - Ø Ramaco implements a 100 feet minimum depth of cover for all of their underground mines
- Areas without Subsidence Rights
  - Ø ARMPS stability factor of 2.0 or greater will be maintained during first mining.
  - Ø Retreat mining will extend no closer than a tangent of 30 degrees times depth of cover to the property boundary.

- Coal Thickness
  - Ø Mining is not planned in areas of coal seams less than 2.0 feet in thickness.

Technical Report Summary
Berwind Complex
Prepared for Ramaco Resources, Inc.
Graphic

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- Ø 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 Berwind Complex typically consists of a total of two to three inches of waste from the roof and/or floor. Some areas may require mining more OSD to accommodate mine facilities such as ventilation or conveyors. OSD is not included in the reserve or resource estimates since all underground ROM coal is processed at the preparation plant, which effectively eliminates OSD from the saleable coal product.

13.2.5 Mining Recovery

Mining recovery when utilizing continuous miner mining is based on the pillar design, which is in turn based on depth of cover. Mining recovery varies based on whether developing main or sub-main entries, or a production panel due to the longevity requirements for the mine entries. Mining recovery for first mining at the complex is approximately 50 percent, based on pillar design. In the areas where retreat mining is conducted, an additional 30 percent mining recovery is achieved.

For surface mining, a recovery of 90 percent was projected. The designed 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 Berwind Complex currently has two active underground mines, an idle underground mine, and an active surface mine. As the underground mines progress, continuous development is required for extensions of belt conveyors, mine power, pipelines, track, and ventilation facilities.

Future ventilation punchouts, or bleeder holes, are anticipated for areas where retreat mining is executed, applicable at 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-

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mining land use requirements. Regrading and backfilling activities will commence within 180 days after the mining operations are complete.

As part of Ramaco's surface mine plans, the contour mining method 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 1/11/23 Asset Retirement Obligations (ARO) summary for the period ending 12/31/22, and backfilling obligations appear to be properly accounted for at its mines. Based on Ramaco's permits with the WVDEP and VDE, bonding requirements are current and at satisfactory levels at the Berwind 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 Berwind 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 Berwind Complex over the next 10 years. In some cases, mines that commence later in the LOM Plan will utilize equipment currently being used at other mines at the Berwind Complex to avoid additional capital expenditures.

Table 13.4.1-2 Berwind Complex Primary Underground Equipment Fleet

Mine	Supersections	Continuous Miners	Shuttle Cars	Roof Bolters	Battery Scoops	Feeder Breakers	Mantrips	Service Locomotive
	4							
Berwind No. 1 Pocahontas 4 Deep Mine		8	12	8	8	4	8	4
Laurel Fork Deep Mine	1	2	3	2	2	1	2	1

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Triad No. 2 Deep Mine	1	2	3	2	2	1	2	1
Total	6	12	18	12	12	6	12	6

No significant changes are anticipated in the type of mining equipment used throughout the Berwind 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.

At the Triple S Highwall mine, the primary equipment involves a Superior Highwall Mining machine, owned and operated by Ramaco. There are two Cat 980 front end loaders that service the contract over the road coal haulers. Coal haulage from the highwall miner is performed by a fleet of four Volvo A40 articulated end dumps (40 ton) loaded from the highwall miner's stockpile by a Cat 980 front end loader. Other Ramaco utility equipment includes a D-6 wide pad dozer, a large forklift that assists the highwall miner, skid steers, and a service truck. As mentioned above, contractors perform bench clearing in front of the Superior highwall miner. The bench widths for the highwall miner are adequate based on WEIR's site visit.

13.4.2 Staffing

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

Table 13.4.2-1 Current Staffing

	Total
Berwind Pocahontas 4 Deep Mine	33
Laurel Fork Deep Mine	51
Triad No. 2 Deep Mine	55
Triad Pocahontas 4 Deep Mine	16
Triple S Highwall Mine	14
Berwind Preparation Plant	28
Environmental Crew	5
Administration	2
	204

Note: Staffing as of December 2022

Each operating mine at the Berwind Complex is scheduled to produce coal on two production shifts each day, the A Shift and the B Shift. Underground mine crews on the idle night shift provide support services including production equipment 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 with any union and no changes to this are anticipated in the near term.

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The preparation plant is staffed with two crews to process ROM coal 20 hours per day over two, 10-hour shifts, five days per week with no holidays.

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)	204
2023	213
2024	211
2025	250
2026	250
2027 - 2042	250
2043 - 2049	93

(1) As of December 31, 2022.

Most of Ramaco's employees live nearby in McDowell County, West Virginia, and Buchanan and Tazewell Counties, Virginia. 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 Berwind Complex mine's manhours worked, NFDL injuries, and NFDL Incidence Rate for 2018 through the third quarter 2022, 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 Berwind Complex Manhours Worked, NFDL Injuries and NFDL Incidence Rate

				NFDL Incidence Rate	
Manhours Worked	NFDL Injuries			Mine	National
	Employee	Contractor	Total	Total	Average

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Berwind No. 1 Pocahontas 4 Deep Mine					
2022	**94,748**	**2**	**3**	**4.22**	**3.46**
2021	**49,759**	**—**	**2**	**—**	**3.60**
2020	**116,253**	**2**	**—**	**3.44**	**3.21**
2019	**161,031**	**2**	**—**	**2.48**	**3.06**
2018	**81,053**	**1**	**—**	**2.47**	**3.18**
Laurel Fork Deep Mine					
2022	**98,015**	**5**	**1**	**10.20**	**3.46**
2021	**3,400**	**—**	**—**	**—**	**3.60**
2020	**4,368**	**—**	**—**	**—**	**3.21**
2019	**10,552**	**—**	**—**	**—**	**3.06**
2018	**8,096**	**—**	**—**	**—**	**3.18**
Triad No. 2 Deep Mine					
2022	**23,894**	**—**	**—**	**—**	**3.46**
2021	**—**	**—**	**—**	**—**	**3.60**
2020	**—**	**—**	**—**	**—**	**3.21**
2019	**—**	**—**	**—**	**—**	**3.06**
2018	**—**	**—**	**—**	**—**	**3.18**
Triad Pocahontas 4 Deep Mine					
2022	**105,028**	**1**	**—**	**1.90**	**3.46**
2021	**81,791**	**—**	**—**	**—**	**3.60**
2020	**—**	**—**	**—**	**—**	**3.21**
2019	**—**	**—**	**—**	**—**	**3.06**
2018	**—**	**—**	**—**	**—**	**3.18**
Triple S Highwall Mine					
2022	**19,149**	**1**	**—**	**10.44**	**0.65**
2021	**2,308**	**—**	**—**	**—**	**0.64**
2020	**—**	**—**	**—**	**—**	**0.79**
2019	**—**	**—**	**—**	**—**	**0.81**
2018	**—**	**—**	**—**	**—**	**0.80**

The Berwind Complex NFDL Incidence Rates were generally similar to or lower than the national average from 2018 through 2021. For 2022, the Berwind No. 1, Laurel Fork, and the Triple S Highwall mines NFDL Incidence Rates, given Ramaco's low staffing levels, minimal injury counts resulted in high NFDL Incidence Rates, as compared to the national average. In addition to the NFDL injuries, a contractor at the Berwind No. 1 Mine was fatally injured on February 28, 2022.

The Berwind Preparation Plant manhours worked, NFDL injuries, and NFDL Incidence Rate reported to the MSHA for 2018 through third quarter 2022, compared to the national average NFDL Incidence Rate for United States preparation plants are shown in Table 13.4.2-4 as follows:

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

	Manhours Worked	NFDL Injuries		NFDL Incidence Rate	
		Berwind	Contractor	Berwind Plant	National Average
2022	41,036	—	1	—	0.85
2021	200	—	—	—	1.00
2020	—	—	—	—	1.83
2019	1,072	—	—	—	2.08
2018	2,024	—	—	—	1.84

The Berwind Preparation Plant historical NFDL Incidence Rates from 2018 through 2021 are significantly lower than the national average. For 2022, the Berwind Preparation Plant had a zero NFDL Incidence Rate, although a contractor incurred a reportable injury.

13.5 LIFE OF MINE PLAN MAPS

The projected mining areas for the Berwind Complex LOM plans are shown on Figures 13.5-1 through 13.5-4.

Figure 13.5-1 Life of Mine Plan, Berwind No. 1 Pocahontas 4 Deep Mine

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Figure 13.5-2 Life of Mine Plan, Laurel Fork Deep Mine

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Figure 13.5-3 Life of Mine Plan, Triple S Highwall Mine

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Figure 13.5-4 Life of Mine Plan, Triad No. 2 Deep Mine

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14.0 PROCESSING AND RECOVERY METHODS

14.1 BERWIND PREPARATION PLANT PROCESS AND FLOWSHEET

The processing circuits in the Berwind Preparation Plant, after refurbishment, include a heavy media vessel, six twenty-inch heavy media cyclones, classifying cyclones, two banks of 10 compound spirals, and five conventional self-aspirating

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flotation cells. A simplified flowsheet for the Berwind Preparation Plant is shown on Figure 14.1-1. New equipment is shown highlighted in green. Replacement of older components is on-going.

Figure 14.1-1 Simplified Preparation Plant Flowsheet

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14.2 PLANT PROCESSING DESIGN, EQUIPMENT CHARACTERISTICS AND SPECIFICATIONS

The Berwind Preparation Plant was originally built in 1955 and was commissioned in 1957, with plant upgrades in 1975. In 2021 and 2022, Ramaco performed major refurbishing of the plant at a cost of approximately $25 million. The preparation plant now has a design capacity of 600 ROM tons per hour. The plant operates two, 10-hour shifts per day, on a 5 to 6 day week processing schedule as required.

ROM coal from the mines within the Berwind Complex is hauled by over the highway end-dump trucks or directly belted from the mines using overland conveyors to the Berwind Preparation Plant. Ground storage ROM coal capacity at the plant is approximately 50,000 tons. The ROM coal is fed into a rotary breaker by front end loaders. From the rotary breaker, a 36-inch-wide conveyor feeds the ROM coal to one of three silos (one 3,000-ton capacity and two, 2,200 ton-capacity). ROM coal from the silos is fed to the to the preparation plant by belt conveyors.

The plant feed ROM coal material is screened at +4 inch, 1 inch, 3/8 inch, and 3/8 inch x 0. The 4 inch x 3/8 inch ROM coal is processed in a heavy media vessel. The 3/8 inch x 0 material is screened at 28 mesh with the 3/8 inch x 28 mesh material being processed in six heavy media cyclones and the 28 mesh x 0 material reporting to eight raw coal classifying cyclones. From the raw coal classifying cyclones, 28 mesh x 100 mesh material is processed in two banks of 10 triple-start compound spirals. The ultrafine 100 mesh x 0 material is cleaned by way of five 500 cubic foot conventional froth flotation cells.

Clean coal capacity is minimal at this time since the plant was initially designed for a single product. Currently clean coal is stored adjacent to the rail line and loaded into rail cars using front end loaders. Plans are being developed to increase clean coal storage capacity as part of the on-going plant refurbishment. A new flood loading system is scheduled to be implemented in late 2023. Typical unit trains loaded involve approximately 100 cars. The load-out facility is served by the NSn Railroad.

Preparation plant refuse is placed in the adjacent Berwind Refuse Disposal Area, which is an impoundment and coarse refuse disposal area. Coarse refuse is transported to the disposal area by conveyor belt with fine refuse pumped as slurry to the impoundment. This system will be replaced by a plate filter press, which will be in operation the second quarter 2023, for

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combined disposal of course and fine plant refuse. Remaining refuse disposal capacity exceeds capacity requirements for the current LOM plans.

14.3 ENERGY, WATER, PROCESS MATERIALS, AND PERSONNEL REQUIREMENTS

Power is supplied to the plant by AEP. Power is received at a primary voltage of 69,000 volts and fed through a 10,000 KVA substation where voltage is reduced to 12,470 volts. Voltage is further reduced inside the preparation plant, to 480 volts.

Make up water is available from several sources including adjacent stream, underground mine mine pools, and detention ponds. There have been no issues regarding make up water availability.

Magnetite consumption is approximately 0.21 pounds per ROM ton processed. The preparation plant chemicals utilized cost approximately $0.20 per ROM ton processed (excluding magnetite).

The LOM Plan projects a total of 32 employees on average for normal plant operations.

15.0 INFRASTRUCTURE

15.1 ROADS

The primary access road to the Berwind Complex is US Route 460, a four-lane highway, located to the south. From US Route 460, Virginia Route 637 and connecting West Virginia Routes 9 and 11 can be used to access the Berwind Complex to the North.

15.2 RAIL

The NS Railroad provides rail service in the area extending from Amonate, Virginia northward through Berwind, West Virginia and from Swords Creek, Virginia eastward through Richlands, Virginia (see Figure 1.1-1).

15.3 POWER

Electrical power is supplied to the Berwind Complex by AEP. Electrical power is received at the preparation plant at a primary voltage of 69,000 volts and fed through a 10,000 KVA substation where voltage is reduced to 12,470 volts. Voltage is further reduced inside the preparation plant, to 480 volts.

15.4 WATER

Water for mining and coal processing operations is provided by a combination of extraction from abandoned underground mine pools and from settling ponds located on the surface. Mine pool recharge rates are higher than Ramaco water usages.

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Individual mine sites typically use purchased potable water. Potable water at the Berwind mine offices and preparation plant is supplied by Ramaco's wells. This portion of the complex also has its own water treatment facility.

15.5 PIPELINES

There are several oil and natural gas collection lines that service wells within the Berwind Complex. Any construction and earth moving activities in proximity to these lines requires coordination with the oil or natural gas line owner.

15.6 PORT FACILITIES, DAMS, AND REFUSE DISPOSAL

Port Facilities

The surrounding waterways are not navigable for commercial traffic. The closest barge loading area is approximately 70 miles to the north on the Kanawha River, south of Charleston, West Virginia.

Export coal from the Berwind Complex is railed, via the NS Railroad, to the Pier 6 Terminal, owned and operated by Norfolk Southern Corporation, located at Lamberts Point in Norfolk, Virginia.

Dams and Refuse Disposal

There are no structures that are existing or planned to be constructed in such a size or manner that will be subject to the West Virginia Dam Control Act, the Virginia Dam Safety Act, and/or MSHA regulations. 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. The Berwind Complex infrastructure is shown on Figure 15.7-1.

Figure 15.7-1 Infrastructure Map

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16.0 MARKET STUDIES

16.1 MARKETS

The Berwind Complex produces saleable low volatile and mid volatile metallurgical coal. The market for metallurgical coal from the Berwind 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

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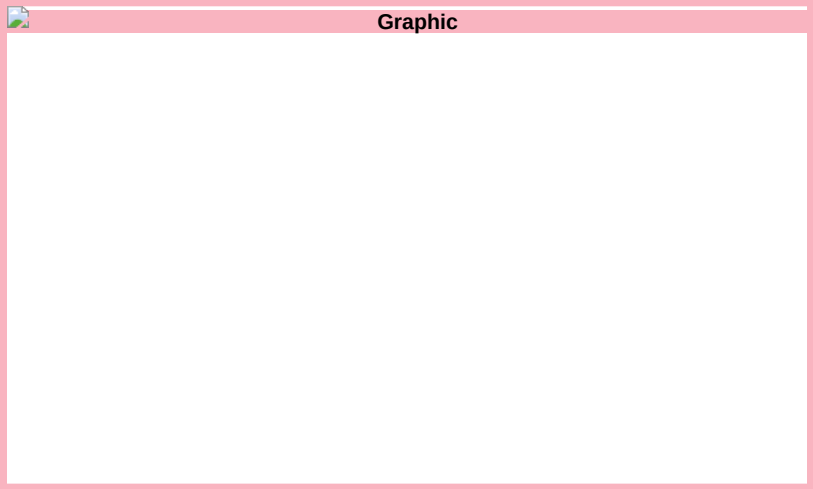
that the EIA data includes all classifications of metallurgical coal (high, mid and low volatile) as well as both spot and contract sales prices. Historical prices for metallurgical coal, as reported by the EIA, are shown on Figure 16.1-1 as follows:

Figure 16.1-1 Metallurgical Coal Sales Prices



Source: EIA Quarterly Coal Report

Between 2016 and third quarter 2022, export prices (FOB port) and domestic coke plant prices (delivered cost) have averaged $145.35 and $132.40 per ton, respectively.

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 mining 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 $196.00 per ton FOB mine.

Coal sales from the Berwind Complex represent approximately 26 percent of Ramaco's 2023 projected coal sales tonnage, with metallurgical coal representing nearly 90 percent of Ramaco's 2023 projected coal sales.

Ramaco has a contract with NS Railroad for coal haulage from the Berwind Complex, which is renewed annually.

16.3 PRICE FORECAST

For purposes of this report, WEIR utilized price forecasts which Ramaco prepared for its Berwind Complex coal sales. Ramaco based its Berwind Complex FOB mine coal sales prices on available FOB Port index forward pricing and Ramaco's estimated adjustments for Berwind Complex coal quality, freight expense, and loading expense. Ramaco's price

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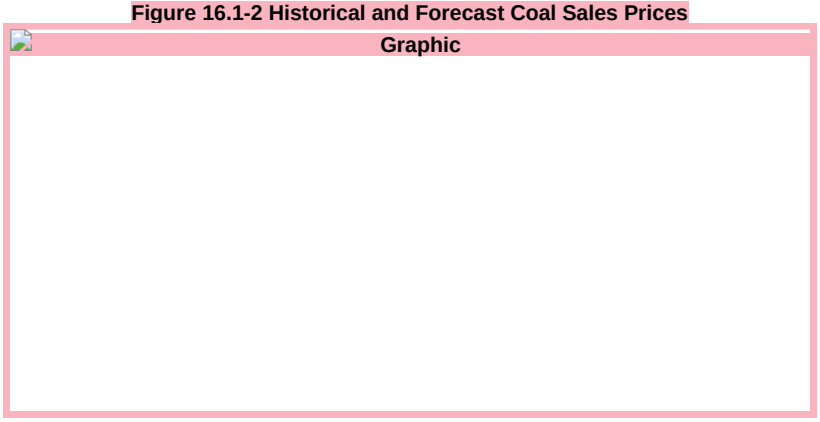
forecasts and adjustments reflect its experience in selling and transporting Berwind Complex saleable metallurgical coal since 2017.

Ramaco's historical (2018 through 2022) and forecast (2023 through 2049) FOB mine coal sales price for the Berwind Complex is shown on Figure 16.1-2.

Figure 16.1-2 Historical and Forecast Coal Sales Prices



Ramaco's forecasted Berwind Complex FOB mine coal sales prices are $168.91 per ton in 2023, $168.90 in 2024, $168.54 in 2025 and thereafter $166.56 to $177.00 per ton through 2049.

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

17.1 ENVIRONMENTAL STUDIES

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As part of the permitting process required by the WVDEP and VDE, 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 and VDE permit application.

Surface Water Baseline Quality, Quantity, and Runoff Analysis

Baseline surface water monitoring for flow and quality parameters was conducted at strategic, WVDEP and VDE approved locations, as applicable, 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, Ramaco proposes that 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 permits.

Probable Hydrologic Consequences

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PHCs were evaluated for each permit application. Subsidence will likely 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 Berwind Refuse Disposal Area (MSHA ID No. 1211WV40737-01) serves the Berwind Preparation Plant. Coarse refuse from the preparation plant is transported to the disposal area by conveyor belt into a refuse bin. The refuse bin loads Caterpillar 773 end dumps, which haul

the coarse refuse the remaining distance to the disposal area. The fine refuse is pumped as slurry to the impoundment. This system will be replaced in the second quarter of 2023 in order to co-dispose of the course and fine refuse. A plate filter press will be operating which will achieve this disposal method. With this methodology of refuse disposal, current refuse capacity significantly exceeds the LOM plan's refuse volumes projected in this TRS. This was readily apparent during WEIR's site visit.

The refuse disposal structure will be constructed in such a size or manner that will be subject to the Virginia Dam Safety Act, and/or MSHA regulations. Stability analyses of the refuse disposal structure show that design of the structure exceeds the minimum safety factors of 1.5 for static stability and 1.2 for dynamic stability that are required by the current 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.

Outside of the Berwind Refuse Disposal Area, no coal, or non-coal related 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.

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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 Berwind Complex. Results of water sampling has shown no significant levels of surface water contamination at the mine sites.

Surface water management for both Ramaco's surface and underground permitted mining areas on the Berwind 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 (CMP) placement for drainages that cross access roads or haulroads, and 6) drainage diversion ditches and collections for excess spoil disposal areas. The underground mine locations have a significantly smaller surface footprint, however, these locations use the same surface water management design considerations as surface mines. Detailed designs for all drainage and sediment control structures are included in Ramaco's permits. Apart from the Berwind Refuse Disposal Area, there are no significant water retention structures subject to the West Virginia Dam Control Act, the Virginia Dam Safety Act, or MSHA regulations, and there are no other permanent impoundments planned at any of the mine permit sites.

All permitted mine sites have a Materials Handling Plan designed to mitigate the potential for acid mine drainage generation regarding 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 is 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.

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Regarding 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. Based on water samples collected from adjacent mining, there is not anticipated to be any acid, alkaline, or iron laden drainage.

All permitted sites have a surface water runoff monitoring plan. Within twenty-four hours of a one-year frequency, twenty-four hour storm event or greater, a permit-wide inspection and report of the drainage systems is completed and submitted to the WVDEP or VDE, as applicable. 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 the Berwind 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 appropriate regulatory authority.

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. A similar filing and approval process is required by the VDE. The Berwind Complex has been issued mining permits and associated NPDES permits by the WVDEP and the VDE as shown in Table 17.3-1 as follows:

Table 17.3-1 Berwind Complex Mining and NPDES Permits

Property Description	Permit Number	State	Permitted Surface Area (Acres)	Issue Date	Current Status	NPDES Permit No.
Amonate Auger No. 1	S-4005-01	WV	50.35	9/6/2001	Active	WV0049751
Amonate No. 31 Mine	U-0209-83	WV	22.00	11/14/1983	Idle	WV0049751
Berwind Preparation Plant and Refuse	O-0150-83	WV	282.41	11/14/1983	Active	WV0049751
Amonate Impoundment	1302370	VA	75.00	4/18/2022	Active	0082251
Berwind Deep Mine No. 1	U-3008-16	WV	34.58	6/26/2017	Active	WV1028952
Berwind Deep Mine No. 1	1202294	VA	—	5/20/2019	Active	0082294

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Berwind Poca 6 Seam Deep Mine	U-5007-21	WV	8.23	4/14/2022	New	WV1028952
Dry Fork Mine	1402369	VA	40.73	4/18/2022	Idle	0082153
Laurel Fork Mine (Harvest Time No. 6)	U-4004-11	WV	7.12	11/20/2012	Active	WV1024281
Laurel Fork Mine (Harvest Time No. 6)	1202367	VA	—	4/12/2022	Active	0082155
Vica Deep Mine (Hiope No. 7)	U-0012-84	WV	11.91	1/17/1984	Idle	WV0021687
Squire Jim Deep Mine No. 1	U-3004-18	WV	8.83	8/31/2020	Idle	WV1029088
Squire Jim Deep Mine No. 2	U-4003-04	WV	7.31	10/17/2005	Idle	WV1021222
Squire Jim Deep Mine No. 2	1202366	VA	—	4/11/2022	Idle	0082154
Squire Jim Deep Mine No. 4	U-4013-08	WV	8.25	12/4/2009	Idle	WV1023837
Triad Pocahontas 4 Prospect	P-3009-21	WV	9.10	9/8/2022	Closed	N/A
Triad Pocahontas 4 Deep Mine	U-5004-19	WV	6.63	3/2/2020	MinedOut	WV1028952
Triad 2 Pocahontas 6 Deep Mine	P-3001-23	WV	5.98	2/16/2023	Active	N/A
Triple S Highwall Mine (Auger II)	S-4004-03	WV	221.53	11/21/2003	Inactive	WV1021141
Vica Deep Mine	U-0011-85	WV	2.34	2/25/1985	Phase 2	WV1005685
Vica Deep Mine (Hiope No. 7)	1202364	VA	—	Pending	Phase 2	0082100
Total			802.30			

A total bond amount of $3.6 million held by Ramaco is based on the mine closure reclamation liability cost estimate as of December 31, 2022. The ARO estimate for all sites within the complex is $4.9 million, as of December 31, 2022. Both the WVDEP and VDE utilize 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 bonding approach, bond amounts, and the ARO estimates that are currently allocated for the Berwind Complex sites appear reasonable.

Upon searching the WVDEP and the VDE violation records, it was found that the Berwind Complex has an excellent environmental compliance record with no significant fines or citations over the last two years.

17.4 LOCAL STAKEHOLDERS

As indicated in Section 13.4.2, Ramaco currently employs 210 personnel at the Berwind Complex and is projected to have maximum employment of approximately 257 personnel during the Berwind Complex LOM Plan. The complex 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 Berwind Complex is located in a rural and fairly isolated area of West Virginia and Virginia. Reportedly, there have been no social or community impact issues relative to the Berwind Complex. The local area supports Ramaco for the jobs that it provides for people in the surrounding communities.

17.5 MINE CLOSURE PLANS

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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 Berwind 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. 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.

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.

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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 are adequate and reasonable in order to obtain approvals necessary relative to the execution of the Berwind Complex LOM plans.

18.0 CAPITAL AND OPERATING COSTS

Ramaco provided historical and projected operating costs and capital expenditures for the Berwind 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 MCM CPAs & Advisors for Ramaco's 10-K reporting to the SEC. The auditing performed by MCM CPAs & Advisors is conducted in accordance with the standards of the Public Company Accounting Oversight Board.

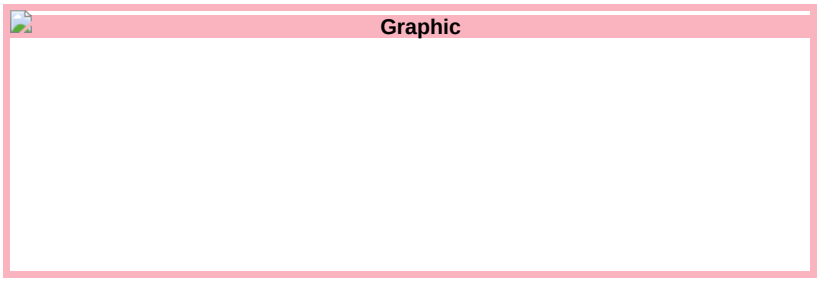
18.1 CAPITAL EXPENDITURES

The Berwind 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 Berwind Complex development costs since 2017 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, and the Berwind Preparation Plant. Actual capital expenditures for 2018 through 2022 and projected capital expenditures, in 2022 dollars, for 2023 through 2048, are shown on Figure 18.1-1:

Figure 18.1-1 Historical and Projected LOM Plan Capital Expenditures



The capital expenditures in 2022 are related to the slope construction and equipment for the Berwind No. 1 Pocahontas 4 Deep Mine, and the Berwind Preparation Plant. The capital expenditures in 2024 are related to the Laurel Fork Pocahontas 3 Deep Mine and the Triad 2 Deep Mine.

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Ramaco began development of the Berwind Complex in 2017 and commenced mining in the fourth quarter 2017. 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 $9.77 per ton for projected mining equipment and infrastructure requirements is $143.66 per ton lower than the historical average cost of $153.43 per ton, which included high development capital from 2018 through 2022 for the Berwind No. 1 Mine and the Berwind Preparation Plant. Capital expenditures per annual ton are estimated to have an accuracy within +/- 15.0 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 Berwind Complex actual and LOM Plan projected operating costs in total dollars and dollars per ton, are shown on Figure 18.2-1:

Figure 18.2-1 Berwind Complex Historical and LOM Plan Operating Costs

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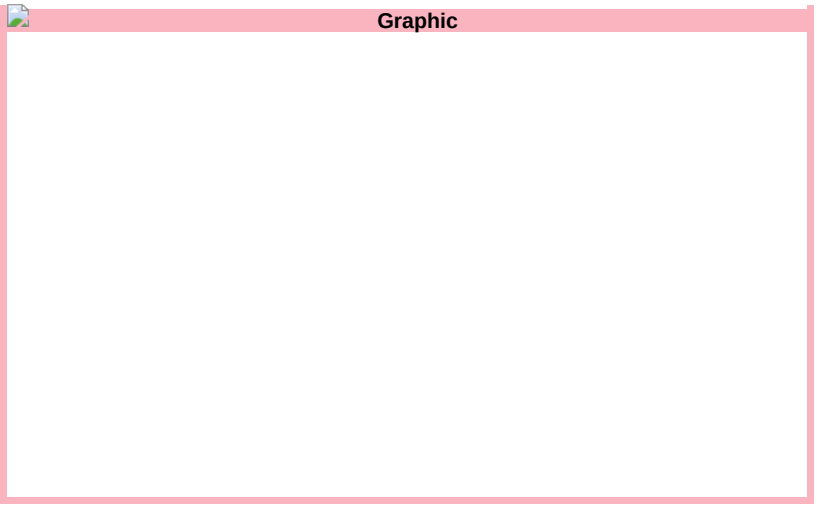

Descriptions or explanations of the operating costs considered in the LOM Plan are as follows:

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 administration.
- Professional services, which are expenses related to legal, engineering, and other firms providing services to the Berwind 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, Virginia and West Virginia Severance Taxes, and Virginia, 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

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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

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Labor costs	28.7	25.6	34.3	37.7	37.7	37.7	37.7	37.7	37.7	37.7	37.7	37.7	37.7	37.7
Maintenance & supplies	36.6	35.7	36.4	38.3	48.5	47.9	44.5	42.4	41.0	41.7	44.5	44.6	46.0	43.3
Utility expenses	2.9	2.6	3.0	3.2	4.3	4.3	4.0	3.8	3.7	3.8	4.0	4.1	4.1	3.9
Trucking costs	8.4	6.9	5.9	5.5	5.2	5.6	5.5	3.7	1.7	1.4	5.5	6.2	6.4	4.2
Contract Mining	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Purchased third-party coal	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Property tax & insurance	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Other costs	0.1	0.5	0.4	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sales related tax costs	16.5	11.2	16.6	20.0	24.3	24.4	22.7	20.2	18.2	18.2	22.6	23.4	23.9	21.0
Administrative costs	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2
Total Cost of Production	95.3	78.1	97.2	106.0	121.0	120.8	115.3	108.8	103.2	103.6	115.2	116.9	119.0	111.0
Asset Retirement obligation	0.3	0.4	0.4	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.7
Depreciation and amortization	13.2	12.8	14.6	8.3	10.2	10.2	9.4	8.5	7.7	7.7	9.4	9.7	9.9	8.8
Total Costs and Expenses	108.8	91.2	112.2	114.6	131.5	131.3	125.1	117.7	111.3	111.8	125.2	127.2	129.5	120.5
Capital Expenditures	19.2	43.5	16.3	21.4	8.1	8.0	7.7	7.6	7.5	7.6	7.7	7.6	7.9	7.6

	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	Total
Labor costs	37.7	37.7	37.7	37.7	37.7	37.7	11.6	11.6	11.6	11.6	11.6	11.6	5.6	804.7
Maintenance & supplies	47.1	44.7	42.8	38.8	23.3	14.0	4.8	5.9	6.1	6.3	6.3	6.1	3.0	840.6
Utility expenses	4.2	4.0	4.0	3.7	2.4	1.6	1.1	1.2	1.2	1.2	1.2	1.2	0.9	79.8
Trucking costs	5.0	5.9	6.7	6.3	6.0	6.1	7.0	8.6	8.9	9.4	9.5	9.1	4.3	164.7
Contract Mining	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Purchased third-party coal	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Property tax & insurance	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	18.7
Other costs	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.1	0.1	0.0	0.4	4.1	0.6	8.4
Sales related tax costs	23.6	23.0	23.0	20.8	14.1	10.4	7.4	9.0	9.3	9.8	9.9	9.5	4.5	457.7
Administrative costs	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	3.4
Total Cost of Production	118.5	116.2	115.0	108.1	84.4	70.6	33.6	37.1	37.9	39.2	39.7	42.4	19.8	2,374.1
Asset Retirement obligation	0.7	0.8	0.9	0.9	0.9	0.2	0.1	0.0	0.0	—	—	—	—	10.8
Depreciation and amortization	9.9	9.6	9.5	8.6	5.8	4.2	2.9	3.5	3.6	3.8	3.8	3.7	1.8	211.1
Total Costs and Expenses	129.1	126.6	125.4	117.6	91.0	74.9	36.5	40.6	41.6	43.0	43.6	46.1	21.5	2,596.1

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Capital Expenditures	7.9	7.7	7.4	6.9	5.0	2.9	2.6	2.7	2.7	2.7	2.7	1.5	—	230.4

The LOM Plan projected cash operating cost of $100.67 per ton is $14.31 per ton lower than the four-year historical average of $114.98 per ton. The historical cash operating cost was higher due to the development costs associated with ramping up from the Pocahontas No. 3 Seam to the Pocahontas No. 4 Seam at the Berwind No. 1 Mine. 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 Berwind Complex has been in operation since 2017 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 Berwind Complex LOM Plan, capital expenditures 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 Berwind Complex LOM Plan. Specifically, plans were evaluated using discounted cash flow analysis, which consists of annual revenue projections for the Berwind 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

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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 2022 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 Berwind 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 incorporates 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 Berwind Complex at a 10 percent discount rate. As the Berwind 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 forecasts used to estimate Berwind Complex revenue are depicted on Figure 19.1-1 and in Table 19.2-1 as follows:

Figure 19.1-1 FOB Mine Coal Sales Price Forecast

Graphic

Table 19.2-1 Annual Cash Flow Forecast Detail

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Revenue	138.2	101.3	157.4	176.6	223.0	222.1	205.1	187.7	174.4	175.8	204.5	210.2	213.9	193.9
Total Costs and Expenses	95.3	78.1	97.2	106.0	121.0	120.8	115.3	108.8	103.2	103.6	115.2	116.9	119.0	111.0

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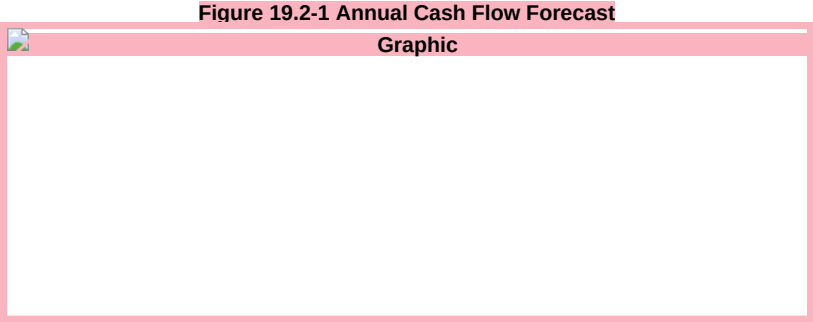
Income before taxes	29.9	10.4	45.5	62.0	91.5	90.8	80.0	69.9	63.1	63.9	79.3	83.0	84.4	73.4
Income tax expense	6.3	2.2	9.6	13.0	19.2	19.1	16.8	14.7	13.2	13.4	16.7	17.4	17.7	15.4
Net income	23.6	8.2	36.0	49.0	72.3	71.7	63.2	55.2	49.8	50.5	62.6	65.6	66.7	58.0
Adjusted EBITDA	36.6	21.0	50.6	57.7	82.8	82.2	73.0	64.2	58.0	58.7	72.6	75.9	77.2	67.4
Capital Expenditures	19.2	43.5	16.3	21.4	8.1	8.0	7.7	7.6	7.5	7.6	7.7	7.6	7.9	7.6
Total Cash Flow	17.4	(22.5)	34.3	36.3	74.6	74.2	65.3	56.6	50.5	51.1	64.9	68.3	69.3	59.8

	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	Total
Revenue	216.8	207.6	204.2	184.0	118.2	81.1	47.8	58.4	60.7	64.0	64.5	61.9	29.4	3,982.6
Total Costs and Expenses	118.5	116.2	115.0	108.1	84.4	70.6	33.6	37.1	37.9	39.2	39.7	42.4	19.8	2,374.1
Income before taxes	87.7	80.9	78.8	66.4	27.1	6.2	11.3	17.8	19.1	21.1	20.9	15.8	7.9	1,387.8
Income tax expense	18.4	17.0	16.5	13.9	5.7	1.3	2.4	3.7	4.0	4.4	4.4	3.3	1.7	291.4
Net income	69.3	63.9	62.2	52.5	21.4	4.9	8.9	14.1	15.1	16.6	16.5	12.5	6.3	1,096.3
Adjusted EBITDA	79.9	74.3	72.6	62.0	28.1	9.2	11.9	17.6	18.8	20.5	20.4	16.1	8.0	1,317.1
Capital Expenditures	7.9	7.7	7.4	6.9	5.0	2.9	2.6	2.7	2.7	2.7	2.7	1.5	—	230.4
Total Cash Flow	72.0	66.6	65.2	55.0	23.1	6.3	9.3	14.9	16.1	17.8	17.7	14.7	8.0	1,086.7

19.2 ECONOMIC ANALYSIS AND ANNUAL CASH FLOW FORECAST

Annual cash flows for the Berwind Complex LOM Plan are summarized on Figure 19.2-1 as follows:

Figure 19.2-1 Annual Cash Flow Forecast



Cash flows decline after 2040, as a result of a projected decrease in coal sales realizations. While not included in these cash flows, Ramaco plans to commence other mining operations within the Berwind 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 Berwind Complex, updates will be made to this analysis.

The Berwind Complex LOM Plan has an after-tax NPV of $405.7 million, at a base case discount rate of 10 percent (Table 19.2-2). As the Berwind Complex is ongoing with no initial investment required (i.e., already sunk cost), the IRR is infinite.

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Cumulative (undiscounted) cash flow over the LOM Plan is positive, at $1,086.7 million. The Return on Investment (ROI), at a 10 percent discount rate, is 217 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 ($Million)	405.7
IRR (%)	Infinite
Cumulative Cash Flow ($Million)	1,086.7
Return on Investment (%)	217

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 $100.67 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)	50,717
Clean Tons Produced (000s)	23,607
Preparation Plant Yield (%)	46.5
Tons Sold (000s)	23,584
	($ Per Ton)
Coal Sales Realization	168.87
Direct Cash Costs	100.67
Non-cash Costs	9.41
Total Cost of Sales	110.08
Profit / (Loss)	58.79
EBITDA	68.26
CAPEX	9.77

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

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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 99 percent between 2018 and 2022
- Production - Variability in production of up to 119 percent from the 2019 through 2020
- Operating Cost - Estimated accuracy of +/- 15 percent
- Capital Costs - Estimated accuracy of +/- 15 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

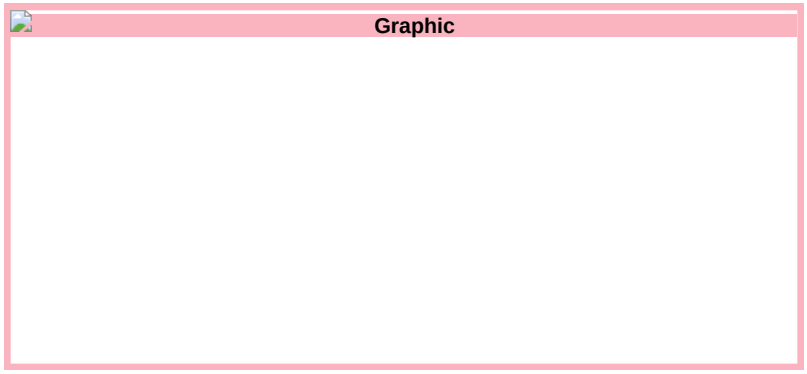

Figure 19.3-1 shows that the Berwind Complex NPV is most sensitive to changes in coal sales prices followed closely by sensitivity to changes in production and operating costs. It is less sensitive to changes in the discount rate and capital expenditures.

20.0 ADJACENT PROPERTIES

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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 Berwind Complex, with extensive exploration data including drillholes, in-mine seam thickness and elevation measurements, and

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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 629.0 million in-place tons of Measured and Indicated coal resources, exclusive of reserves, and 23.6 million clean recoverable tons of mineable reserves within the Berwind Complex, as of December 31, 2022. Reasonable prospects for economic extraction were established through the development of a Preliminary Feasibility Study relative to the Berwind 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 Berwind 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 Berwind 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 Berwind Complex Risk Assessment Summary

WEIR Risk

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Area of 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 to Moderate	Although methane gas is present in the seams, gas liberation experienced to date has been low to moderate, 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 with its 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 Norton and Pocahontas Formations that primarily consists of competent sandstones and shales help decrease this risk at the Berwind 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 to Moderate	The structure of the seams at the Berwind Complex all have a relatively gentle dip of approximately two degrees to the northwest or to the south/southwest. There are seven significant faults in the area. There are no known structural anomalies such as sand channels that cut out seams.

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Spontaneous Combustion	Low	Seams at the Berwind 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 Berwind 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, Japan, Korea, and India are likely to be primary drivers for the metallurgical coal industry.

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 Berwind 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 LOM 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

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References used in preparation of this TRS are as follows:

- Ramaco, 2022. Berwind Poca4 CTPF Mine Plan 2022 – Standard
- Ramaco, 2022, Laurel Fork Mine Plan 2023 - Standard
- Ramaco, 2022. Triad 2 Mine Plan 2023 - Standard
- Ramaco, 2022. Triple S Highwall Mine Plan 2023 – Standard
- Marshall Miller & Associates, Inc., 2021, Coronado Global Resources Inc. and Coronado Group LLC (together *"Coronado"*), Statement of Coal Resources and Reserves for the *Amonate* Division in Accordance with the JORC Code and United States SEC Standards as of December 31, 2020
- Harlow, George E., Jr. and LeCain, Gary D., 1993, Hydraulic Characteristics of, and Ground-Water Flow in, Coal-Bearing Rocks of Southwestern Virginia: U. S. Geological Survey Water-Supply Paper *2388.*

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**
- VDE Permits; Mined Land Repurposing Internet (virginia.gov)

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

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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 - EXHIBITS

Exhibit 6.3-2 **Berwind Complex, Geological Cross Sections**

Graphic

Exhibit 96.2

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Notice

Weir International, Inc. (WEIR) was retained by Ramaco Resources, Inc. (Ramaco) to prepare this Technical Report Summary (TRS) related to Ramaco's Knox Creek Complex. This report provides a statement of Ramaco's coal reserves and resources at its Knox 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, 2022.

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 Knox Creek Complex coal reserve and resource estimates as of December 31, 2022.

Qualified Person:	/s/ Weir International, Inc.
Date:	March 9, 2023
Address:	Weir International, Inc. 1431 Opus Place, Suite 210 Downers Grove, Illinois 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 Knox 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 Knox Creek Complex consists of two general properties or areas as shown below and in Figure 1.1-1, General Location Map:

- Big Creek Property
- Knox Creek Property

The Knox Creek Complex is located approximately 80 miles south of Charleston, West Virginia; 100 miles west of Roanoke, Virginia; 60 miles northeast of Kingsport, Tennessee; and 160 miles east/southeast of Lexington, Kentucky in the vicinity of 37.16 degrees North Latitude and 81.87 degrees West Longitude on the World Geodetic System (WGS 84) reference

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coordinate system. The complex includes areas in Buchanan, Russell and Tazewell Counties, Virginia and McDowell County, West Virginia. The Knox Creek Complex is within the Southwest Virginia and Southern West Virginia coal fields of the Central Appalachia Coal Producing (CAPP) Region of the United States.

The Knox Creek Complex consists of approximately 74,400 acres of owned and leased coal holdings. Within the Knox Creek Complex controlled coal holdings, 9,250 acres lie in McDowell County, West Virginia. There are no active or planned West Virginia mines currently within the Knox Creek Complex. The remaining 65,150 acres lie in Buchanan, Tazewell, and Russell Counties, Virginia. Currently, there are two active mines and two planned and permitted mines within the complex.

Active Mines:

- Big Creek Jawbone No. 1 Deep Mine
- Big Creek Surface and Highwall Mine

Planned and Permitted Mines:

- Knox Creek Tiller Deep Mine
- Kennedy No. 3 Deep Mine

The Knox Creek Tiller Deep Mine has been idle since 2019. The mine was originally planned to re-start in 2023, however, restarting mining operations has been further delayed into 2024. The Knox Creek Kennedy No. 3 Deep Mine was originally in the 2023 budget, but has also been delayed into 2025.

Technical Report Summary
Knox Creek Complex
Prepared for Ramaco Resources, Inc.
Graphic

Figure 1.1-1 General Location Map

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1.2 GEOLOGICAL SETTING AND MINERALIZATION

The upper coal seams of interest within the Knox Creek Complex belong to the Norton Formation in Virginia of Early Pennsylvanian Age, which is stratigraphically equivalent to the Lower Kanawha and New River formations in southwestern West Virginia. The lower coal seams of interest belong to the Pocahontas Formation of the Pottsville Group (Lower Pennsylvanian). The depositional setting for these seams is complex and thought to be upper delta plain, with subsidence

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controlling the sedimentation rate. The Lower Pennsylvania (Pottsville) sedimentary strata of the coal-bearing rocks of the Pocahontas Formation rest uncomformably on the Mississippian Bluestone Formation of the Mauch Chunk Group.

1.3 EXPLORATION

Drilling has served as the primary form of exploration within the Knox Creek Complex. In addition to coal-specific exploration drillholes, data from degasification, coal bed methane, and water wells were also implemented to build the geological model. This model was built using a total of 4,188 exploration drillholes and covers the Knox Creek Complex as well as Ramaco's nearby Berwind Complex. Approximately 2,288 of these drillholes can be allocated to the Knox Creek Complex.

In addition to exploration drillholes, coal seam outcrop measurements, in-mine measurements, and survey points taken from mine maps of previous operations were considered. A total of 194 seam outcrop measurements, 356 mine measurements, and 887 survey points were used in the geological model as a supplement to the exploration drillholes.

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 are acceptable and that these 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 initial leases in 2011. 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 Knox Creek Complex that can be relied upon to accurately estimate coal resources and reserves.

1.4 DEVELOPMENT AND OPERATIONS

The Knox Creek Complex currently has two active mines, and two planned and permitted mines. The two active mines include one surface mine with a highwall miner, and one underground room and pillar mine, which uses continuous miners (CMs) for coal production. Ramaco began production of metallurgical coal at the complex in 2019. The underground mines will implement retreat mining, which typically results in mining recovery of 50 to 80 percent. At the surface mine, contour mining has an average mining recovery of approximately 90 percent, and highwall mining has an average mining recovery of approximately 40 percent.

The Knox Creek Complex is currently mining two seams. Big Creek Jawbone No. 1 Deep Mine is mining the Jawbone 1 seam. The Big Creek Surface and Highwall Mine is mining the Tiller Seam, with some small tonnage of Jawbone 3 Seam being available as well.

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Historical coal production from the Knox Creek Complex, in accordance with the Mine Safety and Health Administration (MSHA) statistics, is summarized in Table 1.4-1 as follows:

Table 1.4-1 Knox Creek Complex Historical Production

Year	Clean Tons Produced (000)
2018	-
2019	1,479
2020	-
2021	45,332
2022	234,710

The current Knox Creek Complex Life-of-Mine (LOM) Plan projects mining through 2037, an expected mine life for the complex of 15 years. It is anticipated that 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. This statement is based on the large amount of coal resources that are within the complex.

All Run-of-Mine (ROM) coal is washed at the Knox Creek Preparation Plant. The Knox Creek Preparation Plant, built in 1981 by Powell Construction Company located in Johnson City, Tennessee, is a well designed and constructed preparation plant, with ROM processing capacity of 750 tons per hour.

The Knox Creek Complex produces high quality, mid and high volatile metallurgical coal. Historically, the market for metallurgical coal from the Knox Creek Complex has included both domestic metallurgical coal consumers and the global seaborne metallurgical coal market. The Knox Creek Complex also sporadically produces a minimal quantity of thermal coal from the surface mine from oxidized zones.

1.5 MINERAL RESERVE AND RESOURCE ESTIMATE

The Knox Creek Complex coal resources, as of December 31, 2022, 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, 2022

Mine Area / Seam	Area (Acres)	Average Coal Thickness (Feet)	In-Place Resources (000 Tons)				Coal Quality (Dry Basis) Raw	
			Measured	Indicated	Total	Inferred	Ash (%)	Relative Density (Lbs/CF)
Big Creek								

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Red Ash 3	1,275	2.04	5,025	—	5,025	—	17.0	88.61
Red Ash 2	1,420	2.75	7,495	—	7,495	—	4.5	87.98
Jawbone 3	1,400	2.27	6,445	—	6,445	—	24.0	92.98
Jawbone 1	2,210	2.99	13,536	—	13,536	—	12.2	94.38
Tiller 1-2	495	2.67	2,520	—	2,520	—	21.7	87.36
	6,800	2.59	35,021		35,021		14.1	91.42
Knox Creek								
Upper Banner 2	450	2.27	2,060	—	2,060	—	17.0	88.61
Kennedy 2	1,765	2.72	8,780	—	8,780	—	13.2	86.28
Red Ash 2	12,485	2.65	59,450	35	59,485	—	4.7	82.41
Jawbone 3	8,420	3.13	50,260	—	50,260	—	15.1	87.43
Jawbone 1	15,025	3.21	93,500	150	93,650	—	13.6	89.46
Upper Seaboard 2	450	2.72	2,340	—	2,340	—	17.0	88.61
Greasy Creek 2	290	4.29	2,640	—	2,640	—	43.0	97.93
Lower Seaboard 2	760	2.75	4,470	—	4,470	—	30.9	98.19
Pocahontas 11	770	4.72	7,010	—	7,010	—	17.0	88.61
Lower Horsepen 1	1,425	2.89	7,965	—	7,965	—	17.0	88.61
Pocahontas 9-2	2,030	2.8	8,240	2,750	10,990	—	17.0	88.61
Pocahontas 4	1,605	2.97	8,300	3,830	12,130	—	26.6	94.90
Pocahontas 3	710	2.77	3,780	—	3,780	—	17.0	88.61
	46,185	2.99	258,795	6,765	265,560		13.5	87.76
Knox Creek Complex - Total	52,985	2.94	293,816	6,765	300,581		13.6	88.23

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 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, producing primarily metallurgical mid and high volatile coal product realizing an average sales price of $183.50 per ton at a cash cost of $98.68 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 Knox 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.

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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, 2022

							Coal Quality (Dry Basis)	
							Raw	
			Average Coal	Clean Recoverable Tons (000)				
	Product	Area	Thickness	Reserves			Ash	Relative Density
Area / Mine / Seam	Quality	(Acres)	(Feet)	Proven	Probable	Total	(%)	(Lbs/CF)
Knox Creek								
Kennedy No. 3 Deep Mine								
Kennedy 2	Hi Vol	336	3.23	720	—	720	13.60	86.48
Knox Creek Tiller Deep Mine								
Jawbone 3	Hi Vol	1,546	3.44	6,362	—	6,362	16.10	88.05
		1,882	3.40	7,082		7,082	15.85	87.89
Big Creek								
Surface and Highwall Mine								
Jawbone 1	Mid Vol	20	1.27	30	—	30	18.4	89.50
Tiller 2-2 and 1-2	Mid Vol	175	2.61	318	—	318	19.1	89.75
Jawbone Deep Mine								
Jawbone 1	Mid Vol	383	3.40	586	—	586	30.6	97.38
		578	3.09	934		934	26.3	94.53
Knox Creek Complex Grand Total		2,460	3.33	8,016		8,016	17.06	88.66

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 mid and high volatile metallurgical coal product at an average sales price of $183.50 per ton and cash cost of $98.68 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 Knox Creek Complex LOM Plan. Specifically, plans were evaluated using discounted cash flow analysis, incorporating annual revenue projections for the Knox 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 2022 United States dollars. WEIR's study was

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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 Knox 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 $249.0 million for the Knox 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)	17,451
Clean Tons Produced (000s)	8,016
Preparation Plant Yield (%)	45.9
Tons Sold (000s)	8,016
	($ Per Ton)
Coal Sales Realization	183.50
Direct Cash Costs	98.68
Non-cash Costs	8.08
Total Cost of Sales	106.76
Profit / (Loss)	76.74
EBITDA	84.82
CAPEX	12.20

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 Knox Creek Complex NPV is most sensitive to changes in coal sales prices and operating costs. 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

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As part of the permitting process required by the Virginia Department of Energy (VDE) and 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. Similar filings are required in Virginia through the VDE. The Knox Creek Complex has been issued mining permits and associated NPDES permits by the WVDEP and the VDE as shown in Table 1.7.-1 as follows:

Table 1.7-1 Knox Creek Complex Mining and NPDES Permits

Property Description	State Permit Number	State	Permitted Surface Area (Acres)	Issue Date	Current Status	NPDES Permit No.
Big Creek Surface Mine	1102335	VA	447.63	1/22/2020	Active	0082335
Big Creek Jawbone 1 Deep Mine	1402231	VA	42.61	5/22/2017	Active	0082231
Knox Creek Tiller No. 1 Deep Mine	1202204	VA	20.57	2/15/2017	TmpIdle	0082204
Kennedy No. 3 Surface Mine	1402215	VA	106.18	4/3/2017	NonProdActive	0082215
Kennedy No. 3 Deep Mine	1702202	VA	75.95	2/14/2017	Idle	0082202
Knox Creek Preparation Plant	1302184	VA	41.94	12/2/2017	Active	0082184
Knox Creek Refuse Disposal Area	1302232	VA	322.71	11/23/2018	Active	0082232
Mudlick Surface Mine	1102334	VA	26.25	7/7/2020	Idle	0082234
Total			1,083.84			

As of December 31, 2022, Ramaco estimated a reclamation liability of $9.2 million for its disturbed permit acreage, which is covered with a total bond amount of $12.2 million.

Ramaco currently employs approximately 107 personnel at the Knox Creek Complex and is projected to have maximum employment of 275 personnel through its Knox Creek Complex LOM Plan. The Knox Creek Complex also creates

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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 and VDE are typical of similar citations issued to other operators in southern West Virginia and Southwestern Virginia. 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 Knox 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 successfully obtained mineral control for approximately 98 percent of all existing and planned mines included in the Knox Creek Complex LOM plan. There are no uncontrolled areas that materially affect any of the LOM plans.

The coal resource and coal reserve estimates and supporting Preliminary Feasibility Study were prepared in accordance with Regulation S-K 1300 requirements. There are 300.6 million in-place tons of measured and indicated coal resources, exclusive of reserves, and 8.0 million clean recoverable tons of underground mineable reserves within the Knox Creek Complex, as of December 31, 2022. Reasonable prospects for economic extraction were established through the development of a Preliminary Feasibility Study relative to the Knox 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.

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WEIR assessed that the risks associated with the economic mineability of the Knox 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 Knox Creek Complex coal holdings.

The Knox Creek Complex is located north of the town of Richlands, Virginia 80 miles south of Charleston, West Virginia; 100 miles west of Roanoke, Virginia; 60 miles northeast of Kingsport, Tennessee; and 160 miles east/southeast of Lexington, Kentucky. The Knox Creek Complex is located in McDowell County, West Virginia, and Buchanan, Russell, and Tazewell Counties, Virginia (see Figure 1.1-1).

2.2 TERMS OF REFERENCE AND PURPOSE

This TRS was prepared specifically for Ramaco's Knox Creek Complex. The reserves and resources at the Knox Creek Complex have been classified in accordance with SEC mining property disclosure rules under Subpart 1300 and Item 601

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(96)(B)(iii) of Regulation S-K. Unless otherwise stated, all volumes, qualities, 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.

For the Knox 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 Knox 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,

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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 30, 2021.
- Interviews between WEIR personnel and Ramaco personnel including:
  - Ø Senior V.P., General Counsel and Secretary
  - Ø Director of Financial Reporting and Accounting
  - Ø Chief Operating Officer
  - Ø Contract Geologist
  - Ø V.P. of Safety
  - Ø V.P. of Surface Mining Operations
  - Ø V.P. of Underground Mining Operations
  - Ø 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 and VDE.
- Current and projected mine plans, including production, productivity, operating costs, and capital expenditures required to sustain projected levels of production for the Knox 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

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WEIR personnel visited the Knox Creek Complex on November 30, 2021 and conducted a secondary meeting with management at the Berwind No. 1 Deep Mine Office on January 27, 2023. 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 Knox Creek Complex included the following:

- Mine surface operations including office, maintenance, and warehouse facilities
- Knox Creek Preparation Plant, stockpiles, and rail loadout facilities
- Mine operations
  - Ø Big Creek Surface and Highwall Mine
- Knox Creek Refuse Disposal Facilities

Based on WEIR's inspection of the Knox Creek Complex, the mines, preparation plant, and associated infrastructure 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 Knox Creek Complex. The Knox Creek mines and facilities were previously included in the Berwind Complex TRS which reported mineral reserves and resources as of December 31, 2021. Ramaco has decided to separate the Knox Creek Complex from the Berwind Complex as the operations within the Berwind Complex no longer use the Knox Creek Preparation Plant facilities as a result of Ramaco's late 2021 acquisition of the Amonate property which includes its own preparation plant which now

services the Berwind Complex. Ramaco decided that the large tonnage of resources available at the Knox Creek Complex, along with the Knox Creek Preparation Plant and refuse disposal establish this complex as an independent material property.

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3.0 PROPERTY DESCRIPTION

3.1 PROPERTY LOCATION

The Knox Creek Complex consists of two separate properties as follows:

- Knox Creek Property
- Big Creek Property

The town of Richlands, Virginia is located approximately just south of the Knox Creek Complex. The Knox Creek Complex is generally located approximately 80 miles south of Charleston, West Virginia; 100 miles west of Roanoke, Virginia; 60 miles northeast of Kingsport, Tennessee; and 160 miles east/southeast of Lexington, Kentucky at 337.16 degrees North Latitude and 81.87 degrees West Longitude on the WGS 84 reference coordinate system. The comprised properties are fairly remote containing scattered rural residences and some small towns.

The Knox Creek Complex is within the Southern West Virginia and Southwest Virginia Coal Fields of the CAPP Region of the United States (see Figure 1.1-1). The USGS 7.5-minute quadrangle map sheets are Patterson, Keen Mountain, Honaker, Bradshaw, Jewell Ridge, Richlands, and Amonate.

3.2 PROPERTY AREA

Details of each Knox Creek Complex property are as follows:

Knox Creek Property
The Knox Creek Property covers approximately 56,600 acres of owned and leased coal holdings in McDowell County, West Virginia, and Buchanan, Tazewell, and Russell Counties, Virginia. The areas are shown in Figure 1.1-1. The original Knox Creek Property was obtained by Ramaco in 2016. Ramaco started mining coal on the property in 2019. The Knox Creek Jewell Property was acquired subsequently. The Knox Creek Jewell Property does not currently contain active or planned mines. However, it does have material coal resources.

The Knox Creek Property includes the Knox Creek Preparation Plant, which currently processes coal from both the Knox Creek and Big Creek Properties. The Jamison Creek Refuse

Technical Report Summary
Knox Creek Complex
Prepared for Ramaco Resources, Inc.
Graphic

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Disposal Area, which services the Knox Creek Preparation Plant, is located on the property adjacent to and just northeast of the plant. The property also includes the currently idle Knox Creek Tiller Deep Mine which is currently in the Jawbone 3 Seam. The Knox Creek Tiller Deep Mine is planned to restart at a yet to be determined date.

Ramaco owns approximately 976 acres (1.7 percent) of mineral rights on the overall Knox Creek Property. All other mineral rights are leased. Ramaco also owns surface rights to 1,026 acres on the property, which includes the Knox Creek Preparation Plant. Ramaco holds surface leases to approximately 21,994 acres (39 percent of total at the Knox Creek Property), which includes the Jamison Creek Refuse Disposal Area that is adjacent to, and northeast of, the Knox Creek Preparation Plant.

Ramaco's Knox Creek Property coal holdings covers a very large area that has large amounts resources in many different seams (see Section 11). However, current mine plans and permits on the property are currently limited to the Knox Creek Tiller Deep Mine and the Kennedy No. 3 Deep Mine.

Big Creek Property

The Big Creek Property covers an area of approximately 17,800 acres of leased coal holdings in Buchanan and Tazewell counties, Virginia. Ramaco obtained leases for the Big Creek Property in late 2019 and commenced surface mining activities in 2021.

The Big Creek Property includes Ramaco's Big Creek Surface and Highwall Mine which is a currently active multi-seam surface mine with associated highwall mining operations. The northern portion of the permit is a contour mining operation in the Tiller Seam with subsequent highwall mining. The southern portion of the permit involves surface area mining with the Tiller Seam as a base. Over the permit area, small amounts of the above Jawbone Seam that are mineable are also recovered. In the future, the Red Ash Seam may be contour and highwall mined on the far north side of the permitted area. The Red Ash Seam mining prospects are still being evaluated.

The Big Creek Property also includes the active Big Creek Jawbone 1 Deep Mine in the Jawbone No. 1 Seam just to the north of the current Big Creek Surface and Highwall Mine. The Big Creek Jawbone 1 Deep Mine started producing coal mid-2022.

3.3 PROPERTY CONTROL

The Big Creek Property consists of leases from White Wolf Energy and Omega Highwall Mining LLC that were secured in late 2019. The Knox Creek Property is primarily comprised of numerous deeds and leases from both private individuals and other business entities.

Over the Knox Creek Complex extents, leases typically apply to specific seams, or a vertical range of seams. Therefore, the seams involved often vary from lease to lease for specific areas across the complex. Table 3.3-1 below shows the various property control contracts.

Table 3.3-1 Knox Creek Complex Property Control

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Area	Document Type	Quantity
Big Creek	Coal Leases	2
Knox Creek	Agreements	2
	Assignments	37
	Coal Leases/Coal Subleases	72
	Deeds	113
	Easements	11
	Guarantees	1
	License	1
	Options	1

3.4 MINERAL CONTROL

The Knox Creek Complex mineral control is detailed in Table 3.4-1 below:

Table 3.4-1 Knox Creek Complex Mineral Control

Area	File Number	Document Type	Seams	Expiration Date (1)
Big Creek	25	Coal Lease		9/19/2026 Extensions of 5 years until all coal exhausted
	26	Coal Lease		02/28/2026 Extensions of 5 year until all coal exhausted
Knox Creek	1A	Coal Deed	Unknown	NA
	2	Deed of Lease	Jawbone	20 year term, extensions of 20 years until all coal exhausted
	3	Coal Lease		30 year term, extensions of 20 years until all coal exhausted
	4	Coal Lease	Raven, Tiller and Lower Seaboard	2 year term, extensions of 50 years until all coal exhausted
	5 through 64	Coal Deeds	Unknown	NA
	65	Coal Lease	Tiller and Above	1 year terms until all coal exhausted
	66	Coal Lease	Tiller and Above	1 year terms until all coal exhausted
	67	Coal Lease	Tiller and Above	1 year terms until all coal exhausted
	68	Coal Lease	Tiller and Above	1 year terms until all coal exhausted
	69	Coal Lease	Tiller and Above	10 year terms until all coal exhausted
	70	Coal Lease	Tiller and Above	10 year terms until all coal exhausted
	72	Coal Lease	Tiller and Above	5 year terms until all coal exhausted
	73	Coal Lease	Red Ash	1 year terms until all coal exhausted
	74	Coal Lease	Jawbone, Red Ash and Kennedy	4 year terms until all coal exhausted
	75	Coal Lease	Tiller and Above	1 year terms until all coal exhausted
	76	Coal Lease	Kennedy and Above	1 year terms until all coal exhausted
	79	Coal Lease	Tiller and Above	10 year terms until all coal exhausted
	80	Coal Lease	Tiller and Above	5 year terms until all coal exhausted
	81	Coal Lease	Tiller and Above	5 year terms until all coal exhausted
	82	Coal Lease	Tiller and Above	5 year terms until all coal exhausted

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83	Coal Lease	Tiller and Above	5 year terms until all coal exhausted
84	Coal Lease	Tiller and Above	5 year terms shall not exceed 20 years
85	Coal Lease	Tiller and Above	5 year terms shall not exceed 20 years
86	Coal Lease	Tiller and Above	5 year terms shall not exceed 20 years
87	Coal Lease	Tiller and Above	5 year terms shall not exceed 20 years
88	Coal Lease	Tiller and Above	5 year terms shall not exceed 20 years
89	Coal Lease	Tiller and Above	5 year terms shall not exceed 20 years
90	Coal Lease	Tiller and Above	5 year terms until all coal exhausted
91	Coal Lease	Tiller and Above	5 year terms until all coal exhausted
92	Coal Lease	Tiller and Above	5 year terms until all coal exhausted
93	Coal Deed	Unknown	NA
94	Coal Lease	Tiller and Above	5 year terms until all coal exhausted
95	Coal Lease	Tiller and Above	5 year terms until all coal exhausted
96	Coal Lease	Tiller and Above	5 year terms until all coal exhausted
97	Coal Lease	Tiller and Above	5 year terms until all coal exhausted
99	Coal Lease	Jawbone and Tiller	5 year terms until all coal exhausted
100	Coal Lease	Jawbone and Tiller	5 year terms until all coal exhausted
101	Coal Lease	Jawbone and Tiller	5 year terms until all coal exhausted
102	Coal Lease	Jawbone and Tiller	5 year terms until all coal exhausted
103	Coal Lease	Jawbone and Tiller	5 year terms until all coal exhausted
104	Coal Lease	Jawbone and Tiller	5 year terms until all coal exhausted
105	Coal Lease	Jawbone and Tiller	1 year terms until all coal exhausted
106	Coal Sublease	Jawbone and Tiller	20 year term
109 through 117	Coal Lease	Right to surface mine	Until all surface mineable coal has been removed
122	Coal Lease	All coal above drainage	5 year terms, up to 20 times
124	Coal Lease	Tiller	5 year terms, up to 20 times
127	Coal Sublease	Lower Spit of Banner	1 year terms until all coal exhausted
128	Coal Sublease	Unknown	Terminates with 30 day notice from either party
130	Coal Deed	Unknown	NA
138	Coal Sublease	Kennedy	Until all mineable coal has been removed
139	Coal Sublease	Banner	Until all mineable coal has been removed
140	Coal Sublease	Kennedy	Until all mineable coal has been removed
141	Coal Sublease	Upper and Lower Banner	Until all mineable coal has been removed
143	Coal Deed	Unknown	NA
164	Coal Sublease	Banner	Until all mineable coal has been removed
178 through 225	Coal Deeds	Unknown	NA

3.5 SIGNIFICANT PROPERTY ENCUMBRANCES AND PERMIT STATUS

WEIR is not aware of any significant encumbrances for any of the tracts within the Knox Creek Complex.

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A list of Ramaco's permits for the Knox 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 Status

Property Description	State Permit Number	State	Permitted Surface Area (Acres)	Issue Date	Current Status	NPDES Permit No.
Big Creek Surface Mine	1102335	VA	447.63	1/22/2020	Active	0082335
Big Creek Jawbone 1 Deep Mine	1402231	VA	42.61	5/22/2017	Active	0082231
Knox Creek Tiller No. 1 Deep Mine	1202204	VA	20.57	2/15/2017	TmpIdle	0082204
Kennedy No. 3 Surface Mine	1402215	VA	106.18	4/3/2017	NonProdActive	0082215
Kennedy No. 3 Deep Mine	1702202	VA	75.95	2/14/2017	Idle	0082202
Knox Creek Preparation Plant	1302184	VA	41.94	12/2/2017	Active	0082184
Knox Creek Refuse Disposal Area	1302232	VA	322.71	11/23/2018	Active	0082232
Mudlick Surface Mine	1102334	VA	26.25	7/7/2020	Idle	0082234
Total			1,083.84			

3.6 SIGNIFICANT PROPERTY FACTORS AND RISKS

Given Ramaco's controlled interests at the Knox Creek Complex, which relate to property that is mostly held by others and leased to Ramaco, WEIR assesses that there are no significant issues affecting access to the coal interests or Ramaco's ability to execute its mine plans.

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 Knox Creek Complex, holds no material 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 Knox Creek Complex is in the southwestern part of the Appalachian Plateau Province directly north and adjacent to the Valley and Ridge Province. It is in the Cumberland Mountain zone of the Appalachian Plateau. The terrain is mountainous, steep, and rugged with elevations ranging from approximately 1,120 feet above Mean Sea Level (MSL) along the valley bottoms to over 4,040 feet above MSL along the ridges, averaging 2,230 feet. The landscapes are well-dissected

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with dendritic drainage systems. There are no major rivers in the area, however, there are numerous small creeks throughout the complex. The Dry Fork, Jacobs Fork, Indian Creek, and War Creek rivers, all tributaries of the Tug Fork River of the Ohio River watershed, traverse the complex. Topography and other features of the area are shown on Figure 7.5-1.

The Knox Creek Complex consists mostly of unmanaged forestland and scattered pastureland. The forestland consists of typical trees for this area of the Appalachians, with Oak/Hickory as the dominant forest-type group and a lesser percentage of the Maple/Beech/Birch forest-type group.

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 mine permit areas.

4.2 PROPERTY ACCESS

The primary access road to the properties is US Route 460, a four-lane highway, located south of the Knox Creek and Big Creek properties. From US Route 460, Virginia Route 637 and connecting West Virginia Routes 9 and 11 can be used to access the Knox Creek Property to the north.

The NS Railroad provides rail service in the area extending north from Raven, Virginia northward to the Knox Creek Preparation Plant (see Figure 1.1-1).

The nearest airport is the Tri-Cities Airport (TRI), which is located in Bristol, Tennessee. The Tri-Cities Airport is approximately 90 miles from Berwind, West Virginia and the Yeager International Airport (CRW) in Charleston, West Virginia, 120 miles from Berwind, West Virginia.

The surrounding waterways are not navigable for commercial traffic. The closest barge docking area is approximately 70 miles to the north on the Kanawha River, south of Charleston, West Virginia.

4.3 CLIMATE AND OPERATING SEASON

The climate associated with the Knox Creek Complex is classified as 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 Knox Creek Complex currently operate year-round, regardless of weather conditions.

4.4 INFRASTRUCTURE

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Power

Electrical power for the Knox Creek Preparation Plant and mines on the Knox Creek Complex is provided by American Electric Power (AEP). AEP's average industrial price is approximately 10 cents per kWh, which is slightly higher than the U.S. national average industrial price of 8.63 cents per kWh (EIA.gov statistics, December 2022).

Water

Water for mining and coal processing operations is provided by a combination of extraction from abandoned underground mine pools and from settling ponds located on the surface.

Individual mine sites use purchased potable water. Potable water at the preparation plant is supplied by a local municipality water connection.

Personnel

The area surrounding the Knox Creek Complex has a long history of coal mining and attracting mining personnel with qualified skills has not been an issue for Ramaco thus far. The Knox Creek Complex is projected to employ a maximum of 275 personnel over the LOM Plan. The Knox Creek Complex operations employed approximately 107 personnel, at the end of December 2022. 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 mining equipment dealerships located within 50 miles of the Knox Creek Complex. There are three Komatsu/Joy Manufacturing mining equipment dealerships within 50 miles of the Knox Creek Complex.

5.0 HISTORY

5.1 PREVIOUS OPERATIONS

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The Knox Creek Complex and surrounding area has an extensive history of coal mining, primarily by underground mining 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 Virginia Department of Mines Minerals and Energy, the USGS, and the MSHA. Mining within the Knox Creek Complex likely began in the early 1900s. There have been many different mine operators both large and small in the region since then.

Areas of the Big Creek Property have been previously surface and underground mined. Ramaco is currently surface mining the Tiller Seam at the Big Creek Surface and Highwall Mine. Previous mining on this property mostly involved the Jawbone, Tiller, and Red Ash seams. Previously mined out areas on the property were provided to WEIR by Ramaco, however, WEIR has not verified, nor field checked these previously mined out areas.

Areas of the Knox Creek Property have also been previously surface and underground mined. There is currently no mining activity within the Knox Creek Property. However, the Red Ash 2, Jawbone 3 and Jawbone 1 seams have been extensively mined on the property, as a result of desirable metallurgical coal properties, seam continuity, and ease of seam access. Previously mined out areas on the property were provided by Ramaco, however, WEIR has not verified, nor field checked these previously mined out areas.

5.2 PREVIOUS EXPLORATION AND DEVELOPMENT

Prior to Ramaco's control of the property in 2011, previous exploration included 4,821 holes drilled within or in proximity to both Ramaco's Knox Creek and Berwind Complexes. Previous exploration activity dates back prior to 1910. A list of 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 exploration drilling records are not fully available in original form.

Table 5.2-1 Previous Exploration

Company	Drill Holes	Drilled Footage	Year Drilled
Anker Coal Group, Inc.	57	25,087	Unknown
Consol Energy, Inc.	3,474	4,497,009	1970's-1980's
Georgia-Pacific	31	39,355	Unknown
Harmon Coal Company	1	750	Unknown
Island Creek Coal Coampany	70	114,561	Unknown
Jewell Ridge Coal Company	241	125,314	1960's-1990's
Jewell Smokeless Coal Corporation	473	221,931	1940's-2013
New River & Pocahontas Consolidated	73	50,287	1910's-Unknown
Olga Mining Company	22	17,434	Unknown
Paramont Coal Company Virginia, LLC	9	3,828	Unknown
Permac, Inc.	19	7,029	Unknown
Pocahontas Fuel Company, Inc.	25	18,649	Unknown
Republic Steel Corporation	98	47,738	Unknown
United Coal Company	126	53,973	Unknown

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US Steel Corporation	1	617	Unknown
West Virginia Geological & Economic Survey	2	9	Unknown
Unknown	99	5,688	Unknown
Total	4,821	5,229,258	

As can be seen in Table 5.2-1, Ramaco's Knox Creek and Berwind Complexes have a rich history of coal exploration. It should be noted that Consol Energy, Inc. has an exceptionally large number of drillholes because of their substantial participation in the natural gas industry in the area.

Organizing such a significantly large amount of data requires performing tasks such as; 1) removing drillhole duplicates (especially where companies change drillhole names to match their own naming conventions), 2) resolving multiple copies of drillholes "shared" between companies (i.e. different companies own different seams over the same area and agree to "share" drillhole data, but delete the data for their seams before sharing), 3) resolving localized seam naming differences, and 4) resolving different coordinate systems. These are significant (and on-going) tasks for Ramaco. WEIR's review of Ramaco's current drillhole database is highly complementary based on the results of its work to date on these matters. Based upon thorough review of Ramaco's compilation of this historical drilling data, it is WEIR's opinion that this historical data is reliable for use in generating an accurate geological and quality model for the Knox Creek Complex.

6.0 GEOLOGICAL SETTING, MINERALIZATION, AND DEPOSIT

6.1 REGIONAL, LOCAL, AND PROPERTY GEOLOGY

6.1.1 Regional Geology

The upper coal seams of interest within the Knox Creek Complex belong to the Norton Formation in Virginia of Early Pennsylvanian Age, which is stratigraphically equivalent to the Lower Kanawha and New River formations in southwestern West Virginia. The lower coal seams of interest belong to the Pocahontas Formation of the Pottsville Group (Lower Pennsylvanian). The depositional setting for these seams is complex and thought to be upper delta plain, with subsidence controlling the sedimentation rate. The Lower Pennsylvania (Pottsville) sedimentary strata of the coal-bearing rocks of the Pocahontas Formation rest uncomformably on the Mississippian Bluestone Formation of the Mauch Chunk Group.

The Norton and Lee Formations (Virginia nomenclature) encompasses the Knox Creek Complex which additionally is within the western margin of the folded and faulted Central Appalachian Basin, with deformation occurring during the Alleghany (post-Permian) Orogeny. The Dry Fork Anticline is a regionally persistent fold, which extends from Buchanan County, Virginia to Mercer County, West Virginia. The anticline passes through the center of the complex and plunges to the southwest. North of the Dry Fork Anticline, coal beds dip at approximately one degree to the northwest, while to the south, seams dip one to two degrees toward the Boissevain Fault to the south/southwest.

The coalbeds of the Norton Formation are interbedded with sandstones, shales, siltstones, and underclays. The sandstones are light gray, very fine to coarse grained, thin bedded to massive, and crossbedded, and consist of 50 to 65 percent quartz, with large proportions of white-weathering feldspar, mica flakes and dark mineral grains. The shales are

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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 of interest within the Knox Creek Complex are in the Southwest Virginia Coal Field and the Southern Coal Field in West Virginia. These coal seams are known for very high

calorific content (Btu/lb) and high through low-volatile metallurgical coal characteristics, with high fluidity, low ash content, and low sulfur content.

The Boissevain and Middle Creek faults are major northeast/southwest trending thrust faults, which pass through the southern boundary of the Knox Creek Property. The strata on the southeast side of the fault has been thrust upward, relative to the strata on the northern side, along a plane which is, in most places, inclined at approximately 45 degrees. Along much of the length of the fault, the strata have been overturned, and the fault offset is over 200 feet. The Boissevain and Middle Creek faults parallel the Richlands Fault, another large thrust fault to the south of the property, where Mississippian Age strata have been thrust above the Pennsylvanian coal-bearing formations. No mining has occurred south of the Boissevain and Middle Creek faults, within or near the complex.

The Keen Mountain and Pistol Gap faults are northwest/southeast trending right-lateral strike slip faults. The southern side of both faults is downthrown, up to 18 feet vertically. The Spur Fault is a small fault which occurs perpendicular to, and terminates in, the Keen Mountain Fault in the northern area of the property. Mining has occurred on both sides of these faults throughout the area, and fault crossings were common. These minor faults appear in the northwestern part of the Knox Creek Property.

The Canebrake Fault is a northwest/southeast trending fault, with an offset of approximately 200 feet based on evaluation of drillhole information. The upthrown side is to the north of the fault. Underground mining in the Red Ash Seam has occurred on both sides of the fault. This fault passes through the northern part of the Knox Creek Jewell Property

6.1.3 Property Geology

Big Creek Property

The primary coal seams of interest on the Big Creek Property, in descending order, are the Red Ash, Jawbone 1, and Tiller. No significant faults have been mapped on the property.

Knox Creek Property

The primary coal seams of interest on the Knox Creek Property, in descending stratigraphic order, are the Kennedy, Red Ash, Jawbone 3, and Jawbone 1 (see Figure 6.3-1, Generalized Stratigraphic Section). However, there are several other mineable seams that occur throughout the property.

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6.2 MINERAL DEPOSIT TYPE AND GEOLOGICAL MODEL

The Knox Creek Complex resource area is a relatively flat lying, sedimentary deposit of Pennsylvanian Age. The 34 coal seams in the Pocahontas Formation and the overlying Norton Formation account for approximately 3,000 feet of geologic section. For internal planning, Ramaco models these seams from exploration results 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. 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. 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 Knox Creek Complex. Cross sections related to the Knox Creek Complex can be found on Figure 6.3-2. For more detail on these sections, please see Exhibit 6.3-2.

Figure 6.3-1 Knox Creek Stratigraphic Column

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Figure 6.3-2 Knox Creek Stratigraphic Cross Sections

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7.0 EXPLORATION

7.1 NON-DRILLING EXPLORATION

Drilling has served as the primary form of exploration within the Knox Creek Complex. In addition to exploration drillholes, seam outcrop measurements, in-mine measurements, and survey points taken from mine maps of previous operations were considered. A total of 194 seam outcrop measurements, 356 mine measurements, and 887 survey points were

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implemented in modeling the deposit. Data from degasification, coal bed methane, and water wells were also incorporated in the geological model, including a total of 4,188 drillholes.

7.2 DRILLING

Ramaco's exploration activities involve rotary and continuous core drilling performed by competent contract drilling companies. 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 which is stored and evaluated as needed. 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 in consideration for re-drilling. The successful acquisition of accurate geophysical logs for holes with poor core recovery play an important role in the decision to re-drill, since improvements in lithology recognition in geophysical logging has significantly improved over the years.

Once recovered, all core samples are boxed, photographed, and stored. Coal seam core samples are sent to laboratories for quality analyses. Caliper, density, gamma, and resistivity 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	Drilled Footage	Rotary	Core	Drill Hole Header	Geophysical Logs	Downhole Deviation Log	Geologist's Log	Driller's Log	Lab Analyis Certificates
BC Series	2022	3	770	0	3	3	3	—	3	3	—
KC Series	1998-2018	37	14,725	5	32	37	31	—	8	32	11
		40	15,495	5	35	40	34		11	35	11

Referring to the drilling programs outlined in Table 7.2-1, the BC (Big Creek) and KC (Knox Creek) series of drillholes are mainly intended as in-fill drilling on the complex. 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
- 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

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- 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 19 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 for the complex 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 Knox 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 Knox 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

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Graphic

7.6 OTHER RELEVANT DRILLING DATA

Ramaco generally uses one of several local drilling companies based on availability and pricing. Downhole geophysical logging is usually performed by Marshall Miller & Associates of Bluefield, Virginia. Coal quality analyses are typically performed by Precision Testing Laboratory, Inc. (Precision) of Beckley, West Virginia.

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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. (Precision) located in Beckley, West Virginia beginning in 2016. Also certified by the ANSI National Accreditation Board, Precision performs all the coal analyses to ASTM standards. 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

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As outlined in Section 5.2, WEIR relied upon drillhole data from prior property owners. The quality data from other laboratories appears 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 ANSI certified laboratories, both SGS and Precision have in-house quality control and assurance procedures. Both are well-known and respected providers of coal quality analysis 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 Knox 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 Knox Creek Complex, which included Excel spreadsheets, driller's log, field geologist's logs, core photographs, 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

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- 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
- Excessive 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, 81 drillholes were excluded from the drillhole database due to various reasons.

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 some of the 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 performed by both SGS and Precision have been 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 2016. 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 Knox Creek Complex that can be relied upon to estimate coal resources and reserves to an accuracy that is acceptable for this report's specified standards.

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10.0 MINERAL PROCESSING AND METALLURGICAL TESTING

10.1 MINERAL PROCESSING TESTING AND ANALYTICAL PROCEDURES

Daily sampling is performed by SGS on samples obtained from various conveyor and stockpile locations prior to shipping clean coal products. Proximate and oxidation analyses are performed on the samples. Train and sublot samples include all petrographic and rheology analyses for each individual customer specification.

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 to help ensure proper coal and non-coal separations are occurring throughout the preparation plant processing 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 Knox 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.

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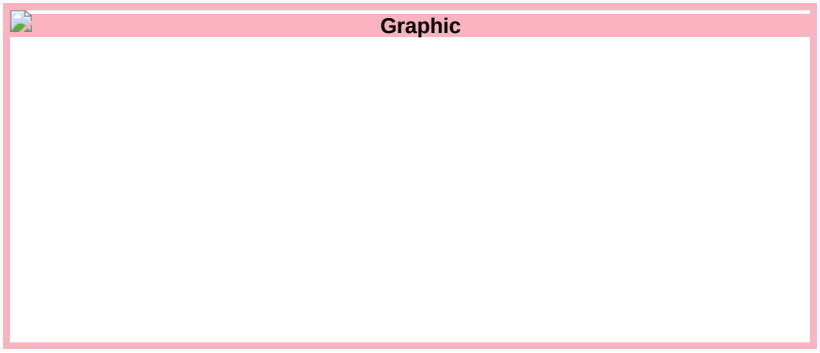
10.4 RELEVANT RESULTS AND PROCESSING FACTORS

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 Knox Creek Preparation Plant processes ROM coal at specific gravities ranging from 1.50 to 1.65, depending on customer specifications, in order to produce saleable metallurgical coal products.

Historical (2022) and projected LOM Plan preparation plant recovery are shown on Figure 10.4-1.

Figure 10.4-1 Preparation Plant Recovery



The preparation plant yield decreases in 2023 associated with increasing tons from the Big Creek Jawbone 1 Deep Mine and the exhaustion of the Big Creek HWM reserves.

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

Historical preparation plant recovery from 2022, based on plant belt scale records, is summarized in Table 10.4-1 as follows:

Technical Report Summary
Knox Creek Complex
Prepared for Ramaco Resources, Inc.
Graphic

Table 10.4-1 Historical Preparation Plant Recovery

	2022
Raw tons processed	600,608

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Clean tons processed	234,710
Plant Recovery (%)	39.1

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, 2022, 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).

In addition to the currently active and planned mines, there are numerous other resource areas within the Knox Creek Complex which Ramaco may plan and/or permit at a future date.

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 4,290 drillholes, 4,188 holes of which are included in the geological model.

In-mine seam thickness and floor measurement from previous operations' mine maps were provided in tabular file format. These mine measurements included 356 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 625 drillholes was provided for the Knox Creek Complex. Of the 625 drillholes, 558 holes were used in the quality model. Data was provided in Excel format along with quality certificates in PDF format.

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

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- 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.
- Analyses were not performed at the appropriate wash specific gravity.

Geological Model

The Knox Creek Complex geological model was developed 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. WEIR investigated significant collar elevation discrepancies. Most differences are due to original drillhole locations being covered with burden or being subsequently mined. Drillholes for which such discrepancies could not be resolved were not used in the model.

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:

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Table 11.1-1 Stratigraphic Model Interpolators

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

Ninety-eight (98) coal seams (including seam splits) were modeled for the Knox Creek Complex. A summary of drillhole statistics for the 16 seams that WEIR considered to have economic potential for the Knox Creek Complex are shown in Table 11.1-2. These statistics involve the 2,288 drillholes out of the total 4,188 that can be allocated to the Knox Creek Complex versus the Berwind Complex.

Table 11.1-2 Drillhole Statistics

				Average	Minimum		Maximum		Standard
CODE	Seam	In Mine Plan	Number of Intercepts	Thickness (Feet)	Hole Name	Thickness (Feet)	Hole Name	Thickness (Feet)	Deviation (Feet)
UPB2	Upper Banner 2	No	150	1.28	J-328	0.08	J-542	4.32	0.86
KDY2	Kennedy 2	Yes	877	2.03	20	0.04	04BI113	9.50	1.25
RED3	Red Ash 3	No	730	0.90	VA-160	0.02	CBMW49A	4.30	0.77
RED2	Red Ash 2	No	1662	2.47	25	0.08	80RU-8	8.00	0.94
JWB3	Jawbone 3	Yes	1936	2.07	KC00-03	0.05	06AW114A	8.00	0.98
JWB1	Jawbone 1	Yes	1930	2.57	L053	0.05	85RU-53	11.74	1.18
TL22	Tiller 2-2	Yes	1137	1.22	96VA283	0.08	00-VA-301	7.70	0.87
TL12	Tiller 1-2	Yes	851	1.39	VA-157	0.03	07BB48A	7.20	1.10
USB2	Upper Seaboard 2	No	626	1.46	O-M	0.04	VA-48	6.69	0.91
GCK2	Greasy Creek 2	No	1329	1.27	L038	0.08	BC30-97	6.35	0.64
LSB2	Lower Seaboard 2	No	1289	1.38	OLGA-13	0.08	VA-235	5.23	0.91
P114	Pocahontas 11	No	1461	2.48	L038	0.04	110107033	9.00	0.88
LHP1	Lower Horsepen 1	No	731	1.35	VA-145	0.05	PCP-136	4.65	0.72
PO92	Pocahontas 9-2	No	331	1.31	05BE121	0.10	VA-91	8.90	0.91
PO42	Pocahontas 4	No	602	1.23	PCP-108	0.08	02DGDD29	7.66	1.23
PO32	Pocahontas 3	No	806	2.41	05AY140	0.03	VA-206	9.25	2.07

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.

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

- Resources were estimated as of December 31, 2022.
- 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.

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- 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, and where stripping ratio exceeds 20:1, were excluded from the resource estimate.
- Tonnage outside of current LOM plans, 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 (pounds per cubic foot) 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, 2022, 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, 2022

							Coal Quality (Dry Basis)	
							Raw	
Mine Area / Seam	Area (Acres)	Average Coal Thickness (Feet)	In-Place Resources (000 Tons) Measured	Indicated	Total	Inferred	Ash (%)	Relative Density (Lbs/CF)
Big Creek								
Red Ash 3	1,275	2.04	5,025	—	5,025	—	17.0	88.61
Red Ash 2	1,420	2.75	7,495	—	7,495	—	4.5	87.98
Jawbone 3	1,400	2.27	6,445	—	6,445	—	24.0	92.98
Jawbone 1	2,210	2.99	13,536	—	13,536	—	12.2	94.38
Tiller 1-2	495	2.67	2,520	—	2,520	—	21.7	87.36
	6,800	2.59	35,021		35,021		14.1	91.42
Knox Creek								
Upper Banner 2	450	2.27	2,060	—	2,060	—	17.0	88.61
Kennedy 2	1,765	2.72	8,780	—	8,780	—	13.2	86.28
Red Ash 2	12,485	2.65	59,450	35	59,485	—	4.7	82.41
Jawbone 3	8,420	3.13	50,260	—	50,260	—	15.1	87.43
Jawbone 1	15,025	3.21	93,500	150	93,650	—	13.6	89.46
Upper Seaboard 2	450	2.72	2,340	—	2,340	—	17.0	88.61
Greasy Creek 2	290	4.29	2,640	—	2,640	—	43.0	97.93
Lower Seaboard 2	760	2.75	4,470	—	4,470	—	30.9	98.19
Pocahontas 11	770	4.72	7,010	—	7,010	—	17.0	88.61
Lower Horsepen 1	1,425	2.89	7,965	—	7,965	—	17.0	88.61

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Mine Area / Seam	Area (Acres)	Average Coal Thickness (Feet)	In-Place Resources (000 Tons) Measured	Indicated	Total	Inferred	Coal Quality (Dry Basis) Raw Ash (%)	Relative Density (Lbs/CF)
Knox Creek								
Pocahontas 9-2	2,030	2.8	8,240	2,750	10,990	—	17.0	88.61
Pocahontas 4	1,605	2.97	8,300	3,830	12,130	—	26.6	94.90
Pocahontas 3	710	2.77	3,780	—	3,780	—	17.0	88.61
	46,185	2.99	258,795	6,765	265,560		13.5	87.76
Knox Creek Complex - Total	52,985	2.94	293,816	6,765	300,581		13.6	88.23

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 primarily metallurgical mid and high volatile coal product realizing a sales price of $183.50 per ton at a cash cost of $98.68 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 Knox Creek Complex.

Ramaco's forecasted Knox Creek Complex FOB mine coal sales prices are $164.36 per ton in 2023, $172.10 in 2024, $179.69 in 2025 and $186.00 thereafter through 2037. Ramaco's sales price projections conform to published forward price curves for coal of similar quality to that of the Knox 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 $12.20 per ton over the Knox Creek Complex LOM Plan, compared to actual capital expenditures of $25.35 per ton in 2022.

Operating cash costs are discussed in further detail in Section 18.2 and are projected to average $98.68 per ton over the Knox Creek Complex LOM Plan, compared to actual Knox Creek Complex operating cost of $117.25 per ton in 2022.

Total projected capital expenditures and operating cost of $110.88 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

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stripping ratio of approximately 20:1 or lower, has prospects of economic extraction within the Knox Creek Complex.

11.4 MINERAL RESOURCE CLASSIFICATION

Mineral Resource estimates prepared for the Knox Creek Complex are based on the 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 four primary seams at the Knox Creek Complex to develop variogram ranges (radii) used for resource classification. Figure 11.4-1 illustrates the variogram for the Tiller No. 1 Seam, containing 649 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 for the Jawbone No. 1, Pocahontas No. 4, and Tiller No.1 and No. 2 seams. Variographic ranges were similar in each seam,

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demonstrating seam thickness continuity over 9,000 feet in each case. Theoretical ranges estimated for Measured (to 3,000 feet) and Indicated (to 9,200 feet) resources in the analysis demonstrates the spatial continuity of mineable coal seam thickness at the Knox Creek Complex.

Figure 11.4-1 Variogram Model Tiller No. 1 Seam Thickness

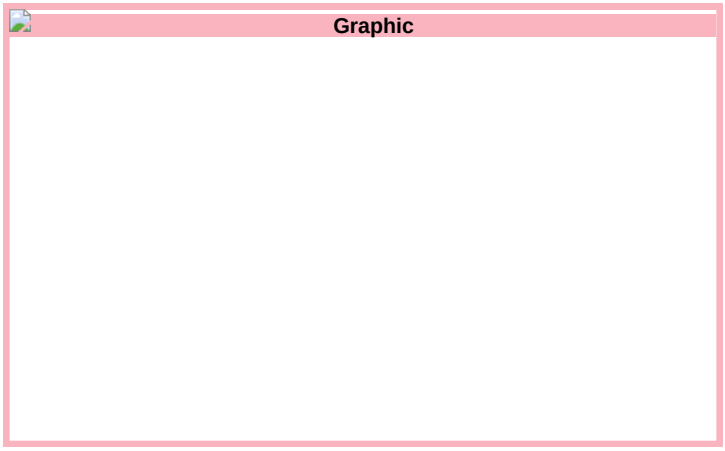

Table 11.4-1 Theoretical Variogram Ranges

Variogram	Figure	Sample Count	Measured Range (Ft.)	Indicated Range (Ft.)
Jawbone No. 1 Seam	1	1,290	2,250	6,800
Pocahontas No. 4 Seam	2	865	7,300	22,000
Tiller No. 1 Seam	3	649	3,050	9,200
Tiller No. 2 Seam	4	702	4,800	14,500

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 Knox Creek Complex.

Table 11.4-2 Statistics for Composited Drillhole Samples

Quality Parameter	Number of Samples	Total Sample Length (ft)	Minimum Value	Maximum Value	Average Value
Audibert-Arnu Maximum Dialation (%)	116	314	0	300	188
Composition Balance Index	48	135	0.51	7.63	5.38

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Free Swell Index	374	1,020	3.1	9	8.6
Gieseler Maximum Fluidity (DDPM)	219	586	1	30,000	9,457
HGI	17	60	94	105	99
Inerts (%)	61	169	8.2	36.3	25.8
Raw Ash (%)	357	984	2.7	62.1	20.4
In-Place Relative Density	925	2,585	1.27	1.96	1.44
Reflectance (ROMAX, %)	112	323	1.2	1.71	1.45
Rank	48	135	0.6	7.0	4.7
Stability Index	99	289	42.0	65.0	55.7
Coal Oxidation by Light Transmittance (%)	17	60	97.0	99.0	97.7
Ash (%)	809	2,223	2.0	19.1	5.9
BTU/lb	507	1,361	12,509	15,505	14,627
Sulfur (%)	803	2,206	0.37	3.50	0.85
Volatiles (%)	721	1,983	15.5	37.4	26.2
Yield (%)	923	2,582	10.4	100.0	74.8

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

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 four coal 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 - 3,000 feet (based on 905 observations informing estimate of coal thickness within this range)
- Indicated: 3,000 – 9,200 feet (based on 905 observations informing estimate of coal thickness within this range)
- Inferred: greater than 9,200 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

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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 Knox 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 Knox Creek Complex. The spatial continuity of all seams with resource attributes at the Knox 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 Knox 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.

The consistency of the seams within the complex 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.

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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.

A large percentage (approximately 98 percent) of currently planned coal deeds and leases have been secured by Ramaco at the Knox Creek Complex and WEIR finds no high risks associated with these coal deeds and leases. Resources that exist in currently unplanned areas are well situated for potential mining as the total size of the uncontrolled areas are not significant in comparison to the total potential mining areas.

Risk is also associated with volatility of coal market prices. Significant variations in operating costs, capital expenditures, productivity, and coal sales prices could impact the economic mineability of the Knox Creek Complex.

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 Knox Creek Complex.

12.0 MINERAL RESERVE ESTIMATES

12.1 KEY ASSUMPTIONS, PARAMETERS, AND METHODS

The conversion of resources to reserves at the Knox Creek Complex considers the effects of projected dilution and associated loss of product coal quality, projected coal sales prices, operating costs, regulatory compliance requirements, and mineral control. These factors all 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.

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For Ramaco's underground room and pillar operations, retreat mining will be implemented in most of the existing and planned underground operations within the complex, as permitted. This will result in 50 to 80 percent mining recovery of coal.

The Knox 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 mine 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 Knox Creek Complex.

Based on WEIR's review and evaluation of the Knox 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 Knox Creek Complex:

- Reserves were estimated as of December 31, 2022.
- Underground mining recovery of 50 to 80 percent (dependent on whether retreat mining can be performed), surface mining recovery of 90 percent, and 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. Areas with less than 400 feet penetration depth potential, as a result of any site-specific boundary limitations, were excluded from reserve classification.
- 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 Knox Creek Complex LOM plans.

12.2 ESTIMATES OF MINERAL RESERVES

The coal reserves that represent the economically viable tonnage controlled by Ramaco at the Knox Creek Complex, based on the coal reserve estimate methodology described, are shown in Table 12.1-3 as follows:

Table 12.1-3 Recoverable Coal Reserve Tonnage and Quality Estimate
as of December 31, 2022

Area / Mine / Seam	Product Quality	Area (Acres)	Average Coal Thickness (Feet)	Clean Recoverable Tons (000) Reserves			Coal Quality (Dry Basis) Raw	
				Proven	Probable	Total	Ash (%)	Relative Density (Lbs/CF)

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Knox Creek								
Kennedy No. 3 Deep Mine								
Kennedy 2	**Hi Vol**	**336**	**3.23**	**720**	**—**	**720**	**13.60**	**86.48**
Knox Creek Tiller Deep Mine								
Jawbone 3	**Hi Vol**	**1,546**	**3.44**	**6,362**	**—**	**6,362**	**16.10**	**88.05**
		1,882	**3.40**	**7,082**		**7,082**	**15.85**	**87.89**
Big Creek								
Surface and Highwall Mine								
Jawbone 1	**Mid Vol**	**20**	**1.27**	**30**	**—**	**30**	**18.4**	**89.50**
Tiller 2-2 and 1-2	**Mid Vol**	**175**	**2.61**	**318**	**—**	**318**	**19.1**	**89.75**
Jawbone Deep Mine								
Jawbone 1	**Mid Vol**	**383**	**3.40**	**586**	**—**	**586**	**30.6**	**97.38**
		578	**3.09**	**934**		**934**	**26.3**	**94.53**
Knox Creek Complex Grand Total		**2,460**	**3.33**	**8,016**		**8,016**	**17.06**	**88.66**

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 mid and high volatile metallurgical coal product at a sales price of $183.50 per ton and cash cost of $98.68 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

12.3 ESTIMATES OF RESERVE CUT-OFF GRADE

The seams within the Knox Creek Complex display consistent quality attributes representative of high-quality metallurgical coal. Current mine plans involve mid to high volatile products. One significant variable regarding cost considerations 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 Knox 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 Knox Creek Complex historical and consistent saleable coal product quality, current coal sales contract specifications, and the projected coal quality that has been modeled, WEIR does not foresee any deviations that would adversely affect future saleable coal product.

12.4 MINERAL RESERVE CLASSIFICATION

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WEIR prepared the Knox 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 1300 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 Knox 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

Knox 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 (%)	Audibert-Arnu Maximum Dilation (%)	Calculated Stability Index	Fluidity DDPM	Free Swell Index	Reflectance ROMAX (%)
Knox Creek												
Kennedy 2	13.6	86.9	5.2	0.83	35.3	14,803	86.9	220	ND	30,024	9.0	ND
Jawbone 3	16.1	88.1	5.0	0.85	32.2	14,732	79.5	246	ND	30,017	8.7	ND

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Average	15.8	87.9	5.0	0.85	32.5	14,739	80.3	243	—	30,018	8.7	—
Big Creek												
Jawbone 1	30.6	97.2	7.2	0.62	25.9	14,465	50.8	208	56.2	17,595	8.3	1.46
Tiller 1-2	19.1	89.8	5.3	0.66	28.9	14,780	75.5	198	49.6	26,498	8.0	0.94
Average	26.7	94.7	6.5	0.63	26.9	14,572	59.2	205	53.9	20,626	8.2	1.28
Overall Average	17.1	88.7	5.2	0.82	31.9	14,720	77.8	239	—	28,923	8.7	—

ND = No Data

The average quality for the reserve tons shows that the Knox Creek Complex ranges from a high quality mid volatile to a high quality high volatile metallurgical coal product, all possessing good coking properties. The range of dry washed volatile matter is between approximately 25.9 and 35.3 percent, with an average of 31.9 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 high quality metallurgical grade coal products.

Ramaco's forecasted Knox Creek Complex FOB mine coal sales prices are $164.36 per ton in 2023, $172.10 in 2024, $179.69 in 2025 and $186.00 thereafter through 2037. Ramaco's sales price projections conform to published forward price curves for coal of similar quality to that of the Knox 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 high continuity of the coal seams within the Knox 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 Knox Creek Complex have good 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 Knox Creek Complex being a relatively low risk operation. As previously noted, mineral rights are acceptably secure for all operating and planned mines.

Mining recovery is an important aspect in assessing the economic viability of a mine. Based on Ramaco's historical extraction rates, WEIR does not anticipate significant deviation of product recovery in the future. For deep mines, aerial recovery is based on the pillar size that has been designed for the operation, which is dependent on depth of cover and overlying rock strength and quality. The pillar design is most importantly intended to provide safe operation of the primary coal extraction efforts. Where planned advance and retreat recoveries were not provided by Ramaco, WEIR utilized an average mining recovery of 50 percent for the Knox Creek Complex CMs 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 and planned by Ramaco.

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

13.0 MINING METHODS

The underground mining method at the Knox Creek Complex is room and pillar mining utilizing CMs. 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, will typically increase overall mining recovery to approximately 80 percent. Due to lack of surface structures within the complex, retreat mining is planned for the majority of the underground mining areas. 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 deep mining is proposed within 50 feet of gas wells.

The Big Creek Surface and Highwall Mine operations involve a mix of contour mining and area removal methods. To accommodate the subsequent highwall mining, a minimum contour mining bench width of 125 feet projected by WEIR. Concern regarding stripping ratio for Ramaco's contour operations in this area is secondary in comparison to the access gained to coal seams to be mined by lower cost highwall mining. The area removal method is planned in the southern portion of the mine plan 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 Knox 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 Knox Creek Complex, the first mining protection zones are limited to small areas where there are intermittent streams with less than 200 feet of cover.

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

For highwall mining operations, hole spacing is based on ACPS analysis and 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 and VDE permits. No mining is proposed within 50 feet of the gas wells. One gas well will be replaced on the property at the well owner's expense. 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 Knox Creek Complex. WEIR notes that to date, Ramaco has not experienced any significant stability problems at its Knox Creek Complex mines. Based on WEIR's experience in the coal 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

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The Knox Creek Complex is regionally within the Virginia Big Sandy River Basin and Upper Guyandotte River watershed of West Virginia. The Clinch River, to the south of the complex, is the primary hydrological feature in the local area and is a tributary of the Tennessee 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 Norton Formation in the region 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 complex.

A 1993 study conducted by the USGS in cooperation with the VDE in the immediate vicinity further supports this and suggests that the primary aquifers with significant horizontal flow in the area are due to relatively shallow fracture flow systems. Coal seams also act in horizontal flow systems typically resulting in discharge as springs or seeps on hill slopes, or recharge of coal seams at depth. The study found that as depth increases beyond 100 feet, hydraulic conductivity significantly decreases for strata other than coal. This results in little deep regional ground-water flow.

Due to the rural nature of the area, there are several cooperative and private water wells on and adjacent to the Knox Creek Complex. There are also structures that utilize the 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 Knox 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 Knox Creek Complex regarding hydrologic impact or compliance.

13.1.3 Other Mine Design and Planning Parameters

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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 Knox 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, VDEP, 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

Big Creek Surface and Highwall Mine

The mine employs both contour mining and area removal mining methods. Highwall mining follows behind contour mining. The stripping ratio averages approximately 20:1 BCY/ton, excluding highwall miner contour mining areas. The highwall miner has the ability to penetrate approximately 800 feet into targeted coal seams that are, on average, at least 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 Ramaco mine is a multiple seam operation involving the Jawbone and Tiller seams. The Tiller Seam is the only seam that is highwall mined. Ramaco started operations here in early 2021 and currently employs a total of 32 people as of year-end 2022.

Big Creek Jawbone 1 Deep Mine

The mine utilizes one CM unit (single section) which is in the Jawbone 1 Seam. Coal production started in mid-2022. Seam thickness is consistent at approximately 3.4 feet. The Tiller Seam has been previously undermined in this area and Ramaco has adjusted the mine plan accordingly considering total planned extraction and panel design extents. Retreat mining is planned for all panels at approximately an 80 percent total extraction rate. Approximately 54 people will be involved in the mine's normal operations. The CM unit's productivity is projected to be 180 feet per shift.

Knox Creek Property Planned Mines

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

- Knox Creek Tiller Deep Mine (Jawbone 3 Seam, currently inactive, currently targeted for 2024 startup). This is a dual section CM mine with projected productivity at 160 feet per unit shift and employing approximately 98 people for normal operations.
- Kennedy No. 3 Deep Mine (Kennedy 2 Seam, currently targeted for 2024 startup). This is a single section CM mine with projected productivity at 150 feet per shift and employing 54 people for normal mine operations.

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Actual clean coal production attained by the Knox Creek Complex for 2018 through 2022 is shown in Table 13.3.1-1 as follows:

Table 13.2.1-1 Knox Creek Complex Historical Clean Production

Mine	Clean Tons Produced (000)				
	2018	2019	2020	2021	2022 (1)
Big Creek Jawbone 1 Deep Mine	—	—	—	—	63,852
Big Creek Surface and Highwall Mine	—	—	—	45,332	170,858
Knox Creek Tiller Deep Mine	—	1,479	—	—	—
Knox Creek Complex Total	—	1,479	—	45,332	234,710

(1) 2022 - Eleven Months Actual, One Month Forecast

Actual and projected ROM and clean coal production, and preparation plant yield for the Big Creek Surface and Highwall Mine, and each of the underground mines for the Knox Creek Complex LOM Plan are shown in Table 13.2.1-2 as follows:

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

	2022 (1)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	Total
ROM Tons (000)																	
Big Creek Jawbone 1 Deep Mine	173	492	392	397	359	—	—	—	—	—	—	—	—	—	—	—	1,812
Kennedy No. 3 Deep Mine	—	—	—	268	342	393	304	199	—	—	—	—	—	—	—	—	1,506
Knox Creek Tiller Deep Mine	—	—	672	1,195	1,200	1,158	1,175	1,243	1,180	1,194	1,195	1,204	788	580	635	328	13,748
Big Creek Surface and Highwall Mine	428	251	210	98	—	—	—	—	—	—	—	—	—	—	—	—	987
Total	601	743	1,273	1,957	1,901	1,551	1,479	1,442	1,180	1,194	1,195	1,204	788	580	635	328	18,052
Clean Tons (000)																	
Big Creek Jawbone 1 Deep Mine	64	151	159	142	135	—	—	—	—	—	—	—	—	—	—	—	650
Kennedy No. 3 Deep Mine	—	—	—	120	175	189	140	97	—	—	—	—	—	—	—	—	720
Knox Creek Tiller Deep Mine	—	—	269	547	544	599	597	583	513	560	563	550	339	279	286	134	6,362
Big Creek Surface and Highwall Mine	171	148	137	63	—	—	—	—	—	—	—	—	—	—	—	—	519
Total	235	298	565	872	853	787	737	679	513	560	563	550	339	279	286	134	8,250
Preparation Plant Yield (%)																	
Big Creek Jawbone 1 Deep Mine	37.0	30.6	40.6	35.7	37.6	—	—	—	—	—	—	—	—	—	—	—	35.9
Kennedy No. 3 Deep Mine	—	—	—	44.9	51.1	47.9	46.0	48.6	—	—	—	—	—	—	—	—	47.8
Knox Creek Tiller Deep Mine	—	—	40.1	45.8	45.3	51.7	50.8	46.9	43.5	46.9	47.1	45.6	43.0	48.0	45.1	40.8	46.3
Big Creek Surface and Highwall Mine	39.9	58.8	65.2	65.0	—	—	—	—	—	—	—	—	—	—	—	—	52.6
Average	39.1	40.2	44.4	44.6	44.9	50.7	49.8	47.1	43.5	46.9	47.1	45.6	43.0	48.0	45.1	40.8	45.7

(1) 2022 - Eleven Months Actual, One Month Forecast

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13.2.2 Expected Mine Life

Individual mines at the Knox Creek Complex have expected mine lives varying from about four years to 15 years. 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 mining at the complex progresses, future mines will be planned and scheduled as necessary to meet internal Ramaco goals as they align

with market conditions. 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 2037 for the various mine plans are shown on Figures 13.5-1 through 13.5-4.

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

- Gas Wells
  - Ø State Permit required to mine within 500 feet of a well
  - Ø MSHA Permit required to mine within 150 feet of a well
  - Ø Active Well barrier - tangent of 15 degrees x depth of cover or 50 feet, whichever is greater
  - Ø Inactive Well barrier - tangent of 5 degrees x depth of cover or 50 feet, whichever is greater
  - Ø Plugged Wells - mine-through is allowed with acquisition of proper State and MSHA Permits

- Pillar Size
  - Ø 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.
  - Ø ARMPS stability factor of 1.5 or greater for all other room and pillar development.

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

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

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

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13.2.4 Mining Dilution

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

13.2.5 Mining Recovery

Mining recovery when utilizing CM mining 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 at the complex is usually approximately 50 percent, based on pillar design. In the areas where retreat mining is conducted, an additional 30 percent mining recovery is usually attainable. The CMs 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 Knox Creek Complex currently has one active underground mine and an active surface mine. As 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.

Future ventilation punchouts, or bleeder holes, are anticipated for areas where retreat mining is executed, applicable at 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.

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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 Ramaco's surface mine plans, the contour mining method will require backfilling as mining progresses. 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 1/11/23 Asset Retirement Obligations (ARO) summary for the period ending 12/31/22. Backfilling obligations appear to be properly accounted for at Ramaco's mines. Based on Ramaco's permit filings with the WVDEP and VDE, bonding requirements are also current and at satisfactory levels at the Knox 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 Knox Creek Complex is currently utilizing the following industry standard mining equipment on the CM 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 Knox Creek Complex over the next 10 years. In some cases, mines that commence later in the LOM Plan

Technical Report Summary
Knox Creek Complex
Prepared for Ramaco Resources, Inc.
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will utilize equipment currently being used at other mines at the Knox Creek Complex to avoid additional capital expenditures.

Table 13.4.1-2 Knox Creek Complex Primary Underground Equipment Fleet

Mine	Supersections	Continuous Miners	Shuttle Cars	Roof Bolters	Battery Scoops	Feeder Breakers	Mantrips	Service Locomotive
Big Creek Jawbone Deep Mine	1	2	3	2	2	1	2	1
Kennedy No. 3 Deep Mine	1	2	3	2	2	1	2	1
Knox Creek Tiller Deep Mine	2	4	6	4	4	2	4	2
Total	4	8	12	8	8	4	8	4

Current equipment at the Big Creek Surface and Highwall Mine is shown in Table 13.4.1-3. There will be one highwall miner at the Big Creek Surface and 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 Loader (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. Yard)
1	John Deere 250G Excavator (Utility 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 throughout the Knox 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 Knox Creek Complex staffing is summarized in Table 13.4.2-1 as follows:

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Table 13.4.2-1 Current Staffing

	Total
Big Creek Surface and Highwall Mine	36
Big Creek Jawbone Deep Mine	40
Knox Creek Tiller No. 1 Deep Mine	—
Kennedy No. 3 Deep Mine	—
Knox Creek Preparation Plant	19
Environmental	6
Administration	6
	107

Note: Staffing as of December 2022

Each operating mine at the Knox 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 two crews to process ROM coal 20 hours per day over two, 10-hour shifts, five days per week with no holidays.

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

	Big Creek Surface Mine	Big Creek Jawbone 1 Deep Mine	Knox Creek Tiller Deep Mine	Kennedy No. 3 Deep Mine	Knox Creek Preparation Plant	Environmental	Admin	Total
Current(1)	36	40	—	—	19	6	6	107
2023	32	54	—	—	19	6	6	117
2024	32	54	98	54	23	6	8	275
2025	32	54	98	54	23	6	8	275
2026	29	54	98	54	23	6	8	272
2027 - 2037	—	—	98	54	23	6	8	189

(1) **As of December 31, 2022.**

After 2023, staffing levels are expected to increase in 2024 with the startup of the Kennedy No. 3 and Knox Creek Tiller Mines.

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Most of Ramaco's employees live nearby in McDowell County, West Virginia, and Buchanan, Tazewell, and Russell Counties, Virginia. 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 Knox Creek Complex mines (excluding the preparation plant) manhours worked, NFDL injuries, and NFDL Incidence Rate reported to the MSHA for 2018 through 2022, 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 Knox Creek Complex Manhours Worked, NFDL Injuries and NFDL Incidence Rate

				Incidence Rate	
	Manhours	NFDL Injuries		Mine	National
	Worked	Employee	Contractor	Total	Average
	Big Creek Jawbone Deep Mine (Mine No. 1)				
2022	51,283	1	—	3.90	3.46
2021	—	—	—	—	3.60
2020	—	—	—	—	3.21
2019	—	—	—	—	3.06
2018	—	—	—	—	3.18
	Knox Creek Tiller No. 1 Deep Mine				
2022	—	—	—	—	3.46
2021	1,400	—	—	—	3.60
2020	5,493	—	—	—	3.21
2019	14,583	—	—	—	3.06
2018	—	—	—	—	3.18
	Big Creek Surface Mine				
2022	87,321	—	—	—	0.65
2021	34,656	—	—	—	0.64
2020	—	—	—	—	0.79
2019	—	—	—	—	0.81
2018	39,778	—	—	—	0.80

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The Knox Creek Complex NFDL Incidence Rates are perfect and are significantly lower than the national average, except for the Big Creek Jawbone Deep Mine that incurred one lost time injury in 2022 with low manhours during the initial mine startup.

The Knox Creek Preparation Plant manhours worked, NFDL injuries, and NFDL Incidence Rate reported to the MSHA for 2018 through 2022, compared to the national average NFDL Incidence Rate for United States preparation plants are shown in Table 13.4.2-4 as follows:

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

	Manhours Worked	NFDL Injuries		NFDL Incidence Rate	
		Knox Creek	Contractor	Knox Creek Plant	National Average
2022	56,158	—	—	—	0.85
2021	39,933	—	—	—	1.00
2020	32,996	—	—	—	1.83
2019	19,480	—	—	—	2.08
2018	20,345	—	—	—	1.84

The Knox Creek Preparation Plant historical NFDL Incidence Rates are perfect and are significantly lower than the national average.

13.5 LIFE OF MINE PLAN MAP

The projected mining areas for the Knox Creek Complex LOM Plans are shown on Figures 13.5-1 through 13.5-4.

Figure 13.5-1 Life of Mine Plan, Big Creek Surface and Highwall Mine

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Figure 13.5-2 Life of Mine Plan, Big Creek Jawbone 1 Deep Mine

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Figure 13.5-3 Life of Mine Plan, Knox Creek Tiller Deep Mine

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Figure 13.5-4 Life of Mine Plan, Knox Creek Kennedy No. 3 Deep Mine

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14.0 PROCESSING AND RECOVERY METHODS

14.1 PLANT PROCESS AND FLOWSHEET

Presently coal requiring processing within the Knox Creek Complex is processed at the Knox Creek Preparation Plant. The processing circuits include a heavy media cyclone, classifying cyclones, spirals, and conventional self-aspirating flotation cells. A simplified flowsheet for the Knox Creek Preparation Plant is shown on Figure 14.1-1.

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Figure 14.1-1 Simplified Preparation Plant Flowsheet

14.2 PLANT PROCESSING DESIGN, EQUIPMENT CHARACTERISTICS AND SPECIFICATIONS

The Knox Creek Preparation Plant, built in 1981 by Powell Construction Company located in Johnson City, Tennessee, is a well designed and constructed preparation plant. The preparation plant has a design capacity of 750 ROM tons per hour. Based on the Knox Creek Complex LOM Plan average projected preparation plant yield of 45 percent, a 20 hour per day, 260 days per year processing schedule, and 96 percent plant mechanical availability, the preparation plant has a capacity of approximately 1.8 million clean tons per year, with its existing circuitry. The plant is currently being significantly upgraded to increase capacity and efficiency. These upgrades are scheduled to be completed in 2023.

ROM coal from the mines within the Knox Creek Complex is transported by over the highway end-dump trucks to the Knox Creek Preparation Plant and dumped into either a 100,000 ton ROM ground storage stockpile or into one of seven ROM hoppers. The ROM coal is reclaimed with feeders from either the stockpile or the truck dump bins and enters a nine-feet x

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16-feet Pennsylvania rotary breaker at 750 ROM tons per hour. From the rotary breaker, a 36-inch-wide conveyor feeds ROM coal to the preparation plant.

The plant feed ROM coal material is screened at +3 inch, 3/4 inch x 5/16 inch and 5/16 inch x 0. The 3 inch x 5/16 inch ROM coal is processed in a heavy media vessel. The 5/16 inch x 0 material is screened at ½ mm with 5/16 inch x 28 mesh material processed in heavy media cyclones and the 28 mesh x 0 material reporting to raw coal cyclones. From the raw coal cyclones, 28 mesh x 100 mesh material is processed in triple-start spirals. The ultrafine 100 mesh x 0 material is cleaned by way of two banks of 5-300 cubic feet conventional flotation cells.

Clean coal can be stored in either of two clean coal stockpiles, each with a capacity of 40,000 tons. Clean coal is reclaimed from these piles and belted to the rail loadout at a rate of approximately 2,500 tons per hour and it can load 46-car trains. The load-out facility is served by the NS Railroad. The loadout belt is equipped with a J.B. Long two stage sweep sampler. The rail loadout facility has a capacity of 2,500 tons per hour.

Knox Creek disposes of refuse in the adjacent Jamison Creek Refuse Disposal Area, which is an impoundment and coarse refuse disposal area. Coarse refuse is transported to the disposal area by conveyor belt with fine refuse pumped as slurry to the impoundment. Current permitted life for this facility is approximately six years at an annual refuse production rate of 1.48

million tons/year (combined fine and course refuse). A permit package is currently being prepared, which will add an additional 11.8 years of capacity at the same production rate.

The preparation plant is scheduled to operate two, 10-hour shifts per day, five days per week, depending on the quantity of ROM coal to process. According to Ramaco records, the Knox Creek Preparation Plant averaged 96 percent mechanical availability in 2021.

The Knox Creek 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		
2	-	Truck Scales
7	-	Truck Dumps, 3 - 500 Ton and 4 - 250 Ton Capacity
1	-	Truck Dump Reclaim Conveyor, 48-Inch x 665-Feet
2	-	Stacking Tubes, 70-Feet
2	-	ROM Coal Stockpiles, 110,000 Ton Total Capacity
1	-	Reclaim Tunnel, 331-Feet
11	-	ROM Coal Reclaim Feeders (Truck Dumps and Stockpile)
1	-	ROM Coal Stockpile Reclaim Conveyor, 48-Inch x 590-Feet
1	-	Tramp Iron Magnet
1	-	ROM Breaker Feed Conveyor, 48-Inch x 400-Feet
1	-	Pennsylvania Rotary Breaker, 9-Feet x 16-Feet

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3	-	Belt Scales
1	-	Plant Feed Conveyor, 36-Inch x 648-Feet

Preparation Plant - 750 ROM TPH		
2	-	ROM Coal Double Deck Screens, 7-Feet x 16-Feet
2	-	Pre-wet Screens, 7-Feet x 12-Feet
1	-	Peters Heavy Media Vessel, 56-Inch x 9-Feet
1	-	Coarse Clean Coal Double Deck Screen, 6-Feet x 16-Feet
1	-	Refuse Double Deck Drain and Rinse Screen, 6-Feet x 16-Feet
1	-	McLanahan Crusher
1	-	Coarse Clean Coal Centrifuge, VC-48
4	-	Desliming Screens, 8-Feet x 16-Feet
4	-	Heavy Media Cyclones, 20-Inch Diameter

Preparation Plant - 750 ROM TPH		
4	-	Small Clean Coal Single Deck Screens, 8-Feet x 16-Feet
4	-	Small Clean Coal Centrifuge, EB-36
2	-	Small Refuse Single Deck Screens, 6-Feet x 16-Feet
8	-	Triple Start Spirals
2	-	Clean Coal Classifying Cyclones, 15-Inch Diameter
5	-	Raw Coal Classifying Cyclones, 15-Inch Diameter
1	-	Refuse Classifying Cyclone
2	-	Refuse High Frequency Screens, 6-Feet x 12-Feet
10	-	Flotation Cells, 300 Cubic Feet
5	-	Screen Bowl Centrifuges, 36-Inch x 72-Inch
1	-	High Rate Thickener, 90-Feet Diameter

Clean Coal Handling System		
1	-	No. 1 Clean Coal Stacker Conveyor, 42-Inch x 642-Feet
1	-	No. 2 Clean Coal Stacker Conveyor, 42-Inch x 642-Feet
2	-	Stacking Tubes, 91-Feet
2	-	Clean Coal Stockpiles, 70,000 Ton Total Capacity
1	-	Belt Sweep Clean Coal Sampler
1	-	Reclaim Tunnel, 50-Feet
1	-	Loadout Conveyor, 54-Inch x 1,254-Feet
1	-	Belt Scale
1	-	100-Ton Railroad Car Loadout

Refuse Handling System		
1	-	Belt Sweep Refuse Sampler
1	-	Refuse Conveyor, 36-Inch x 615-Feet
1	-	Belt Scale
1	-	Refuse Bin, 100-Ton

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7 - Refuse Conveyors, 42-Inch x 10,269-Feet (Total)

14.3 ENERGY, WATER, PROCESS MATERIALS, AND PERSONNEL REQUIREMENTS

Power is supplied to the plant by AEP. Power is received at a primary voltage of 69,000 volts and fed through a 10,000 KVA substation where voltage is reduced to 12,470 volts. Voltage is further reduced inside the preparation plant, to 480 volts by a 1,000 KVA transformer bank.

Make up water is supplied to the plant from a 100,000 gallon storage tank located above the plant. Water is pumped into the storage tank from an idled underground mine. This underground area has a storage capacity of approximately 8.5 million gallons. Water can also be supplied to the storage tank from ponds located at the toe of the refuse area. Water is

supplied to these ponds by the refuse underdrain, clear water diversion ditches and runoff from the refuse area itself. Make up water requirements are approximately 500 gallons per minute.

Magnetite consumption is approximately 0.9 pounds per ROM ton processed. The preparation plant chemicals utilized cost approximately $0.20 per ROM ton processed (excluding magnetite).

Personnel requirements to operate the processing shifts at the preparation plant currently are 15 employees per shift on day shift and eight employees on night shift. The LOM Plan projects a total of 23 employees.

15.0 INFRASTRUCTURE

15.1 ROADS

The primary access road to the properties is US Route 460, a four-lane highway, located to the south of the Knox Creek and Big Creek Properties. From US Route 460, Virginia Route 637 and connecting West Virginia Routes 9 and 11 can be used to access the Knox Creek Property to the North. Similarly, the Big Creek Property can be accessed from US Route 460 to the

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north using Virginia Route 67. Other highways and county roads traverse these two properties. US Route 460 turns to the north after running south of Big Creek and continues through the middle of the original Knox Creek Property and passes just to the east of the Knox Creek Preparation Plant and its associated Jamison Creek Refuse Disposal Area.

15.2 RAIL

The NS Railroad passes through and has a rail spur to the Knox Creek Preparation Plant. The NS Railroad provides rail service in the area extending from Amonate, Virginia northward through Berwind, West Virginia and from Swords Creek, Virginia eastward through Richlands, Virginia, south of the Knox Creek Property (see Figure 1.1-1).

15.3 POWER

Electrical power is supplied to the Knox Creek Complex by AEP. Electrical power is received at the preparation plant at a primary voltage of 69,000 volts and fed through a 10,000 KVA substation where voltage is reduced to 12,470 volts. Voltage is further reduced inside the preparation plant to 480 volts, by a 1,000 KVA transformer bank. Electrical power is also supplied to mines from the substation.

15.4 WATER

Water for mining and coal processing operations is provided by a combination of extraction from abandoned underground mine pools and from settling ponds located on the surface. Mine pool recharge rates are higher than Ramaco water usages.

Individual mine sites use purchased potable water. Potable water at the preparation plant is supplied by a local municipality water connection.

15.5 PIPELINES

There are some oil and gas collection lines that service gas wells within the Knox Creek Complex. Any construction and earth moving activities in proximity to these lines will require coordination with the oil or gas line owner.

15.6 PORT FACILITIES, DAMS, AND REFUSE DISPOSAL

Port Facilities

The surrounding waterways are not navigable for commercial traffic. The closest barge docking area is approximately 70 miles to the north on the Kanawha River, south of Charleston, West Virginia.

Export coal from the Knox Creek Complex is railed, via the NS Railroad, to the Pier 6 Terminal, owned and operated by Norfolk Southern Corporation, located at Lamberts Point in Norfolk, Virginia.

Dams and Refuse Disposal

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There are no structures that are existing or planned to be constructed in such a size or manner that will be subject to the West Virginia Dam Control Act, the Virginia Dam Safety Act, and/or MSHA regulations. 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 Big Creek Surface and Highwall Mine. The Knox Creek Complex infrastructure is shown on Figure 15.7-1.

Figure 15.7-1 Infrastructure Map

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16.0 MARKET STUDIES

16.1 MARKETS

The Knox Creek Complex produces saleable mid volatile and high volatile metallurgical coal. The market for metallurgical coal from the Knox 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

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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 2022, export prices (FOB port) and domestic coke plant prices (delivered cost) have averaged $145.35 and $132.40 per ton, respectively.

A small amount of thermal coal product is sold from the Knox 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 Knox Creek Preparation Plant. This coal is sold on thermal spot markets, based on product availability. All thermal coal sales from the Knox Creek Complex are projected to end in 2024.

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 mining 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 $196.00 per ton FOB mine.

Coal sales from the Knox Creek Complex represent approximately 10 percent of Ramaco's 2023 projected coal sales tonnage, with metallurgical coal exports representing nearly 90 percent of Ramaco's 2023 projected coal sales.

Ramaco has a contract with NS for rail coal haulage from the Knox Creek Complex that is renewed annually.

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16.3 PRICE FORECAST

For purposes of this report, WEIR utilized price forecasts which Ramaco prepared for its Knox Creek Complex coal sales. Ramaco based its Knox Creek Complex FOB mine pricing on available FOB Port index forward pricing and Ramaco's estimated adjustments for Knox Creek coal quality, freight expense, and loading expense. Ramaco's price forecasts and adjustments reflect its experience in selling and transporting Knox Creek Complex saleable coal since 2019. Policy, the following terms shall have the meanings set forth below:

Ramaco's historical (2022) "Committee" means the Compensation Committee of the Board of Directors of the Company.

"Erroneously Awarded Compensation" means the amount of Incentive-Based Compensation received that exceeds the amount of Incentive-Based Compensation that otherwise would have been received had it been determined based on the restated amounts resulting from a Restatement, and forecast (2023 through 2037) FOB mine coal must be computed without regard to any taxes paid. For Incentive-Based Compensation based on stock price or total shareholder return, where the amount of Erroneously Awarded Compensation is not subject to mathematical recalculation directly from the information in a Restatement: (a) the amount must be based on a reasonable estimate of the effect of the Restatement on the stock price or total shareholder return upon which the Incentive-Based Compensation was received; and (b) the Company must maintain documentation of the determination of that reasonable estimate and provide such documentation to the Nasdaq Stock Market.

"Executive Officer" means any employee of the Company who is currently, or within the period covered by this Policy, employed as the Company's president, principal financial officer, principal accounting officer (or if there is no such accounting officer, the controller), any vice-president of the Company in charge of a principal business unit, division, or function (such as sales, price administration, or finance), any other officer who performs a significant policy-making function, or any other person who performs similar significant policy-making functions for the Knox Creek Complex is shown on Figure 16.1-2.

Figure 16.1-2 Historical Company, including Executive Officers of the Company's subsidiaries if they perform such policy making functions for the Company, and Forecast Coal Sales Prices shall include each Named Executive Officer as determined under Section 402(a)(3) of Regulation S-K.

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Ramaco's forecasted Knox Creek Complex FOB mine coal sales prices "Financial Reporting Measures" mean those measures that are $164.36 per ton in 2023, $172.10 in 2024, $179.69 in 2025 determined and $186.00 thereafter through 2037.

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 and VDE, 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 and VDE permit application.

Surface Water Baseline Quality, Quantity, and Runoff Analysis

Baseline surface water monitoring for flow and quality parameters was conducted at strategic, WVDEP and VDE approved locations, as applicable, over a period of six months for each of the permit areas. During mining and through the final

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release of the permit, the stations selected for each site are monitored presented in accordance with the approved surface water monitoring plans submitted accounting principles used in preparing the Company's financial statements, and any measures that are derived wholly or in part from such measures. Stock price and total shareholder return are also Financial Reporting Measures. A Financial Reporting Measure need not be presented within the financial statements or included in a filing with the Securities and Exchange Commission.

"Incentive-Based Compensation" means any compensation that is granted, earned, or vested based wholly or in part upon the attainment of a Financial Reporting Measure. For purposes of this Policy, Incentive-Based Compensation is deemed received in the site's permits. Data collected Company's fiscal period during this period will be compared with which the pre-mining baseline data to determine Financial Reporting Measure specified in the award is attained, even if and how the proposed operation is affecting payment or grant occurs after the surface water systems. If necessary, remedial measures can be taken to assure end of that period.

"Non-Employee Board" means the protection members of the surface water systems. Board who are not employed by the Company or any affiliate thereof.

Based on samples from adjacent mining and the baseline surface water sampling there should be no acid or toxic mine drainage. However, Ramaco proposes that 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 "Restatement" means an accounting restatement required 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 be prepared by the University Company due to the material noncompliance of Kentucky. These analyses and results are included the Company with any financial reporting requirement under the securities laws, including any required accounting restatement to correct an error in previously issued financial statements that is material to the previously issued financial statements, or that would result in a material misstatement if the error were corrected in the individual sites' permits and show that there will current period or left uncorrected in the current period. The date of a Restatement shall be no increase in peak discharge during mining or post mining for any the earlier to occur of: (a) the date the Company's board of directors, a committee of the permit areas. It should be noted that in order to attain these acceptable results, board of directors, or 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 permits.

Probable Hydrologic Consequences

PHCs were evaluated for each permit application. Subsidence will likely 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

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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 officer or officers 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 Company authorized to take such action if board action is not required, concludes, or surface water resource is likely to be contaminated, diminished, or interrupted, providing reasonably should have concluded, that the approved drainage control and revegetation plans Company is required to prepare a Restatement; or (b) the date a court, regulator, or other legally authorized body directs the Company to prepare a Restatement. The Company's obligation to recover Erroneously Awarded Compensation is not dependent on if or when restated financial statements are adhered to throughout existing and planned mining activities. filed.

17.2 REFUSE DISPOSAL AND WATER MANAGEMENT Administration
3.

Refuse Disposal ofthisPolicy

The Jamison Creek Refuse Disposal Area (MSHA ID No. 44-05236) is a coal refuse disposal facility that serves the Knox Creek Preparation Plant. Coarse refuse from the preparation plant

is transported to the disposal area by conveyor belt with fine refuse pumped as slurry to the impoundment. The estimated life for this facility as of January 2023 is approximately six years.

A PHC determination included in the Jamison Creek Refuse Disposal Area Permit No. 1302232 concluded that no detrimental hydrologic consequences are either anticipated, or expected, with a fine coal refuse slurry impoundment at this facility.

Further, a Breakthrough Potential Study was conducted by Schnabel Engineering, LLC in April 2020 (Schnabel Report) to assess whether there is a breakthrough potential to the Red Ash and Kennedy seams mined beneath the impoundment. The Schnabel Report concluded that the Breakthrough Potential into the Red Ash mine workings and Kennedy auger holes is considered to be moderate. However, based on the four significant barriers to breakthrough into the Red Ash mine workings that were discussed in the AME report and considering that the Kennedy auger holes are going to be grouted, Schnabel believes that the Breakthrough Potential at this site is somewhat lower.

The refuse disposal structure will be constructed in such a size or manner that will be subjected to the Virginia Dam Safety Act, and/or MSHA regulations. Stability analyses of the refuse disposal structure show that design of the structure exceeds the minimum safety factors of 1.5 for static stability and 1.2 for dynamic stability that are required by the current 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.

Outside of the Jamison Creek Refuse Disposal Area, no coal, or non-coal related disposal, is planned at any of the mine sites.

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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.

Graphic

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.

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 Knox Creek Complex. Results of water sampling has shown no significant levels of surface water contamination at the mine sites.

Surface water management for both Ramaco's surface and underground permitted mining areas on the Knox 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 (CMP) placement for drainages that cross access roads or haulroads, and 6) drainage diversion ditches and collections for excess spoil disposal areas. The Big Creek Surface and Highwall Mine has a relatively large network of these construction types. The underground mine locations have a significantly smaller footprint, however, these locations use the same surface water management design considerations as surface mines. Detailed designs for all drainage and sediment control structures are included in Ramaco's permits. Apart from the Jamison Creek Refuse Disposal Area, there are no significant water retention structures subject to the West Virginia Dam Control Act, the Virginia Dam Safety Act, or MSHA regulations, and there are no other permanent impoundments planned at any of the mine permit sites.

All permitted mine sites have a Materials Handling Plan designed to mitigate the potential for acid mine drainage generation regarding 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

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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 is 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. Regarding 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. Based on water samples collected from adjacent mining, there is not anticipated to be any acid, alkaline, or iron laden drainage.

All permitted sites have a surface water runoff monitoring plan. Within twenty-four hours of a one-year frequency, twenty-four hour storm event or greater, a permit-wide inspection and report of the drainage systems is completed and submitted to the WVDEP or VDE, as applicable. 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 the Knox 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 appropriate regulatory authority.

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. A similar filing and approval process is required by the VDE. The Knox Creek Complex has been issued mining permits and associated NPDES permits by the WVDEP and the VDE as shown in Table 17.3-1 as follows:

Table 17.3-1 Knox Creek Complex Mining and NPDES Permits

Property Description	State Permit Number	State	Permitted Surface Area (Acres)	Issue Date	Current Status	NPDES Permit No.

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Big Creek Surface Mine	1102335	VA	447.63	1/22/2020	Active	0082335
Big Creek Jawbone 1 Deep Mine	1402231	VA	42.61	5/22/2017	Active	0082231
Knox Creek Tiller No. 1 Deep Mine	1202204	VA	20.57	2/15/2017	TmpIdle	0082204
Kennedy No. 3 Surface Mine	1402215	VA	106.18	4/3/2017	NonProdActive	0082215
Kennedy No. 3 Deep Mine	1702202	VA	75.95	2/14/2017	Idle	0082202
Knox Creek Preparation Plant	1302184	VA	41.94	12/2/2017	Active	0082184
Knox Creek Refuse Disposal Area	1302232	VA	322.71	11/23/2018	Active	0082232
Mudlick Surface Mine	1102334	VA	26.25	7/7/2020	Idle	0082234
Total			1,083.84			

A total bond amount of $12.2 million held by Ramaco is based on the mine closure reclamation liability cost estimate as of December 31, 2022. The ARO estimate for all sites within the complex is $9.2 million, as of December 31, 2022. Both the WVDEP and VDE utilize 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 Knox Creek Complex sites appear reasonable.

Upon searching the WVDEP and the VDE violation records, it was found that the Knox Creek Complex has an excellent environmental compliance record without a history of any significant fines or citations over the last two years.

17.4 LOCAL STAKEHOLDERS

As indicated in Section 13.4.2, Ramaco currently employs 107 personnel at the Knox Creek Complex and is projected to have a maximum employment of approximately 275 personnel during the Knox Creek Complex LOM Plan. The complex 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 Knox Creek Complex is located in a rural and fairly isolated area of West Virginia and Virginia. Reportedly, there have been no social or community impact issues relative to the Knox Creek Complex. The local area supports Ramaco for the jobs that it provides for people in the surrounding communities.

17.5 MINE CLOSURE PLANS

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 Knox 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.

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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. 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.

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 Knox Creek Complex mining plans.

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18.0 CAPITAL AND OPERATING COSTS

Ramaco provided historical and projected operating costs and capital expenditures for the Knox 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 MCM CPAs & Advisors for Ramaco's 10-K reporting to the SEC. The auditing performed by MCM CPAs & Advisors is conducted in accordance with the standards of the Public Company Accounting Oversight Board.

18.1 CAPITAL EXPENDITURES

The Knox 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 Knox Creek Complex development costs since 2016 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, and the Knox Creek Preparation Plant. Actual capital expenditures for 2021 through 2022 and projected capital expenditures, in 2022 dollars, for 2023 through 2037, are shown on Figure 18.1-2:

Figure 18.1-1 Historical and Projected LOM Plan Capital Expenditures

Graphic

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The capital expenditures in 2023 relate to the development of the Big Creek Jawbone 1 Deep Mine, the Knox Creek Preparation Plant, and rehabilitation of the Knox Creek Tiller Mine.

Ramaco began development of the Knox Creek Complex in 2017 and commenced mining in 2019. 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 $12.20 per ton for projected mining equipment and infrastructure requirements is $13.15 per ton lower than the historical average cost of $25.35 per ton, which included high development capital from 2021 through 2022 for the Big Creek Jawbone 1 Deep Mine and minimal production. Capital expenditures estimates per annual ton are estimated to have an accuracy within +/- 15.0 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 Knox Creek Complex actual and LOM Plan projected operating costs in dollars and dollars per ton, are shown on Figure 18.2-1:

Technical Report Summary
Knox Creek Complex
Prepared for Ramaco Resources, Inc.
Graphic

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

Graphic

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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.
- Professional services, which are expenses related to legal, engineering, and other firms providing services to the Knox 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, Virginia and West Virginia Severance Taxes, and Virginia, 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

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	Total
Labor costs	13.0	25.8	34.5	33.0	27.5	20.5	20.5	20.5	20.5	20.5	20.5	13.7	11.8	11.8	5.7	0.1	299.7
Maintenance & supplies	11.4	26.4	30.3	28.3	25.5	24.7	23.5	19.3	20.9	21.0	20.6	12.9	10.5	10.9	5.2	0.1	291.5
Utility expenses	1.4	2.5	4.2	4.2	3.5	3.3	3.2	2.6	2.7	2.8	2.7	1.7	1.4	1.4	0.7	—	38.3
Trucking costs	3.5	2.9	5.6	5.7	4.3	3.2	2.2	—	—	—	—	—	—	—	—	—	27.5
Contract Mining	0.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.7
Purchased third-party coal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Professional services	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	1.0
Property tax & insurance	0.4	0.5	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.4	0.4	8.9
Other costs	0.0	0.0	0.5	0.6	1.0	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	1.7	0.8	5.7
Sales related tax costs	4.7	7.3	11.9	11.9	10.9	10.3	9.5	7.2	7.8	7.9	7.7	4.8	4.0	4.1	2.0	—	111.8
Administrative costs	0.1	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.0	2.8

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Total Cost of Production	39.4	63.9	88.6	85.2	73.6	62.9	59.9	50.6	52.9	53.0	52.4	33.8	28.2	28.8	15.9	1.4	791.0
Asset Retirement obligation	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.1	4.1
Depreciation and amortization	2.3	4.2	9.8	6.0	5.6	5.2	4.8	3.6	3.9	4.0	3.9	2.4	2.0	2.0	1.0	0.0	60.7
Total Costs and Expenses	41.9	68.4	98.7	91.5	79.5	68.4	64.9	54.4	57.1	57.2	56.5	36.5	30.5	31.1	17.2	1.5	855.8
Capital Expenditures	10.3	8.9	11.0	9.2	8.3	7.7	7.3	5.7	6.1	6.0	5.9	3.8	3.1	3.1	1.5	—	97.8

The LOM Plan projected cash operating cost of $98.68 per ton is $18.57 per ton lower than the 2002 historical average of $117.25 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 Knox Creek Complex has been in operation since 2019 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 Knox Creek Complex LOM Plan, capital expenditures 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

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A Preliminary Feasibility Study financial model has been prepared in order to assess the economic viability of the Knox Creek Complex LOM Plan. Specifically, plans were evaluated using discounted cash flow analysis, which consists of annual revenue projections for the Knox 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 Knox 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 incorporates 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 Knox Creek Complex at a 10 percent discount rate. As the Knox 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 Knox Creek Complex revenue are depicted on Figure 19.1-1 and Table 19.2-1 as follows:

Figure 19.1-1 FOB Mine Coal Sales Price Forecast

Table 19.2-1 Annual Cash Flow Forecast Detail

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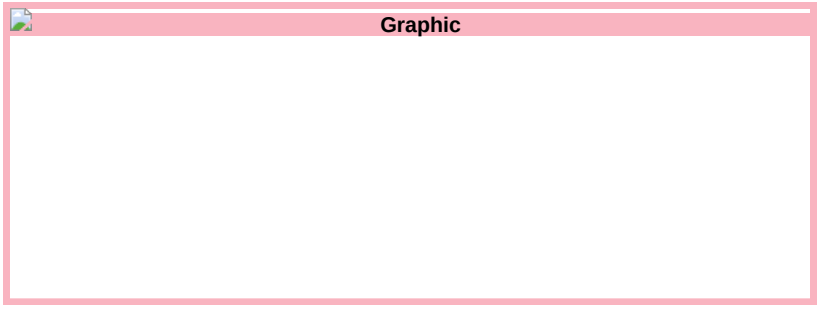
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	Total
Revenues	54.0	91.5	157.3	158.7	146.4	137.2	126.4	95.4	104.2	104.7	102.2	63.1	51.8	53.3	24.8	—	1,470.9
Total Costs and Expenses	41.9	68.4	98.7	91.5	79.5	68.4	64.9	54.4	57.1	57.2	56.5	36.5	30.5	31.1	17.2	1.5	855.8
Income before taxes	12.0	23.1	58.6	67.2	67.0	68.8	61.4	40.9	47.1	47.5	45.7	26.5	21.3	22.2	7.7	(1.5)	615.2
Income tax expense	2.5	4.8	12.3	14.1	14.1	14.4	12.9	8.6	9.9	10.0	9.6	5.6	4.5	4.7	1.6	(0.3)	129.2
Net income	9.5	18.2	46.3	53.1	52.9	54.3	48.5	32.3	37.2	37.5	36.1	21.0	16.9	17.5	6.1	(1.2)	486.0
Adjusted EBITDA	12.0	22.8	56.4	59.4	58.8	59.8	53.6	36.2	41.4	41.7	40.2	23.7	19.1	19.8	7.3	(1.1)	550.8
Capital Expenditures	10.3	8.9	11.0	9.2	8.3	7.7	7.3	5.7	6.1	6.0	5.9	3.8	3.1	3.1	1.5	—	97.8
Total Cash Flow	1.7	13.9	45.4	50.3	50.5	52.1	46.3	30.5	35.3	35.7	34.3	19.9	16.0	16.7	5.8	(1.1)	453.0

19.2 ECONOMIC ANALYSIS AND ANNUAL CASH FLOW FORECAST

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

Figure 19.2-1 Annual Cash Flow Forecast



Cash flows decline after 2028, as a result of a projected decrease in coal production. While not included in these cash flows, Ramaco plans to commence other mining operations within the Knox 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 Knox Creek Complex, updates will be made to this analysis.

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The Knox Creek Complex LOM Plan has an after-tax NPV of $249.0 million, at a base case discount rate of 10 percent (Table 19.2-2). As the Knox Creek Complex is ongoing with no initial investment required (i.e., already sunk cost), the IRR is infinite. Cumulative (undiscounted) cash flow over the LOM Plan is positive, at $453.0 million. The Return on Investment (ROI), at a 10 percent discount rate, is 314 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)	249,018
IRR (%)	Infinite
Cumulative Cash Flow ($000)	452,989
Return on Investment (%)	314

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 $98.68 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 TonsProduced (000s)	17,451
CleanTons Produced (000s)	8,016
Preparation PlantYield(%)	45.9
Tons Sold (000s)	8,016
	($PerTon)
CoalSalesRealization	183.50
DirectCashCosts	98.68
Non-cashCosts	8.08
TotalCostofSales	106.76
Profit / (Loss)	76.74
EBITDA	84.82
CAPEX	12.20

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

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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 44 percent between 2021 and 2022
- Production - Variability in production of up to 63 percent from the 2021 through 2022
- Operating Cost - Estimated accuracy of +/- 15 percent
- Capital Costs – Estimated accuracy of +/- 15 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

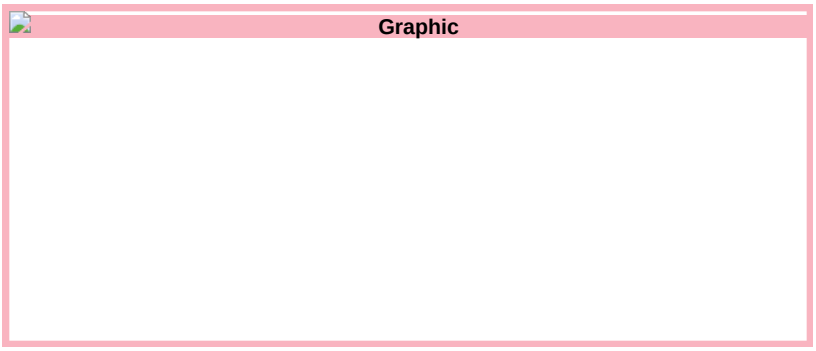

Figure 19.3-1 shows that the Knox Creek Complex NPV is most sensitive to changes in coal sales prices and production. It is less sensitive to changes in operating costs and least sensitive to changes in discount rate and capital expenditures.

20.0 ADJACENT PROPERTIES

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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 Policy shall be administered by the Committee. The Committee shall have full power and authority to construe and interpret this Policy, and to recommend to the mineral Non-Employee Board its determinations as to whether recoupment is required under the Policy, the amount of Incentive-Based Compensation to recoup from an Executive Officer and surface rights whether any other action should be taken pursuant to Section 6 of Ramaco's mining operations was not part the Policy. Upon the approval of WEIR's scope the Committee's recommendations by a majority of work. This TRS is based the members of the Non-Employee Board (even if less than a quorum), the final decision shall be binding and conclusive 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

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22.1 SUMMARY OF INTERPRETATIONS AND CONCLUSIONS

Interpretation

Ramaco has a long operating history of resource exploration, mine development, and mining operations at the Knox 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 300.6 million in-place tons of measured and indicated coal resources, exclusive of reserves, and 8.0 million clean recoverable tons of mineable reserves within the Knox Creek Complex, as of December 31, 2022. Reasonable prospects for economic extraction were established through the development of a Preliminary Feasibility Study relative to the Knox 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. parties.

22.2 SIGNIFICANT RISKS AND UNCERTAINTIES Recoupment 4.

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 Knox 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 Knox Creek Complex LOM Plan. The risks, WEIR's assessment of risk magnitude, and comments

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based on WEIR's experience with surface and underground mining operations are summarized in Table 22.2-1 as follows:

Table 22.2-1ofIncentiveCoKnox 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 to Moderate	Although methane gas is present in the seams, gas liberation experienced to date has been low to moderate, 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 with its 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.

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Roof Lithology	Low to Moderate	All underground coal mines have the potential to experience unstable roof conditions. The relative consistency of the Norton and Pocahontas Formations that primarily consists of competent sandstones and shales help decrease this risk at the Berwind 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 to Moderate	The structure of the seams at the Berwind Complex all have a relatively gentle dip of approximately two degrees to the northwest or to the south/southwest. There are seven 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 Berwind 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 Berwind 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, Japan, Korea, and India are likely to be primary drivers for the metallurgical coal industry.

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 Knox 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 LOM 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).

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24.0 REFERENCES

References used in preparation of this TRS are as follows:

- Ramaco. 2022. *Jawbone Mine Plan 2023*
- Ramaco. 2022. *Kennedy No. 3 Mine Plan 2023*
- Ramaco. 2021. *Big Creek Surface Mine Plan 2021 - Standard*
- Ramaco. 2021. *Knox Creek Tiller Mine Jawbone Seam Plan 2020 - Standard*
- Harlow, George E., Jr. and LeCain, Gary D., 1993, *Hydraulic Characteristics of, and Ground-Water Flow in, Coal-Bearing Rocks of Southwestern Virginia: U. S. Geological Survey Water-Supply Paper 2388.*

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**
- VDE Permits; Mined Land Repurposing Internet (virginia.gov)

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 event that the underlying assumptions Company is required to prepare a Restatement, the Company must recover reasonably promptly the Erroneously Awarded Compensation received by a person (a) after beginning service as an Executive Officer, (b) who served as an Executive Officer at any time during the performance period for that Incentive-Based Compensation, and facts supporting information provided by (c) during the registrant are factual and accurate, and WEIR has no reason recovery period described in Section 5 below. Recovery is subject only to believe that any material facts have been withheld or misstated. WEIR has taken all appropriate steps, those exceptions set forth in its professional opinion, to ensure information provided by the registrant is reasonable and reliable for use in this report. Recoupment Rules.

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The registrant's technical and financial personnel provided information as summarized on Table 25.1 as follows: Committee can recommend that the Non-Employee Board recoup from the Executive Officer all or a portion of the following in order to satisfy the Executive Officer's recoupment obligation:

Table 25.1 Information Relied Upon from Registrant Cash Incentive Plan: The Committee can recommend that the Non-Employee Board (i) cancel and forfeit the Executive Officer's annual or other cash incentive opportunity for the then current plan year, and/or (ii) require repayment of any annual or other cash incentive awards previously paid for prior years within the period described in Section 5.

Category	
	Long Term Incentive Plan (LTIP): The Committee can recommend that the Non-Employee Board (i) cancel and forfeit any outstanding LTIP awards, (ii) require the E
Legal	
Geotechnical	
Hydrogeological	
Marketing	
Environmental	
Macroeconomic	

The Committee can also recommend that the Non-Employee Board recoup similar compensation under any subsequently adopted plans, arrangements or agreements or compensation under any non-qualified deferred compensation arrangements.

5. LimitationonPeriodforRecoupment

In the event that the Company is required to prepare a Restatement, the Company must recover Erroneously Awarded Compensation received by Executive Officers during the three completed fiscal years immediately preceding the date that the Company is required to prepare a Restatement, and any transition period (that results from a change in the Company's fiscal year) of less than nine months within or immediately following those three completed fiscal years.

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NoImpairmentofOtherRemedies

This Policy shall not preclude the Committee from recommending that the Non-Employee Board take any other action to enforce an Executive Officer's obligation to the Company, including termination of employment, institution of civil proceedings, or action to effect criminal proceedings.

7.

Notwithstanding the foregoing, to the extent any provision of applicable law, including the Recoupment Rules, requires non-discretionary recoupment or would result in a larger recoupment than permitted under this Policy, the provision of such applicable law shall supersede the relevant provisions of this Policy.

Technical Report Summary
Knox Creek Complex
Prepare*EffectiveDate*› Resources, Inc.
8.

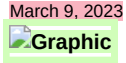
Graphic

APPENDIX A - EXHIBITS

Exhibit 6.3-2 **Knox Creek Complex, Geological Cross Sections****This Policy shall apply to all Incentive Compensation paid, awarded or granted on or after October 2, 2023.**

PolicyAcknowledgmentandConsent

I hereby acknowledge that I have been designated an Executive Officer, I acknowledge and agree to the terms of this Policy, I agree to fully cooperate with the Company in connection with the enforcement of the Policy, including the repayment by or recovery from me of Erroneously Awarded Compensation, and I agree that the Company may enforce its rights under the Policy through any and all reasonable means permitted under applicable law as the Company deems necessary or appropriate under the Policy.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