Eureka No. 40
Berwind-White Coal Mining Company
E of PA 56, N of Little Paint Creek
Scalp Level
Cambria County
Pennsylvania

HAER No. PA-184

HAER
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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Department of the Interior
Washington, D.C. 20013-7127

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HISTORIC AMERICAN ENGINEERING RECORD

EUREKA NO. 40

HAER No. PA-184

Location:	East of PA 56, north of Little Paint Creek, Scalp Level, Cambria County, Pennsylvania USGS Quad: Richland, Pennsylvania (1:24,000) UTM: 17 E.683520 N.4457880
Date of Construction:	1902
Builder:	Berwind-White Coal Mining Company
Present Owner:	Berwind Corporation
Present Use:	Abandoned
Significance:	Built by Berwind-White, one of the nation's leading producers of steam coal, Eureka no. 40 was one of the largest and best equipped mines in the Windber area, a coal town developed by the Berwind-White Coal Mining Company.
Project Information:	In February 1987, the Historic American Engineering Record (HAER) and the Historic American Buildings Survey (HABS) began a multi-year historical and architectural documentation project in southwestern Pennsylvania. Carried out in conjunction with America's Industrial Heritage Project, HAER undertook a comprehensive inventory of the region's surviving historic engineering and industrial works. One of these, Eureka No. 40, was found to be among the most intact collieries in the region. In the summer of 1988, HAER undertook a historical study and photographic documentation project of Eureka No. 40. Historian Demian Hess carried out the research and writing under the direction of HAER Engineering Historian Gray Fitzsimons. The large-format photography was performed by HAER Photographer Jet Lowe.
Historian:	Demian Hess, 1988

CONTENTS

Introduction

This report examines the general operation of the Berwind-White Mining Company's mines located in the Windber field of Cambria and Somerset counties, and specifically Eureka No. 40, which is currently the most intact of these Berwind-White mines. Particular attention has been given to Berwind-White's operation of, and changes to, its mines with an emphasis on No. 40, which operated longer than any of the other Eureka mines in the Windber area. As will be seen, there were many engineering and economic factors affecting the development of the Windber mines. In part, the growth of the mines themselves necessitated more efficient methods of haulage, and improved ventilation and drainage. However, the impetus for these improvements was also rooted outside the mines: increasing competition in the expanding bituminous coal industry in the early 1900s required more efficient mining and processing operations. Such large companies as Berwind-White sought increased efficiency through physical improvements, as well as through strong managerial control over the work force.

Unfortunately, due to the limited amount of time available to conduct this study, a number of important areas have not been addressed, including, most critically, the history of the miners and colliery workers of Berwind-White's Eureka mines. By providing an understanding of the technology employed by the Berwind-White Mining Company, and the changes made to its Windber mines, it is hoped that this study will spark further inquiry into the relation of the miners to the company as well as their response to the many changes in the work place. It is only then that we will have a more complete understanding of the history of one of western Pennsylvania's richest bituminous coal fields.

To document the evolution of the Windber mines this study relied primarily on reports in trade journals, company records, local residents and retired Berwind-White employees, and surveys of surviving structures. The main body of the report is divided into three sections: the first section provides a brief overview of Pennsylvania's bituminous industry; the second section includes a short history of the Berwind-White Coal Mining Company; and the third section traces the development of the Eureka mines in the Windber area. The main report is followed by two appendices: Appendix A contains an inventory of structures that are either currently standing or which once stood in the area of Eureka No. 40. Appendix B is intended as a research aid for further study of Eureka No. 40, and contains a list of all known company drawings relating to this once active mine.

A number of HABS/HAER historians reviewed this manuscript for editorial concerns. This includes Ken Rose, Frances Robb, and

Gray Fitzsimons. The comments of these readers were incorporated into this report in June 1993. One further note needs mention. A section of this study of Berwind-White's mining activities concerns the introduction of machines into the mines. At the time the research and writing for this study was carried out an important book on mine mechanization, Keith Dix's What's a Coal Miner to Do? The Mechanization of Coal Mining (Pittsburgh, PA: University of Pittsburgh Press, 1988), was just being issued. This case study of Berwind-White's Eureka mines complements, in a small way, the many keen insights made by Dix, who examined mine mechanization from a broader national standpoint (though most of his material is on West Virginia) and assessed the conflicts among the purveyors of this new technology, as well as the tension between coal operators and miners at the outset of its introduction into the mines. Readers of this manuscript are strongly encouraged to consult What's a Miner to Do?.

Part I
Overview of Pennsylvania's Bituminous Coal Industry

> Unlike the bituminous part of the coal industry the production of anthracite has been fairly well publicized; in fact until about 1845 whenever the coal industry of Pennsylvania was mentioned in papers, magazines or books, anthracite only was meant.[1]

The development of bituminous coal mining has not received the attention of the anthracite industry, although by the late nineteenth century it was a much more important industrial fuel and its production far outstripped that of hard coal. In fact, soft coal is much more widely available, underlying most of western Pennsylvania in a broad bed known as the Pittsburgh field. Anthracite is almost wholly confined to a few narrow beds in eastern Pennsylvania. As early as 1800, over 87,000 tons of bituminous and only 250 tons of anthracite coal were mined in the state local use.[2]

Coal production, both bituminous and anthracite, increased in the nineteenth century, mirroring the rise in trade and population throughout the country. The anthracite fields, however, were closer to the populated coastal centers and thus developed on a larger commercial scale. One of the earliest successful ventures was the Delaware and Schuylkill Canal Company which opened the Schuylkill Canal in 1825 to carry anthracite to Philadelphia. In 1829, the Lehigh Navigation and Coal Company completed the Lehigh Canal for shipping coal, iron, agricultural and other goods. By 1832, the annual output of anthracite had reached 501,951 tons compared to 450,940 tons of soft coal.[3]

The Pittsburgh coal field was eventually developed on a similarly extensive-scale, particularly after the introduction of railroads to the area in the last quarter of the nineteenth

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[1]Howard N. Eavenson, The First Century and a Quarter of American Coal Industry (Pittsburgh; 1942), 138.

[2]Robert D. Billinger, Pennsylvania's Coal Industry (Gettysburg; 1954), 38.

[3]Billlinger, Pennsylvania's Coal Industry, 38.

century.[4] Bituminous production equalled that of anthracite in 1870 and then surpassed it in every following year.[5] Soft coal was used primarily in industry for generating steam or was processed to form coke for steel manufacturing. Hard coal was largely used for domestic heating.[6]

The steady growth of the bituminous coal industry reached a peak in 1918 when 178 million tons were mined in Pennsylvania. After the war, state coal production declined and never wholly recovered. Even in 1929, a year of tremendous industrial activity, only 144 million tons were produced.[7] In part, the decline was due to increased competition with other coal producing states, particularly Kentucky and West Virginia. Operators in these states had been encouraged to enter the field by high coal prices during the first World War and possessed an advantage in lower labor costs.[8]

The decline of coal production in Pennsylvania was also part of a nation-wide slump in the coal industry. One writer observed:

> The [national] peak in both production and employment in bituminous coal mining came during the first World War, and that conflict may, therefore, be taken as a convenient dividing point in the history of the industry. Before the war one may trace a general upward movement in both series which culminated in their wartime peaks. Thereafter the direction of movement was reversed....[B]etween 1899 and 1918 [production increased]...200 percent....[B]etween 1918 and the low point

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[4]The expansion of bituminous mining after the introduction of the railroad in the last quarter of the nineteenth century is touched upon in several sources: Billinger, Pennsylvania's Coal Industry, 38; William Gilbert Irwin, "The Development of the Bituminous Coal Industry," Scientific American, 85 (19 October 1901), 243; and Irwin, "Development of the Coal Industry," Gunton's Magazine, 22 (June 1902), 547.

[5]Hudson Coal Company, The Story of Anthracite (New York; 1932), 109.

[6]T.A. Veenstra, W.G. Fritz, "Major Economic Tendencies in the Bituminous Coal Industry," The Quarterly Journal of Economics, 51 (November 1936), 116.

[7]John N. Hoffman, "Pennsylvania's Bituminous Coal Industry: An Industry Review," Pennsylvania History, 45 (1978), 358.

[8]Hoffman, "Pennsylvania's Bituminous Coal Industry," 359.

in 1932 output declined 47 percent....[9]

This general decline in coal production resulted in part from a more efficient use of coal in industry, particularly by electric utility and railroad concerns. Between 1919 and 1933 "consumption of coal per unit of electric power output decreased 53.1 percent," and, it was reported, "steam railroads used 28.8 percent less coal per ton-mile of freight services and 17.8 percent less per passenger train car-mile."[10] More importantly, coal demand dropped as consumers switched to alternate fuels, particularly gas and oil. These fuels were often easier to handle, requiring less storage space and producing less grime, and were less subject to the interruption of supply.[11]

Throughout much of its existence, the coal industry has been plagued by labor strife, transportation difficulties, and fluctuations in price and demand which often interfered with production.[12] The slackening demand for coal after the First World War was simply another problem in a series of troubles facing the industry. The root of many of these problems was the overabundance of coal. C. E. Lesher, the editor of Coal Age, wrote in 1921:

> In the United States deposits of coal are widely distributed....It outcrops on the hillsides or is but buried by a shallow covering....[People] have but to go to the country banks, the gopher holes, and strip pits, of which there are between ten and twenty thousand, for the coal to meet their ample needs.
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> So easy is the coal of access...and so simple is the initial work of opening a mine that every period of unusual demand, in which

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[9]Harold Barger and Sam H. Schurr, The Mining Industries, 1899-1939: A Study of Output, Employment and Productivity (New York; 1944) 163.

[10]Veenstra and Fritz, "Major Economic Tendencies in the Bituminous Coal Industry," 113.

[11]John T. Ryan, Jr., "The Future of the Bituminous Coal Industry," Harvard Business Review, 14 (1936), 328.

[12]A good assessment of the industry's problems is sketched out as part of a larger thesis in William Graebner, "Great Expectations: The Search for Order in Bituminous Coal, 1890-1917," Business History Review, 48 (1974), 49-72; also see: F.G. Tryon, "The Irregular Operation of the Bituminous Coal Industry," Supplement: American Economic Review (March 1921), 57-73.

> prices rise more than a few cents above the cost of production, finds many entering the business. Whereas the development of 200 new mines of consequence each year will suffice to maintain capacity at the present rate of consumption, there were, it is reported, 1000 new mines opened this year in Central Pennsylvania alone....Having your own coal mine is almost as simple as having a war garden. Raising hogs, cotton, and corn are no more competitive than mining bituminous coal.[13]

The resulting overexpansion, particularly during the war, led to excessive competition between coal producers which actually crippled the industry's response to the constricting market of the 1920s. One historian has claimed that after the war,

> the coal industry ... had to face its competition [with other fuels] at a time when it was in no condition internally to wage an effective battle. The development of new fields in southern West Virginia and Kentucky...brought about a major cleavage in the industry which prevented unified action against the external conditions. Price competition, as between producing sections and between individual concerns, demanded a far greater proportion of the managements' attention than did the development of plans for meeting the external competition in the market.[14]

As early as the 1890s, coal operators were aware of the problem and attempted to moderate competition by forming organizations to set prices and limit output.[15] Unfortunately for the operators, however, most of these cooperative efforts had failed by the time of the first World War. In part, the federal government opposed these attempts as unfair restraints of trade. In 1899, for example, a federal judge invoked the Sherman Act in ruling

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[13]C.E. Lesher, "An Introductory Survey of the Bituminous Coal Industry," <u>Supplement: American Economic Review</u> (March 1921), 49-56.

[14]Ryan, "The Future of the Bituminous Coal Industry," 328.

[15]See Graebner, "Great Expectations," 49-72.

against the New River Consolidated Coal and Coke Company for its price fixing of coal produced in the New River and Kanawha fields of West Virginia. In addition, not all coal operators supported cooperation. Edward Julius Berwind, president of Berwind-White, one of the largest coal producers in Pennsylvania, is reported to have said that he "would never join any operators association, holding that they were all right for the ordinary operator but were beneath his dignity."[16]

The failure of industry-wide cooperation increased the pressure on individual coal operators to improve the efficiency of their operations and thereby offset the harmful effects of fierce competition and low prices. These included increased production, lower operating costs, and attempts to find new markets. Marketing and production solutions were especially popular responses to the increasing competitiveness of the 1920s and coal operators began to tailor their product to meet individual consumers' needs.[17]

The Berwind-White Company was especially successful in finding individual solutions to industry-wide problems. The company maintained a high rate of production and sales by offering superior service and a better product than its competitors. In the end, however, Berwind-White could not escape the general problems of the industry. By the 1960s, it had largely withdrawn from the coal fields. An examination of the rise and decline of Berwind-White reveals a great deal about the history of the bituminous industry in Pennsylvania and the nation.

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[16]For quote, see Graebner, "Great Expectations," 58-59.

[17]It has been argued such economic historians as John Graebner that operational improvements were a common response to the disorder of the bituminous coal industry. However, more research is necessary to gauge to what extent and why the bituminous industry adopted new marketing and preparation techniques. It is clear, nevertheless, that the Berwind-White Company did alter its methods in these areas, particularly during the 1920s. For an example of the company's response, see the chief mining engineer's explanation of why a new cleaning plant was being built: Charles Enzian, "Dry Cleaning of Coal at the Berwind-White Operations," The Mining Congress Journal, 13 (June 1927), 427.

Part II
The Berwind-White Coal Mining Company

> So firm is its foundation laid today, it is impossible to conceive of a coal industry in the United States, even generations ahead, in which The Berwind-White Coal Mining Company does not function, then, as in the past, and now, a dominant, pioneering leader among coal companies yet to evolve.[18]

The Berwind-White Coal Mining Company was one of the largest and most important coal producers in the United States. Even in 1955, a low-point in its operations, and only seven years before it closed its last mine, the company ranked as the nation's ninth largest commercial producer.[19] In an industry marked by fluctuating demand and severe competition, Berwind-White was distinguished for its stability and foresight.

The founder of the company was Charles F. Berwind, who entered the trade in 1861 at the age of 15 as an office boy for the coal merchant Robert Hare Powell. In 1863, Powell organized the Powelton Coal and Iron Company and by 1867 had promoted Berwind to vice president. In 1869, Berwind founded his own company named Berwind and Bradley. This enterprise later dissolved and in 1874 he formed a partnership called Berwind, White and Company with Judge Allison White of White and Lingle.

The first mine of Berwind, White and Company was Eureka Number 1 near Osceola Mills, Pennsylvania, which had been opened by White and Lingle in 1869.[20] The newly formed partnership developed additional coal lands, primarily in Clearfield and

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[18]For this quote see A. Tappan Sargent, "Enduring Coal Enterprise: Far Flung, the Berwind-White Coal Mining Company Serves World-Wide Trade," The Black Diamond, 96 (28 March 1936), 32. Unless otherwise noted the information from this section of the report was drawn from Sargent, "Enduring Coal Enterprise," 21-32, and an unpublished manuscript prepared for the Berwind-White Company as part of its hundredth anniversary. A copy of this manuscript is in the possession of Robert E. Barrett, a resident of Windber and former vice president of the company's operations in the area, who has a collection of various Berwind-White materials. This collection is hereafter referred to as the Barrett Collection. The unpublished manuscript prepared for the company's hundredth anniversary is hereafter cited as "Unpublished MS," Barrett Collection.

[19]C.L. Christenson, Economic Redevelopment in Bituminous Coal (Cambridge; 1962), 46.

[20]"Eureka Collieries Nos. 4 and 5," 8 June 188[6?], newspaper clipping, Barrett Collection.

Jefferson counties, and by 1885 operated 11 mines. The following year, Berwind and White incorporated as the Berwind-White Coal Mining Company. In the Clearfield region, Berwind-White eventually opened Eureka Numbers 1 through 29 as well as several other groups of mines including the Atlantics, Cataracts, Oceans and Pacifics.[21] In the 1880s, a newspaper near Osceola Mills marvelled that "it matters not how many collieries or how much coal Mr. Crist [the general manager for the company] can produce or purchase from other works, Mr. Berwind appears to have places to dispose of it and is constantly asking for more."[22]

Much of the Berwind-White coal was "disposed of" by Edward Julius Berwind, brother to Charles. Like his brother, he had entered the coal trade in the 1860s working for the Powelton Coal and Iron Company. In 1865, however, he entered the Annapolis Naval Academy and served in the Navy after graduating. He resigned his commission in 1875 to join his brother's new business as a salesman. Edward opened an office in New York and vigorously marketed his company's product. A newspaper later reported that

> up to this time the eastern railroads and the factories of Philadelphia, Camden, Trenton, Newark, Jersey City and other seaboard industrial centres had been using anthracite coal chiefly, and it was the persistent, energetic work of the Berwind-White Coal Company that demonstrated to railway companies, manufacturing industries and steamship corporations that bituminous coal was a cheaper fuel than anthracite and that it was worth their while to use the cheaper fuel.[23]

Reflecting his naval background, Edward found a major market in supplying fuel to the steamship lines operating out of New York. By 1900, Berwind-White bunkered 80 percent of the coal in the

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[21]Robert Barrett, "Period of Operation of Berwind Interests," is a graph showing all of the company's mines, years of operation and coal seams worked. It is hereafter referred to as "Period of Operation," Barrett Collection.

[22]"Eureka Collieries Nos. 4 and 5," Barrett Collection.

[23]"Pennsylvania Captains of Industry," 19 July 1908, newspaper article held in a clippings file, Photojournalism Collection, Temple University Library, Philadelphia, Pennsylvania. This clippings collection is hereafter referred to as PCTUL.

city's harbor.[24]

Aside from Edward's salesmanship, Berwind-White based its success on its ability to guarantee regular deliveries of high grade coal. When the company formed in 1874, it had issued a prospectus emphasizing that it possessed "extensive facilities for large and regular deliveries, and as the coals are prepared under the direct supervision of a member of the firm, purchasers may rely upon receiving prompt shipments and a superior quality of coal."[25] To ensure quality, Berwind-White would close any mine in which the coal did not meet its standards for steam production. And to ensure regular production of coal, the company was willing to expend capital to improve the size and efficiency of its facilities. In 1891, the bituminous mine inspector reported that at a new operation in Jefferson County, "the equipments [sic]...are all of the best and money is not spared to make it a model colliery, in fact this can be said of all their plants located there...."[26]

The investment of capital by Berwind-White extended not only into its collieries, but also into a transportation network for shipping its coal to market. In 1885, Charles Berwind helped found the Clearfield and Jefferson extension of the Bell's Gap Railroad to reach his mines in Clearfield County and, by 1888, the company was maintaining its own fleet of coal cars.[27] Most operators relied on the railroads to supply cars and shortages invariably halted production and delayed delivery.[28] The extent to which Berwind-White would go to ensure delivery was revealed in 1906 when it was accused of bribing Pennsylvania Railroad officials "in return for a liberal distribution of cars and other favors...."[29]

Whether legitimately gained or not, Berwind-White achieved a reputation for dependability even in the face of extreme

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[24]Burcham Harding, "The Largest Collieries in the United States," The Engineering and Mining Journal, 69 (17 February 1900), 197.

[25]"Unpublished MS," Barrett Collection, 22.

[26]Reports of the Inspectors of Mines of the Anthracite and Bituminous Coal regions for the Year 1891 (Harrisburg; 1892), 436.

[27]Richard Burg, "When Empty Return to Windber," The Keystone 19 (Autumn 1986), 7.

[28]For a discussion of coal-car problems see Tryon, "The Irregular Operation of the Bituminous Coal Industry," 64-66.

[29]Newspaper clipping, June 1906, PCTUL.

adversity. In 1889, for example, the Johnstown Flood disrupted coal production in the central Pennsylvania coal fields and drove the Pennsylvania Railroad to seize "all the coal in transit on its lines and at tide water at New York and Philadelphia and other points for consumption by its own locomotives." The Berwind-White Company negotiated the release of its own coal and "to ensure the additional coal needed to meet this emergency, [was]...compelled to pay over $40,000 cash in excess of the regular market price, which loss they sustain[ed] in keeping their contracts good."[30]

In 1890, Charles F. Berwind died and his brother Edward assumed the presidency. Under his direction, the company entered a new phase of development and growth. The first major change came shortly after Charles' death, when a surveyor named Jim Mitchell contacted the new president offering to sell coal lands along the Cambria and Somerset county line. At that time, the company's coal reserves in the Clearfield region were becoming depleted. Although the company had previously surveyed the Cambria/Somerset area without locating any significant coal reserves, it nevertheless dispatched James Stuart Cunningham, a mining engineer, to investigate the new claims.[31] Cunningham recalled that

> Mitchell had furnished E[dward] J[ulius] B[erwind] [with] analyses from 15 openings, etc., that, could they be proven, would make that the country he needed for smokeless coals; and I will say for E.J.B. when he gets an idea, he loses no time. I was fired out by wire and with Mitchell's man Smith, I went carefully through these 15 coal banks and took sections.
>
> Tom Fisher at that time was a fine coal chemist and analyzed these samples. They checked up with the analyses made by Mitchell's chemist, to the second decimal. That was enough for E.J.B.
>
> He closed with Mitchell for 17,518 acres at $40.00 [per acre]...[32]

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[30]For quote see "Unpublished MS," Barrett Collection, 29-31.

[31]James Stuart Cunningham, transcription of a letter to Charles Graham Berwind, 1 November 1921, Barrett Collection.

[32]Cunningham to Berwind, 1 November 1921, Barrett Collection.

Based on the quality of the coal, Berwind decided to transfer the company's main operations to the new field in Cambria and Somerset counties. In 1892 and 1893, Cunningham purchased land in the region and eventually acquired 60,000 acres.[33]

Although the area was primarily rural, there were a few small coal mines in operation when Cunningham arrived. At least one had been opened by a farmer named David Schaffer, who also sold Cunningham a large tract of land. A man named J. Wilcox Brown had also purchased the rights to 4000 acres in 1878 and 1879 but never opened any mines.[34]

Cunningham drove the first Berwind-White mine, Eureka Number 30, in 1897. The next year, the company founded the town of Windber (the name being a transposition of the syllables in "Berwind") on the land purchased from Schaffer to serve as a headquarters. Berwind-White eventually opened Eureka Numbers 30 through 42 around Windber and also two shaft operations named Maryland Numbers 1 and 2 near St. Michael and Wilmore, respectively.

The company did not confine its operations wholly to Pennsylvania in these years. In 1902, Cunningham left Windber to acquire coal lands in the New River and Pocahontas fields of West Virginia.[35] These were among the few high quality "smokeless" coal fields outside of Pennsylvania, and while adding to its reserves, Berwind-White may have been attempting to control the supply of high quality coal. The company acquired at least 43,000 acres in the Pocahontas region and also purchased the W.P. Rend holdings in the New River district which amounted to 3000 acres and included five operating mines. In 1905, Berwind-White incorporated the New River and Pocahontas Consolidated Coal Company to manage its West Virginia properties. In the same year, it founded the town of Berwind in McDowell County, West Virginia, to serve as a headquarters for these operations.

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[33]"The Eureka Collieries," The Engineering and Mining Journal 77 (2 June 1904), 879.

[34]Frank Paul Alcamo, The Windber Story: A Twentieth Century Model Pennsylvania Coal Town (Privately published; 1983) 55-56; "Unpublished MS," Barrett Collection, 34.

[35]S.H. Jencks, "A History or Record or Chronicle of the Cambria and Indiana Railroad Company and...Coal Companies in Cambria and Adjoining Counties [of] Pennsylvania, With Reference to [the] Pocahontas and New River Coal Fields [of] West Virginia," 11. This manuscript is from a diary kept by S.H. Jencks, chief engineer of the Cambria and Indiana Railroad, in the Barrett Collection.

Eventually, the company also secured land in Kentucky.[36]

Unlike Windber coal, which was marketed in the east, coal mined in West Virginia was carried by rail to the Great Lakes region and then distributed by water. The fuel was widely used in the Midwest for domestic heating and utilities. To manage this market, in 1907 Berwind-White incorporated the Berwind Fuel Company with headquarters in Chicago and offices in Cleveland and Minneapolis-St. Paul. The company also operated coal handling facilities in Duluth, Minnesota, and Superior, Wisconsin.

The Pocahontas and New River coals were extremely friable and produced large amounts of slack sizes for which there was no market. To recover some of this product, Berwind-White experimented with methods of compressing the fine coal into briquets for use as fuel. It opened a briqueting plant in Superior in 1912 and another in Berwind in 1929.

While expanding its Midwestern markets, the Berwind-White Company also increased its foreign sales, particularly in the Caribbean. Largely an outgrowth of its bunkering trade, in 1904 it formed the Havana Coal Company to supply steamships making port in Cuba. Other ventures included the Archer Coal Depot Company in Trinidad (1912); the Porto Rico Coal Company in Puerto Rico (1913); as well as coaling stations throughout the Virgin Islands. The company diversified in the region as well, acquiring Industrial Molasses and several transportation-related companies, including the Tradewinds Airline. Berwind-White also engaged in European exports. Early in the twentieth century, it maintained a shipping fleet to carry its coal over the Atlantic. After the first World War, Berwind-White greatly expanded this trade and became the leading coal exporter to France.

Berwind-White's exports and Midwestern markets helped to offset the decline in the nation's coal bunkering trade in the 1920s as ships began to switch to alternate fuels. To further counter the declining demand for coal, Berwind-White sought to broaden its eastern markets by supplying more coal for heating and utilities and attempted to improve its methods of production and processing. Throughout the 1920s, its operations at Windber were marked by technological improvements in most areas, including coal cutting, haulage and ventilation. In 1926 and 1928 the company also built two technologically advanced coal cleaning plants in Windber which were designed to produce a better product and to attract new markets. Despite these efforts, however, the company's output steadily declined. In

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[36]The company is listed as holding land in Kentucky; see Christenson, Redevelopment in Bituminous Coal, 46.

1910, the company had extracted 4,356,886 tons of coal from its Pennsylvania mines. In 1919, after the war, this total fell to 2,842,543 tons. Berwind-White's production never regained its pre-war levels, ranging between two and three million tons throughout the 1920s.[37]

At this critical juncture, Edward Julius Berwind retired and named his nephew, Charles Dunlap, as his successor. By many accounts, Dunlap was an ineffectual manager and during his tenure from 1930 to 1960 production remained low and uneven. In 1930, following the stock market crash, the company produced only 1,909,092 tons. By 1940, output had risen to 2,481,066, but by 1950 it had dropped to 2,134,880 tons. Five years later, the amount of coal mined annually had once again slipped below the two million ton mark, totalling 1,833,547 tons; and by 1960 it had fallen to a low of 974,523 tons. This decline mirrored the overall slump in the industry as the demand for coal steadily contracted.

In 1961, Charles G. Berwind, another nephew of the late Edward J. Berwind, directed the election of a new president and board of directors for the company. The following year, the newly elected officers acquired the shares controlled by Dunlap and reincorporated as the Berwind Company. In an effort to reduce costs and gain solvency, the reorganized company closed its mines and sold many of its coal facilities and other interests.

Throughout much of the late-nineteenth and early-twentieth century, the Berwind-White Company was one of the largest commercial coal operators in the country. In large measure, it based its success on its dependability and the quality of its product. More significantly, during its first four decades Berwind-White continually reinvested in the physical plant of its mines and sought to locate new markets for its coal. This willingness to make improvements is especially apparent in the company's operation of its Windber mines.

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[37]All tonnage figures are taken from the annual reports of the Pennsylvania Bituminous Mins Inspectors for the years cited.

Part III
The Windber Mines

> It was a vast undertaking to open up the [Windber] collieries, requiring expert organization, enterprise and capital. Plans had to be made for mining the coal and carrying it to market, as the nearest railroad was 8 miles distant. The company which initiated this enterprise carried it on by applying the latest devices in mining science. Labor-saving machinery of all descriptions was introduced. Operations on the most extensive scale were designed, and wherever economies could be made by the expenditure of capital, there was no stint.[38]

The Berwind-White Company faced a major challenge in developing the Windber area. The region lacked transportation facilities and the characteristics of the coal seam itself greatly complicated mining operations. However, the area also possessed certain natural advantages and company officials believed that the quality of the coal outweighed nearly any disadvantage. Through careful planning and heavy capital investment, the company surmounted its obstacles and opened the Windber field.

One of Berwind-White's first major expenditures was the extension of the South Fork Branch of the Pennsylvania Railroad at Lovett to Windber and Scalp Level. The company bore this expense alone because, as the Railway World reported, even

> with all the progress that Mr. Berwind has made in building up the coal trade with the steamships coming into New York harbour and with all the possibilities for a further greater development of this trade, the Pennsylvania [Railroad] officers could not see that it would be profitable for the railroad company to build the connecting line.
>
> So sure was Mr. Berwind that he was right, that he determined to have the railroad built at his own expense. He supplied $300,000 to build the road and advanced $173,000 to put it into operation. The Pennsylvania Railroad

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[38]Harding, "The Largest Collieries in the United States," 197.

> supervised the construction and agreed to acquire the stock by paying for it out of the earnings derived on the tonnage from the mines reached by the road.[39]

Construction of the Scalp Level Railroad commenced in 1897 and was completed shortly afterward. In 1902, it merged with the South Fork Branch as the South Fork Railroad Company. The Pennsylvania Railroad acquired the extension on 1 April 1903.[40]

Even while work proceeded on the railroad, Berwind-White turned to the more difficult task of planning its mining operations. It opened most of its mines in a coal bed known as the Lower Kittanning or "B" seam. This was a high-grade steam coal generally having a content of 77 percent fixed carbon, 18 percent volatile matter, 5-10 percent ash and 1-3 percent sulfur.[41] The company also developed the Upper Kittanning or "C prime" seam, which lay approximately 110 feet above the lower bed.

Both of these coal seams lay within the Wilmore Basin, a syncline situated between the Allegheny escarpment to the east and the Ebensburg anticline to the west. The synclinal axis was oriented toward the northeast and the entire basin dipped gradually in that direction at an average grade of 2.5 percent. The Big Paint Creek, which passes south of Windber and forms part of the boundary of Cambria and Somerset counties, had carved a valley through the Wilmore basin which exposed the coal seams. These outcroppings were easily accessible to drift mining, and the valley cut so deeply that a large extent of the Windber field lay above the water table, simplifying mining even further. In fact, due to the gradual dip of the coal seam, mines driven toward the southern end of the field were almost entirely "self draining"; as the headings followed the slope of the coal upward to the southwest, water flowed by gravity to the drift mouths.[42]

The advantageous location of the Paint Creek Valley was, as

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[39]Quoted in "Unpublished MS," Barrett Collection, 32.

[40]Fred C. Doyle, ed., 50th Anniversary...Windber, Pa. (Dubois and Fall Creek, PA; [1947]), 50; Jencks, "A History," Barrett Collection, 7.

[41]Harding, "The Largest Collieries in the United States," 198.

[42]E.J. Newbaker, "Drainage and Pumping, Windber Field, Berwind-White Coal Mining Company," The Mining Congress Journal 15,(September 1929), 679.

Cunningham once noted, "the reason for Windber's existence."[43] With the town as the center of its operations, Berwind-White drove its mines radially into the flanks of the valley. Between 1897 and 1906, the company opened Eureka Numbers 30 through 42. Later, it also opened two shaft operations in the northern end of the field. The largest drift mines in Windber were Eureka Numbers 35, 36, 37, 40 and 42. These mines remained in operation into the 1950s. They all had workings in the Lower Kittanning seam and, with the exception of Eureka Number 36, also in the Upper Kittanning.[44]

Despite the area's natural advantages, none of these mines were easily developed. The upper and lower seams were very thin, averaging between three and four feet in thickness. As a result, much larger areas needed to be worked to recover a given amount of coal than would have been the case with a thicker seam. This entailed greater "dead work", that is, labor to lay track, prop ceiling, clear rock, etc. Longer headings required mining locomotives to run longer distances, reducing the number of daily trips, and thus, the amount of coal which could be extracted. And ventilating thin, extensive workings required continuous improvement and considerable expense.[45]

Another problem posed by the Windber field was the unevenness of the floor or bottom of the coal seam. The numerous "horsebacks" or rolls interfered with drainage, haulage, and undercutting.[46] The roof in some sections of the field also presented difficulties. At one point, the bituminous inspector reported that "the very peculiar roof encountered in...[some of the] heavy covered mines in the Windber region requires much attention and constant examination to keep it safe...."[47] Moreover, Windber coal was extremely friable and care was needed during handling to reduce breakage, as fine or "slack" sizes of

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[43]James Stuart Cunningham, "The Windber Mine," Mines and Minerals 21, (March 1901), 340.

[44]Barrett, "Period of Operation," Barrett Collection.

[45]For the difficulties of mining a thin-seam see: "Scraper Loader in Low Coal Triples Productiveness of Labor," Coal Age 31, (16 June 1927), 875-878; Donald J. Baker, "Ventilating an Extensive Thin-Coal Mine," Coal Age 18, (15 July 1920), 103-105.

[46]Charles Enzian, "Persistent Haulage Adjustment Overcomes Distance," Coal Age 32, (1927), 91.

[47]Report of the Department of Mines of Pennsylvania: Part II - Bituminous, 1915, 894.

coal had little market value.[48] Although the Windber mines were largely free of explosive gas, the company discovered that coal dust which was equally hazardous. In fact, a combination of coal dust and a small amount of gas could result in a devastating explosion.[49]

Berwind-White approached the mining of coal in the Windber area in the systematic manner which had characterized its operations in the Clearfield region. The company planned its mines with the single object of producing regular deliveries of high-grade coal for market. It selected what it considered the most practical and modern techniques and equipment, and employed them in all of its mines. A correspondent of the Engineering and Mining Journal observed the effects of this centralized planning when he visited the Windber field at the turn of the century and reported that

> the chief impression one gets from an inspection of the surface works in the mines is the manner in which equipment is standardized. This factor, too often neglected by companies operating a number of mines, is a most powerful aid in securing maximum output at minimum cost.[50]

In addition to standardizing its mining operations, the company sought to continually improve them. Berwind-White recognized the necessity of reassessing its methods as its mines grew and as changes occurred in mining science and the bituminous industry as a whole. Cunningham expressed the company's general philosophy of change when he wrote that

> the whole aim in the Windber installation is to keep every active piece of machinery necessary for the production of coal busy at effective work, and replace it instantly when broken or damaged.
>
> Doubtless inside of 5 to 10 years the electrical machinery we now have will be found on the scrap heap, and something more

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[48]Reference is made to the friable nature of the coals in Enzian, "Dry Cleaning of Coal at the Berwind-White Operations," 461.

[49]Report of the Department of Mines of Pennsylvania: Part II - Bituminous Report, 1907, xxiv.

[50]"The Eureka Collieries," The Engineering and Mining Journal, 880.

> up-to-date will replace it. We will come to compound condensing duplex compressors, and new mining methods may be installed from which we can all learn something. We can only say at present, we are in a state of evolution, and what exists to-day, may be discarded to-morrow for something better.[51]

Persistent evolution or continuous improvement became a hallmark of the Berwind-White engineering staff through at least the first two decades of the twentieth century--and, in fact, the philosophy may have been followed in every branch of the company from marketing to management. In 1922, following the bituminous miners' strike which hit hard Berwind-White's Windber operations, the company chose to replace many of its local managers. Among the newly hired at Windber was Charles Enzian, whom the company assigned chief engineer.[52]

Enzian was a graduate of Lehigh University and before coming to Berwind-White served as the president and general manager of the Liberty Coal & Iron Coal Corporation of Kentucky.[53] At Windber, Enzian sought greater efficiency in the company's operations. Among his major accomplishments, he founded a testing laboratory, introduced the use of time studies and graphs to arrange haulage schedules and equipment placement, experimented with mechanical loading and constructed the first coal cleaning plants in the area.

Enzian apparently left Windber sometime around 1930.[54] In the same year, Dunlap became president of the firm and the country entered the Great Depression. Perhaps due to this combination of factors, there was a marked decline in the number of improvements to the Windber operations. Some changes were undertaken, particularly the expansion of the mechanical cleaning facilities at one mine in the 1940s, but on the whole, the company invested little capital in new equipment or machinery. This lack of improvements was reflected as well in the fact that few trade journals detailed any significant developments in Windber after 1930.

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[51] Cunningham, "The Windber Mine," 341.

[52] Sewell Oldham, interview with author, 16 August 1988.

[53] Charles Enzian, "Rock-Dusting at Berwind-White Mines Costs Less Than One Cent per Ton of Output," Coal Age, 30 (8 July 1926), 47.

[54] Sewell Oldham, interview with author, 16 August 1988.

Despite the decline after 1930, the least first three decades of the company's mining activities were marked by careful planning and improvement. This level of attention was necessary not only to overcome the technical challenges of mining, but to respond to external conditions in the bituminous industry. The interplay of these issues is revealed in the evolution of the operational elements of the Windber mines.

Planning and operating a coal mine required the integration of many elements and was by no means a simple task.[55] First, it was necessary to layout the mine: the size and direction of the headings determined the extent to which a coal field could be worked. It was important, furthermore, that this layout be compatible with whatever methods were selected for extracting and hauling the coal. And finally, to keep the mine in operation, basic services had to be planned and provided, such as dust control, ventilation and drainage. The Berwind-White Company succeeded in integrating these tasks, developing a standard plan for the operation of all its mines. Over the years, the company also changed this general design to accommodate new operational problems, increasing technical knowledge and innovation, and developments in the bituminous market.

The Layout of the Eureka Mines at Windber

The generally level character of the Windber field enabled the Berwind-White Company to drive chiefly drift mines into the coal outcroppings along the Paint Creek Valley. These mines were spaced so that their workings abutted, allowing the entire extent of the Windber field to be developed. To open a mine, the company would first drive a main heading or "drift" straight back into the outcrop to serve as the main haulage road. By 1915, the company began to turn "panel-headings" off of the main heading to act as major cross streets in the mine.[56] Side entries were then opened approximately every 390 feet off of these major headings to serve as alleys.[57] The main headings were driven to the

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[55]Unless otherwise noted, the following description of the early operation of the Windber mines was drawn from these sources: Harding, "The Largest Collieries in the United States"; A.S. M'Allister, "Electric Plant," Mines and Minerals, 21 (October 1900), 110-112; Cunningham, "The Windber Mine"; and "The Eureka Collieries," The Engineering and Mining Journal.

[56]Panel headings are depicted in Berwind-White Engineering Debarment, "Working Plan. Windber District. Showing Advancing and Retreating Method of Room and Pillar System and Ventilation, 19 July 1915," drawing DC-1304.

[57]Report of the Bureau of Mines of the Department of Internal Affairs of Pennsylvania, Including Reports of Mine Inspectors, 1897, (Harrisburg; 1898), 380.

boundary of the company's holdings, generally a distance of 3-4 miles. The lateral headings were projected to reach a length of 2-3 miles.

All of the headings were largely planned to facilitate haulage. As the most heavily trafficked thoroughfares, the main and panel headings were extensively graded on both the top and bottom, well-ballasted and double tracked.[58] A cross section was normally 5-1/2 feet high and 16 feet wide. The side and panel headings turned off from the major roadways on a gradual curve--none with a radius less than 54 feet--and were banked, allowing mining locomotives to maintain a speed of 8 miles per hour. The side headings were normally 5 feet high and single tracked. They were driven 16 feet wide, but as "gob" or refuse rock was piled to one side, their width was effectively reduced to 8 feet.

Safety and roof conditions were also major factors in heading design. In mines where the roof was too unstable to allow a wide entry, two single-tracked main headings were driven to carry opposing lines of traffic.[59] At all turnouts in the mines, lateral headings were also driven "narrow" for at least 90 feet to create a thicker pillar of coal for roof support.

Method of Working

Branching away from the headings, Berwind-White employed a standard room-and-pillar system to work the coal. Rooms were opened every 42-60 feet off of the side entries. Each could reach a length of 300 feet and were 24-30 feet wide. For the first 30 feet, the rooms were driven narrow--only 9 feet wide--to create a thick pillar in the area of the entry. When all the rooms along a section of side heading had been opened, the pillars of coal between them would be removed. Not only did this increase the amount of coal recovered from the field, but it allowed the roof to settle, relieving pressure and the danger to adjacent sections of a sideways shear.[60]

Although widely used in the industry, the room and pillar system had a major drawback. Each room was isolated, and as the mines grew and the number of rooms and the distances between them increased, supervision, distribution of cars and equipment and

[58] See Enzian, "Persistent Haulage Adjustment," 91.

[59] Enzian, "Persistent Haulage Adjustment," 91.

[60] Sewell Oldham, interview with author, 16 August 1988.

the gathering of coal became increasingly difficult.[61] In 1921, the managing editor of Coal Age observed that coal mining "is still in a way a 'cottage' industry, only the cottage is a room in the mines."[62]

To remedy this problem, Berwind-White experimented with a short-wall working technique in at least one of its Windber mines, as early as 1926. The short-wall method entailed a continuous sawtoothed face worked off of each side entry. Men and equipment could be concentrated in the area of the working face, greatly simplifying supervision and general operations. For reasons that are unclear, however, the system was not fully developed or widely applied.[63]

Undercutting

To drive its headings and rooms, the Berwind-White Company would make a cut across the base of the coal face, 4-1/2 to 5 feet deep, and bore two to three holes at the top to hold explosives. The undercut allowed the coal to break cleanly from the seam when the "shots" were "fired". If the face were insufficiently undercut, the blast would pulverize the coal or, even worse, eject the shot from the bore hole. A "blown" or ejected shot could ignite coal dust in the air, causing a massive explosion.[64]

To make the cut, the Berwind-White Company used compressed-air cutters weighing 700-lbs and manufactured by the Ingersoll-Sargent and Harrison & Sullivan companies. Compressed-air machines were first widely manufactured in 1880 and mimicked the motion of a miner's hand pick, delivering a series of rapid blows

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[61]The problem of room-and-pillar mining is discussed by R. Dawson Hall, "Year 1922 Tackles Hopefully Many of the Big Problems of Coal Production and Preparation," Coal Age, 23 (18 January 1923), 89; and Barger and Schurr, The Mining Industries, 171-173.

[62]R. Dawson Hall, "Have Mining Engineers Accepted All That Developments in Machinery for Handling Coal Imply?" Coal Age 20, (7 July 1921); the quote is from Barger and Schurr, The Mining Industries, 171.

[63]"Scraper Loader in Low Coal Triples Productiveness of Labor," Coal Age, 31 (16 June 1927), 875-878.

[64]Report of the Department of Mines of Pennsylvania: Part II - Bituminous, 1905, (Harrisburg; 1906), xiv.

to pulverize the coal.[65] Where as many as twenty miners once worked, one compressed-air cutter operated by a two-man crew could undercut four to six rooms in a ten-hour shift.

Although by the 1900 most of the large coal operators were using electric chain-breast cutting machines, Berwind-White decided to employ compressed-air cutters in its mines.[66] The Berwind-White Company defended its selection of the compressed-air equipment, noting that the uneven floor of the Windber field interfered with the operation of the chain-breast machines. In addition, it claimed that the punchers offered "greater reliability ... and ... ease of control by untrained hands." The pneumatic punchers gave the additional benefit of conducting air to the working face.[67] Despite its decision to use compressed-air cutters, the company eventually employed chain-breast cutters in its mines. In 1915, for example, forty-one electric machines were installed at Eureka Number 40 and operated in conjunction with ten compressed-air punchers.[68] It is not clear why the change was made, although perhaps the company finally accepted the greater efficiency of the chain machines and employed them in sections of the mine where the floor was suitable.

Even with the installation of electric cutting machines, Berwind-White continued to use compressed-air punchers. In fact, they remained the primary type of undercutting machine. By 1917 in Eureka Number 40, the number of electric machines had dropped to thirty-four and these cutters produced only 280,302 of the 485,614 tons of coal mined in that year.[69]

Several other changes occurred in the company's undercutting methods. In 1922, Berwind-White adapted a rotary-disk cutter developed in Great Britain for long-wall mining. First used in

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[65]Barger and Schurr, The Mining Industries, 120; Edward W. Parker, "Coal Cutting Machinery," Transactions: American Institute of Mining Engineers, 29 (1899), 405-429.

[66]First manufactured in 1894, the chain-breast cutter utilized a horizontal blade fitted with an endless chain to cut the coal face. The new machines were faster, produced less slack, used less power, and spared the operator the expanse and trouble of installing compressed air pipelines. See Barger and Schurr, The Mining Industries, 120; Parker, "Coal Cutting Machinery," 435-449.

[67]M'Allister, "Electric Plant," 110.

[68]Report of the Department of Mines of Pennsylvania: Part II - Bituminous, 1915, (Harrisburg; 1916), 877.

[69]Report of the Department of Mines of Pennsylvania: Part II - Bituminous, 1917, (Harrisburg; 1918), 1164, 1169.

Eureka Number 35, the new machine was electrically powered, weighed 500-lbs, was suitable for use in sections with rolling bottoms and low roofs, and reportedly allowed the operator more control in directing the cut than either chain or punch machines.[70] The cutter may have been used in Eureka Number 37 in 1926 as part of the effort to develop a short wall mining technique. In 1930, the company began to use one-man pickhammers powered by compressed air. The pickhammers soon replaced all of the old punch machines and were used in conjunction with the electric chain cutters. The company reportedly chose the pickhammers because they were easier to control and enabled the miner to produce a cleaner run-of-mine product.[71]

Loading and Spotting

Once the coal was undercut and shot free, miners would push or "spot" cars to the face on tracks laid along either side of the room. The loose coal was then hand loaded and any "gob" or "bony" (among the names used to describe coal that was fused to slate) was removed and piled in the center of the room. The car was then pushed back to the side entry.

After the introduction of mechanical undercutting, loading remained as the most labor intensive task in all coal mines. In fact, hand loading was a major impediment in the application of factory methods to mining. As long as coal was loaded slowly by hand, it created a bottleneck in production. Despite the need for a mechanical loading system, little was accomplished within the industry until after the First World War. Improvements to mechanized coal loaders were hindered by technical problems, particularly the tremendous variability in coal mines, and by the indifference among most coal operators toward faster operations since miners were paid on a piece-rate basis.[72] When and where it was introduced, however, mechanical loading generally proved revolutionary. One historian has observed:

> In loading, more than in any other function, mechanization fosters an increased tempo of mine operations in general. It may indeed be said that the balanced cycle of underground operations is a concomitant of the post-World War mechanization of the loading process.

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[70]A.S. Brosky, "Disk Coal Cutters Installed at Windber Mines," Coal Age, 22 (27 July 1922), 130-131.

[71]Sewell Oldham, interview with author, 16 August 1988.

[72]Barger and Schurr, The Mining Industries, 169-180.

> To the extent that loading machines have replaced hand loading, bituminous coal mining must have become an industry in which many of the old craft traditions have had to be discarded. Each working face does not have its own loading machine; rather loading-machine crews have taken their place...as workers performing a specialized function in the larger process of mining. Ideally, a single working face is attacked in sequence by cutters, drillers and blasters, and loaders, each group working in close coordination with the others....The old routine (or lack of routine) has given way,...to a systematic planning of production with a closely supervised execution of the production process.[73]

Mechanical loading had a similar impact on Berwind-White's operations. The company introduced a scraper loader into its mines in 1926. Manufactured by the Goodman Company of Chicago, this scraper loader consisted of a bucket or scoop attached to an electric hoist. The scoop was pulled past the face, dragging the coal to the side entry and into the mine cars. At about this time, the company began to position the mine cars for loading by means of another electric hoist, obviating the need for hand spotting. After a trial period of several months, Berwind-White managers proclaimed that its production had tripled.[74]

The company first used the scraper loaders in its short wall mining operations, although later they were apparently employed in a standard room-and-pillar system. While speeding production, however, the scrapers had one serious disadvantage: while dragging coal along the floor scrapers also gathered up fireclay, scrap metal, rock, and other refuse. Cleaning facilities were built at some mines in the late 1920s, but in an effort to get as clean a product as possible, the company abandoned the scrapers sometime in the 1930s.[75]

Berwind-White did not, however, abandon its search for mechanical loading. By 1931, the company was using a series of conveyors in at least one of its mines to load coal. By this

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[73]Barger and Schurr, The Mining Industries, 125, 176.

[74]"Scraper Loader in Low Coal Triples Productiveness of Labor," 875-78.

[75]Sewell Oldham, interview with author, 16 August 1988.

system, coal was shovelled onto a "face conveyor" running across the working end of the room. It was then carried to a main conveyor which ran along the right side of the room and discharged into mine cars in the side entry.[76] Berwind-White used this conveyor system until the late 1950s. In 1958 and 1959, in Eureka Number 40, the company put into operation two "ripper-type" continuous miners as well as an array of loaders, shuttle cars and a series of belt conveyors.[77]

Gathering and Haulage

Once the mine cars were loaded, they were collected by the main haulage locomotive and carried to the surface. The problem of keeping all of the rooms supplied with empty cars and gathering and hauling the loaded ones were major factors limiting mine production. It did not matter, after all, how efficiently the company undercut or loaded its coal if there were no cars or locomotives to bring it to the surface.

An efficient haulage system required not only a sufficient number of cars and locomotives, but a good track system and coordination between hauling and mining operations. The complexity of these tasks increased as the mines grew. The Berwind-White Company was well aware of these facts and particularly conscious of the difficulties posed by the Windber mines which extended for many miles and had a number of steep grades. Looking back over the development of the Eureka mines, chief engineer Enzian wrote in 1927:

> General mine operation can be no more efficient than its haulage. Recognizing that this is so, the Berwind-White Coal Mining Company...has always attempted to provide as good a system of mine transportation as tried methods, and existing equipment, would permit. A number of its mines have been in operation for many years so that the hauls are now beyond the average length. The foresight of the early management in establishing, from the beginning, facilities for double-track haulage has enabled the present organization to continue the running

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[76]Berwind-White Engineering Department, "Eureka Number 40. Plan Showing Method of Mining in Conveyor Room 26 Left Main Heading, 20 February 1931" drawing A6-3994.

[77]"Berwind-White Tools Up, Hits Production Peaks," Coal Age, 65 (December 1960), 80-82.

of these mines on an economical basis.[78]

In addition to preparing high-quality roadways, the company carefully calculated the number and distribution requirements of the cars and locomotives it needed. Berwind-White initially estimated that each mine would have a daily output of 1800 to 1900 tons, requiring 600 cars and six locomotives. Cunningham, the chief engineer when the Windber mines opened, described how the cars were deployed in 1900:

> The method of gathering coal is to divide the entry into sections. An entry of 27 rooms would have three, nine-room sections.
>
> A motorman with a 36 empty wagon trip, would run slowly along while his spragger [assistant] cut off four cars for each room; this is done without stopping. Then they couple to the four loaded cars from each room of the next section and run out....[79]

The first electric locomotives used in Windber weighed between ten and twelve tons and were manufactured by the General-Electric and Baldwin-Westinghouse companies. The largest of these locomotives could haul up to 50 mine cars on a 3 percent grade. In 1915, the company began to use 30-ton locomotives manufactured by the Jeffrey Company of Columbus, Ohio. The next year, it also began to use 35-ton locomotives manufactured by Baldwin-Westinghouse. At the time, these were the largest mining locomotives in the world, capable of hauling 100 mine cars. By 1928, the company also acquired a 38-ton engine.[80]

In addition to overhauling its locomotive fleet, the Berwind-White Company improved its entire haulage system to accommodate heavier loads and traffic. By 1928, the company had replaced most of its original wooden wagons with two-ton-capacity steel mine cars. To carry heavier loads, new tracks were also installed. Initially, the main headings were laid with 35 pound

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[78]Enzian, "Persistent Haulage Adjustment," 91.

[79]Cunningham, "The Windber Mine," 341.

[80]"The Largest Electric Mine Locomotive in the World," Coal Age, 7 (10 April 1915), 634-635; photo with caption "This Baldwin-Westinghouse Locomotive...." in Coal Age, 10 (29 July 1916), 185; Newell G. Alford, "Some Economies in Longer Underground Haulage," The Mining Congress Journal, 15 (September 1929), 687.

rail, but by 1928 this was increased to 70 pound rail.[81] Also by that year, the company had developed an automatic block and signal system which "minimize[d] the chances of collisions, increase[d] the speed of trains, reduce[d] peak loads on substations and eliminate[d] some of the expense of manually operated signalling apparatus...."[82]

Importantly, despite the various improvements in loading and haulage overall production in the late 1910s and 1920s steadily decreased. Examination of the Pennsylvania bituminous mine inspector's reports reveals that at Eureka Number 40, while production rose steadily from the mine's opening in 1905 to 1914 (increasing from 21,275 to 579,153 tons), it actually dropped after the introduction of the larger haulage locomotives in 1915 (falling to 488,075 tons). By 1928, when the 38-ton locomotive was introduced, production had further fallen to 469,329 tons. This decline in production was attributable largely to key factor: as the Eureka mines were expanded the workings became more extensive, requiring longer hauls and running time. To maintain haulage economy, the Berwind-White Company was thus forced to increase the size of its locomotives to haul more cars and improve its track and signal systems. Enzian underscored this point in 1929 when he wrote:

> In the earlier years these mines produced at a rate as great as, or greater than, that of the present day, though facilities at hand were such that haulage was necessarily slow; but in those days the working faces were comparatively close to the openings. As the faces advanced further and further from daylight, the managements found it imperative constantly to improve the haulage system in order that the mines committed to their care would continue to produce at an established rate. This being the case, the haulage methods now employed at the mines of this company cannot be considered as revolutionary but as evolutionary.[83]

Coal Preparation

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[81]Enzian, "Persistent Haulage Adjustment," 91.

[82]C.E. Watts, "Automatic Block Signals for Mine Haulage Systems," The Mining Congress Journal, 14 (August 1928), 608-610.

[83]Enzian, "Persistent Haulage Adjustment," 91.

When Berwind-White first opened the Eureka mines at Windber, each mine possessed a wooden tipple equipped with Phillips automatic cross-over dumps for emptying the clean coal into railroad cars. Little else is known about the company's early method of coal preparation, but until the 1920s the system was probably fairly rudimentary: after the mine cars arrived at the tipple, coal was simply screened and hand-picked with clean coal loaded into rail cars for shipment to market. Refuse was hauled to a nearby bony pile.

Growing competition after the first World War led to more sophisticated techniques in coal preparation. To attract customers, many coal operators invested in cleaning plants to improve the quality of their product.[84] In 1926, the Berwind-White Company planned a dry cleaning plant at Eureka Number 37; another was built at Eureka Number 40 in 1928. Referring to the first plant, Enzian wrote:

> The economic conditions of the bituminous coal industry which have existed in the past, and no doubt will exist in the future, require exceptional alertness on the part of the operator to create additional demand through the improvement of the product from his mines so that he may be insured of retaining the market already supplied and a reasonable hope of gaining new markets.[85]

In the first cleaning plant, the Berwind-White Company relied on a dry process, whereby air was passed through the coal to separate it from impurities. Wet processes were also available, but the company avoided them largely because wet coal froze during shipment in cold weather, making it difficult to handle at its destination.[86] In addition, coal operators and consumers had a strong bias against wet coal because it was thought that the coal would have a lower heat output and could

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[84]Although coal demand was declining overall, the demand for certain types of coal, particularly slack sizes, was increasing and served as an additional impetus for the development of cleaning plants. The popularity of slack sizes increased following the development of a technique for blowing pulverized coal into furnaces after the First World War. Small sizes of coal could not be hand cleaned, and so coal operators necessarily were required to build cleaning plants to market a high-quality fine sized coal.

[85]Enzian, "Dry Cleaning of Coal at the Berwind-White Operations," 427.

[86]Enzian, "Dry Cleaning of Coal at the Berwind-White Operations," 427.

damage boilers and by-product coke ovens.[87]

Despite these objections, wet cleaning eventually became the industry's standard, primarily because it did not require the dust collecting equipment that was needed for dry cleaning.[88] Following the lead of other coal operators, Berwind-White installed a small wet-processing facility at its Eureka Number 40 plant, and later expanded this facility. By the 1950s most of the coal from the Eureka mines was cleaned by this process.

Ventilation

Driving headings and working, hauling and cleaning coal were not the only tasks the Berwind-White Company needed to address to operate its mines. To keep the workings open, certain basic operations were necessary such as ventilation, drainage, and dust control. Ventilation, like haulage, was a difficult task in the thin Windber coal seams; and as with haulage, the company committed itself to maintaining the best system practicable to ensure uninterrupted production.

The standard method of ventilation was to force a current of air through the mine and use heavy wooden doors to direct the draft through each heading. This system, however, was often inadequate because the doors in the mine were not tightly sealed or, even worse, because they were accidentally left open. As a result, sections of the mine were frequently deprived of fresh air.

In an attempt to improve its mine ventilation, Berwind-White employed a system that dispensed with doors altogether. This system entailed the installation of a fan, located near the portal, pushing fresh air through the drift to the workings of the mine. At the main heading, this airway "split" into two parts, one of which was made to cross the entry by means of an overcast. On opposite sides from one another, the two airways

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[87]E.J. Newbaker, "Dry Cleaning at the Berwind-White Coal Mining Company," The Mining Congress Journal, 14 (July 1928), 540, 559.

[88]It is not completely clear why wet cleaning of the Eureka coal was eventually the preferred method. One reason may stem from the friable nature of the Windber coals. Dry cleaning required extensive screening and blowing, which produced large amounts of coal dust. It was necessary for Berwind-White to install expensive dust control systems to limit the possibility of a dust explosion in its cleaning plants. Enzian observed that "at the original No. 37 plant we were forced to handle in the neighborhood of 180,000 cubic feet of air a minute to accomplish the cleaning [of the dust from the air]. That is more air than an ordinary sized coal-mine requires for its entire ventilation. See Charles Enzian, "Pneumatic or Dry Cleaning of Bituminous Coal," Proceedings: Engineers' Society of Western Pennsylvania (February 1929), 47.

then ran parallel to the main heading for its entire length. At each side or panel heading, the main airways would split again with one passage bridging the heading and the other turning-off to run parallel to the lateral entry. At the limit of the workings, the side airway entered the side heading. The air then followed the heading back to the main haulage road and, from there, return to the drift mouth. In the process, the air would pass the neck of each room and ventilate the working face. It would be a mistake, however, to assert that no doors were used in the mines. In fact, by 1915, doors were used to close openings cut between the entry and its airways.[89] These openings were probably created either to allow access to the air passage or to serve as crossovers while the heading was being driven.

When first planned, the main airways had a cross sectional area of 50 square feet. The company usually left a 35 foot pillar between the main heading and the main airways, and an 80 foot pillar between the main airway and the first room opened off a side heading. The overcasts were generally built of wood. All of the mines were initially force ventilated by Capell-type fans. The Capell fan at Eureka Number 30 had the distinction of being reversible. The fans were initially powered by Chambersburg steam engines, but by 1915 they were all electrically driven.[90]

As with haulage, the ventilation system required continual improvement as the mines increased in size. The company regularly enlarged the airways and rebuilt most of the original overcasts in brick and concrete. The company also made a practice of sinking airshafts near the working faces of its mines to serve as exhausts, thus reducing the distance the air circulated. This technique was applied on a grand scale beginning in 1914, when the company sank several large concrete lined airshafts 600 feet into the center of the Windber field for its most extensive mines. By 1916 the company completed separate shafts for Eureka Numbers 35, 36, 37 and 40.[91] It is not known whether the company made any other major changes in its ventilating techniques after completing the concrete airshafts. In all likelihood, the system operated without significant revision until the Windber mines closed in the 1960s.

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[89]Refer to Berwind-White Engineering Department, "Working Plan. Windber District. Showing Advancing and Retreating Method of Room and Pillar System and Ventilation, 19 July 1915," drawing DC-1304.

[90]<u>Report of the Department of Mines: Part II - Bituminous, 1915</u> 894.

[91]See the annual reports of the Department of Mines of Pennsylvania for the following years: 1907, 263; 1908, 349; 1912, 950; 1914, 906; 1915, 894; 1916, 1130; Baker, "Ventilating an Extensive Thin-Coal Mine," 103-105.

Drainage

Draining the early Windber mines was a relatively simple task because the workings generally lay above the water table. To keep what little water there was out of the headings, the haulage roads were well ballasted and pipes were installed to direct it to drainage courses located in the airways.[92] In mines driven toward the southern part of the Windber field, the water then flowed by gravity to the drift mouth or out boreholes to the surface. Water would collect, however, in pockets formed by the rolling floor of the Windber seams and in all of the northern mines, which sloped downward. In these instances, the company installed compressed air powered Cameron pumps to lift the water to the surface. Like the company's selection of the compressed air punchers, some engineers questioned why electric pumps were not used. Berwind-White reportedly defended its choice on the grounds that the "Cameron pump does not require skilled attention."[93]

Drainage became more difficult as the northern mines expanded and followed the coal seam downward. In 1909, the Berwind-White company constructed a central pumping station at Eureka Number 35 to facilitate draining all of these mines. Number 35 was selected because its main heading lay almost directly along the synclinal axis and was central to the workings of four other mines located higher up on the flanks of the syncline. By 1928, the station was pumping 4-1/2 million gallons of water each day.[94]

By the mid-1920s, however, the pumping station at Eureka Number 35 was becoming outmoded. The Mining Congress Journal explained the situation when it wrote:

> In 1924 the workings of these [Windber] mines had advanced further to the dip [of the syncline] and greater areas had been and would continue to be exhausted, resulting in increased quantities of ground water coming through the broken strata overlying the coal. In addition to this a mine of an adjoining company, higher on the eastern flank of the syncline, had been partly abandoned and flooded. A part of the water of this mine...passes through the broken strata and

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[92] Mines and Minerals (November 1901), 149.

[93] "The Eureka Collieries," 880.

[94] Newbaker, "Drainage and Pumping," 679-82.

> over the pillar into the workings near the synclinal axis. These conditions rendered the existing pumping and drainage facilities inadequate, and made apparent the necessity for a modern large capacity central pumping plant.[95]

The Berwind-White Company built the new pumping station at Maryland Shaft Number 1 near St. Michael. The shaft was located near the bottom of the Wilmore basin and thus served as an excellent sump for the northern Eureka mines. Completed in 1929, this system consisted of a double sump, a main drainage course connecting Maryland Number 1 to the old station at Eureka Number 35, a settling basin and a pump room. When put into operation, the station pumped 3,500,000 gallons of water each day. The old pumping plant ran in conjunction with the new facility, its load being reduced by 40 percent.[96]

Dust Control

Unlike operations such as drainage and ventilation, the need to control explosive coal dust was not immediately recognized by most coal operators. However, a rash of serious explosions in the early twentieth century led to a closer investigation of coal dust hazards. By 1905, the head of the Pennsylvania department of bituminous mining, convinced that dust was a leading cause of accidents, encouraged operators to institute controls.[97]

The Berwind-White Company did not initially attempt to control the coal dust in its mines. This serious oversight changed after 1909 when an explosion in April of that year occurred in Eureka Number 37 and resulted in the deaths of seven men who had been blasting through rock for a new overcast. An initial investigation suggested that the men had overcharged their shots and were killed by the resulting flame. However, the district mine inspector argued that the flash had ignited coal dust in the room which created the fatal explosion.[98] Perhaps convinced by this argument, the next year the company installed a sprinkler system in at least one of its mines to wet down the

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[95]Newbaker, "Drainage and Pumping," 679.

[96]Newbaker, "Drainage and Pumping," 679.

[97]See the annual reports of the Department of Mines of Pennsylvania for the following years: 1905, xiv; 1907, xxiv, xxiii.

[98]Report of the Department of Mines of Pennsylvania: Part II - Bituminous, 1909 (Harrisburg; 1910), 238.

workings and keep the dust out of the air.[99]

In 1924, Berwind-White began a survey to assess the dust hazard in all of its mines. All those found to be at risk were "rockdusted" for safety. By this process, the walls of the mine were sprayed with crushed rock--most often limestone--to seal in coal dust. Troughs filled with rockdust were also fastened near the roof throughout the mine. In the event of an explosion, the rockdust would be released and prevent the blast from spreading.[100] While it was an improvement over the old sprinkler system, Berwind-White did not undertake the change solely for safety reasons. Enzian noted:

> There is a distinct economic return from rock dusting. As a result of the treatment, these mines have been relieved of a coal-dust penalty of 5 cents per $100 of pay roll, in accordance with the Compensation Rating Bureau's regulations. On the average annual tonnage produced, this is the equivalent of two mills per ton, which would make the net cost of maintaining the rock-dusted condition of these mines about 4 mills per ton of coal produced.[101]

Indeed, concern for safety and increased productivity, as well as pressure from State laws, prompted Berwind-White to undertake these fundamental improvements in dust control.

<u>Auxiliary Operations</u>

The Berwind-White Mining Company performed a number of services not directly related to either coal mining or preparation but were nevertheless vital to its operations. Among its most important services were electric power generation and the operation of repair shops. While either of these services could have been purchased, the company chose to undertake them as part of its general duties.

Most mines of the larger coal operators were run in conjunction with a company-built powerhouses, although some of these mines initially drew power from adjacent plants until they grew large enough to warrant their own powerhouse. The early

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[99] <u>Report of the Department of Mines of Pennsylvania: Part II - Bituminous, 1910</u> (Harrisburg; 1911), 319.

[100] Enzian, "Rock-Dusting at Berwind-White Mines," 47-49.

[101] Enzian, "Rock-Dusting at Berwind-White Mines," 48.

Berwind-White generating equipment for the Eureka mines was housed in wood-frame buildings and equipped with either Thompson-Ryan or General Electric direct-current generators driven by McEwen engines and fired by Stirling boilers. Around 1904, Berwind-White began to build a power plant at Eureka Number 38 which differed from its earlier facilities. At the other mines, the Engineering and Mining Journal reported,

> the boiler-houses and power-houses...are all frame structures and have a temporary look. The new power-plant will be in brick buildings. There will be in the boiler-house twelve 200 h.p. Stirling boilers in four sets of 600 h.p. each, to which the coal will be fed by Roney stokers. In the power-house...there...are being installed, two duplex Ingersoll-Sergeant compressors, each with a capacity of 3,000 cu. ft. of air per minute, and two General Electric alternating-current 300-kw. generators. The current will be stepped up to 6,600 volts, carried by lead-covered cables a longest distance of about three miles, and stepped down to the working mine pressure of 500-550 volts by a rotary transformer. [102]

The new facility provided alternating current for mines 30, 38 and 39, and signalled a change as the company began to replace the individual stations with central generating plants.

The next year, Berwind-White began work on another central power station. Constructed at Eureka Number 40, when the powerhouse opened in 1906 it supplied electricity to mines 30, 31, 32, 35, 37 and 40. It initially produced direct current, although by 1916 it had been refitted for alternating current. Shortly after the plant began operation, a writer for Mines and Minerals observed that

> central plants of such capacity and for supplying power to such a number of distinct mines can seldom be located to such advantage that direct current can be transmitted economically, but this plant will eventually furnish power to six large mines with a combined capacity of 10,000 tons of coal a day, and none of the mines is more than from one to one and a half miles distant from the

[102] "The Eureka Collieries," 880.

> power plant.[103]

At a later date, another central plant was constructed at Eureka Number 35 and a fourth may have been built at another of the large mines around Windber.[104]

All of the large central power plants were eventually replaced by a single generating facility. In 1918, the bituminous inspector reported:

> [A] very large power plant is being erected to provide additional power for the mines of this company, and when completed, it will compare favorably with the largest power plants in the country.[105]

The inspector was probably referring to a large central plant at Eureka Number 34, just south of Windber, which came into operation in 1920.[106]

Substations located at each mine converted the alternating current from the central powerplants into direct-current for use underground. In 1913, the company also installed a substation on a railroad car. <u>Coal Age</u> described the purpose of this unusual arrangement:

> When work at a new development reaches that point when direct current is necessary, the portable substation is hauled to the workings...and put in operation....When the permanent substation is completed the portable one becomes unnecessary and is taken to the next development.
>
> A further use for this substation is to provide insurance against shutdowns. If accidents occur at any of the permanent substations, the portable one is sent to

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[103]William L. Affelder, "The Central Power Plant," <u>Mines and Minerals</u>, 28 (March 1908), 363.

[104]Baker, "Ventilating an Extensive Thin-Coal Mine," 103-105; Sargent, "Enduring Coal Enterprise," 21-32.

[105]<u>Report of the Department of Mines of Pennsylvania: Part II - Bituminous, 1918</u> (Harrisburg; 1919), 1273.

[106]<u>The Glossery: News and Views from M. Glosser and Sons, Inc.</u>, 8 (n.p., n.d.), Barrett Collection; Sargent, "Enduring Coal Enterprise," 26.

carry the load until the necessary repairs are completed.[107]

By 1916, the company had also constructed substations at the ventilation shafts sunk in the center of the Windber field to reach the workings of Eureka Numbers 35, 36, 37 and 40. These substations boosted the power in the furthest workings of these mines to compensate for the voltage drop which occurred in transmitting direct-current over three miles underground from the drift mouth.[108]

In addition to its power plants, Berwind-White developed facilities for repairing and building its own mechanical and electrical equipment. Machine shops, of course, were constructed at each mine to handle routine repairs, but the company also maintained centralized shops for its operations in Windber and elsewhere. The company opened one of the first of these facilities in Hollidaysburg, Pennsylvania in 1906 to repair its steel railroad cars. Subsequently, it opened a similar shop in Windber, although the most difficult jobs continued to be handled in Hollidaysburg.[109]

To repair the electrical and mechanical equipment used in mining, the company also constructed central shops at Eureka Number 35. The mechanical shop actually built some of the company's machinery, including an experimental rotary coal cutter and belt feeders for loading mine cars. The electrical shop was fully outfitted to maintain and wind almost all of the company's armatures used in its room hoists and mining locomotives.[110]

* * *

Whether in mine layout, ventilation, drainage, coal preparation, power generation or machine repair, the Berwind-White Company was frequently commended in the trade journals for its efficiency of operations and the numerous physical improvements the company undertook in its Eureka mines. Such praise was generally deserved, for the company generally planned each aspect of its mining operations in advance and did not hesitate to make improvements. In large measure, however, the company made changes simply to keep pace with the technical

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[107] "A Portable Substation," Coal Age, 4 (27 December 1913), 977-978.

[108] Baker, "Ventilating an Extensive Thin-Coal Mine," 103-105.

[109] Burg, "When Empty Return to Windber," 11.

[110] "New Electric Shop," Coal Age, 44 (March 1939), 41-43.

demands of its growing mines. More extensive workings required new methods of ventilation, drainage, haulage, and even power supply. Berwind-White may have even experimented with new methods of mine layout in the 1920s because the extensiveness of the Windber mines made the room-and-pillar system difficult to supervise.

The internal demands of the mines, however, were not the only factors shaping operations. Advances in technical knowledge and innovations in the industry undoubtedly prompted the company to review its methods and institute improvements. A better understanding of the efficiency of chain-breast cutters, for example, may have led the company to install these machines in its mines. And a greater knowledge of the dangers of coal dust, coupled with state and federal legislation, eventually pushed Berwind-White to develop dust control systems.

Market conditions were among the most significant external factors encouraging internal improvement. As the price of coal dropped or competition increased, the firm was forced to introduce operational changes. Nowhere is this link between market pressures and internal improvements better illustrated than in Berwind-White's decision to build cleaning plants at two of its Windber mines in the 1920s. Designed to produce a cleaner higher quality product, the company hoped that the plants would enable it to gain new markets in a time of lessening demand.

Regardless of the specific cause, the company undertook improvements in order to sell coal. In what was to become an overdeveloped and competitive industry, it had based its early reputation on its ability to guarantee regular deliveries of a superior product. This guarantee was not easily met: the Windber field was difficult to work; changes in mining science and in the mines themselves threatened the company's methods with obsolescence; and changes in the market increased competition, lowered profits and altered demand. To keep abreast of these developments, Berwind-White committed itself to a policy of careful planning and continuous improvement. The evolution of the Windber operations reveals this commitment and is the ultimate basis of the company's success.

APPENDIX A:

EUREKA NUMBER 40, HISTORIC STRUCTURES INVENTORY

APPENDIX A CONTENTS

SECTIONS

Introduction to Eureka Number 40

Work began on Eureka Number 40 in 1902 and it was opened in 1905. The mine had its main operations in the Lower Kittanning seam, although in 1931 workings were also started in the Upper Kittanning. The mine had two main entries and was worked on a full retreating, room-and-pillar system. It was force ventilated through a system of air splits and overcasts.[111]

> When first planned, the bituminous mine inspector noted: A new mine is now being opened by the company in the Windber district which will be known as Eureka Number 40. This operation will possibly have ahead of it the largest coal field...of any single mine of the company in this district.[112]

In 1905, the inspector also predicted that the mine would "be the model" for the region and concluded that "the arrangements being made in the opening of this plant for its ventilation, in airways, overcasts, etc., are sufficient evidence that it will be one of the best."[113]

True to these forecasts, Number 40 became one of the largest and best equipped mines in the Windber area. In 1914, apparently its peak year, it reached an annual output of 579,153 tons. It was also one of only five Windber drift mines to operate through the fifties and was the last to close in 1962.[114]

Befitting its size and importance, Eureka Number 40 was the site of a major central power plant built in 1906 and a technologically advanced cleaning plant completed in 1928. By 1949, Eureka Numbers 35, 36 and 37 -- all of which were connected to the workings of Number 40 -- were loading their coal through

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[111]Cunningham, "The Windber Mine," 340; also see the annual reports of the Department of Mines of Pennsylvania for the following years: 1902, 285-286; 1905, 310; Barrett, "Period of Operation," Barrett Collection.

[112]Report of the Department of Mines of Pennsylvania: Part II - Bituminous Report, 1902 (Harrisburg; 1903), 285-286.

[113]Report of the Department of Mines of Pennsylvania: Part II - Bituminous Report, 1905 (Harrisburg; 1906), 310.

[114]The production totals were only examined to 1930. Production may have surpassed the 1914 level during the Second World War. See the Report of the Department of Mines of Pennsylvania: Part II - Bituminous, 1914 (Harrisburg, 1915), 887; The other drift mines which remained open are Eureka Numbers 35, 36, 37 and 42. See: Barrett, "Period of Operation," Barrett Collection.

Number 40 for processing at the cleaning plant. Another indication of the mine's importance to the company is the fact that it was equipped for continuous mining operations in the 1950s.[115]

The mine sat idle after closing in 1962 until it was leased to the Jandy Coal Company in the 1970s. Jandy operated the mine until 1980 and as a result the site is still fairly intact. Eureka Number 40 is the best, and last, example of the Berwind-White Company's operations in Windber, and affords the visitor and historian a unique glimpse of the industry which was the basis of the area's past livelihood and history.

The following is a summary of all buildings which are currently standing or which have stood at the Eureka Number 40 mine of the Berwind-White Company in Scalp Level, Cambria County, Pennsylvania. The location of each building is shown on a map at the end of Appendix A.

Most of the information was drawn from plans held by the Berwind-White Company in the Engineer's Vault located on the second floor of the Windber borough office. In some cases, details were drawn from trade journal articles or field inspection. Very rarely, past employees of the Berwind-White Company were consulted and these individuals probably represent the most promising source for future documentation.

Although information is sketchy on most buildings, an attempt was made in each entry to indicate whether the building is standing, its location, size and any known dates of construction. This basic information is followed by a discussion of the building's function, general appearance and, if known, history. Important references are included at the end of each entry; historic photographs (of which there are few currently known) are listed first, followed by plans and then published descriptions or references. The citation for a Berwind-White engineering plan consists of the title, date and an alpha-numeric in parentheses. This parenthetical code is composed of a drawer location (such as drawer "G4") in the Engineer's Vault, and a plan number (such as "4277", that is, the 4,277th plan prepared by the Engineering Department).

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[115] Barrett, "Period of Operation," Barrett Collection; "Berwind-White Tools Up, Hits Production Peaks," 80-82.

HISTORIC STRUCTURES INVENTORY

The structures inventoried have been grouped according to general function.

Haulage

Motor Barn
standing
size in plan: 40' x 100'
dates: built c.1905

The Motor Barn served as a garage and repair shop for the locomotives used in Eureka Number 40. The building was probably constructed around 1905, when the mine went into operation, and stood at the end of a spur line leading to the empty drift. It was originally 'L' shaped in plan and constructed of rough stone courses with concrete lintels over the windows and doorways. At sometime after 1934, concrete block additions were made, giving the building a roughly rectangular form.

The locomotive building at Eureka Number 40 probably resembled those at earlier company mines around Windber. At each of these mines, a trade journal reported, there was "located a locomotive house of sufficient size to shelter six locomotives, with pit space for four. The houses are heated by steam and lighted by electricity. The pits are five feet deep and well drained. A 6,000-lb. hoist serves to handle the motors and axles when repairs become necessary."

The company estimated that six locomotives were needed for haulage when each mine operated at maximum capacity, and so the motor barns were designed to accommodate that number. The locomotive houses were thus part of an integrated system of production and typify the company's method of rational planning.

References:

"Eureka Number 40. Tipple, tracks and improvements. Sections in vicinity of tipple," 11 August, 1927 (J11-3499); "Eureka Number 40. Surface features," January 1934 (G4-4277); J.S. Cunningham, "The Windber Mine," Mines and Minerals 21 (March 1901): 340-341; A.S. M'Allister, "Electric Plant," Mines and Minerals 21 (October 1900): 110-112.

Motor Boss Shack (#1)
not standing
size in plan: 8' x 12'
dates: built between 1927 and 1934

The building was identified as an office for the Motor Boss on an insurance plan of the mine site and was apparently constructed of corrugated metal. The Motor Boss was responsible for dispatching the mining locomotives. The building was probably razed to make room for the car shed.

References:

"Map of Eureka No. 40 for the Insurance Department," 31 March 1915, revised: 3 September 1923, 2 April 1930, 11 February 1936; "Eureka Number 40. Tipple, tracks and improvements. Sections in vicinity of tipple," 11 August, 1927 (J11-4277); "Eureka Number 40. Surface features," January 1934 (G4-4277); see also: Motor Boss Shack (#2).

Motor Boss Shack (#2)
standing
size in plan: 12' x 12'
dates: built after 1934

The corrugated metal shack stands to the northeast of the car shed, along the line of "empty" track, that is, track running to the empty drift from the tipple. Based on its location and appearance, the shack has been tentatively identified as an office for the Motor Boss. If so, it probably replaced the old Motor Boss Shack which once stood where the car shed was erected.

References:

(no written sources; observation in field, summer 1988)

Sanding Shed
not standing
size in plan: 16' x 20'
dates: built before 1927; razed c. 1928

The Sanding Shed served as a refilling station for mine locomotive sand boxes and stood directly over a line of track connecting the Motor Barn to the entry drift for empty mine cars, or "empty" drift. The shed was divided into two bays measuring 16'x 10' feet and a switch 70' to the east allowed locomotives to enter either room for refilling. The building was probably razed in 1928 when the Berwind-White Company installed a new sand handling and refilling system.

References:

"Eureka Number 40. Tipple, tracks and improvements. Sections in vicinity of tipple," 11 August 1927 (J11-3499); see also: Sand House, Sand Tank.

Sand Tank
standing
size in plan: platform measures 10' x 20'
dates: installed 1928

The Sand Tank was installed in late 1928 to refill locomotive sand boxes. A steel platform supported the 19-ton capacity tank over two tracks leading to the empty drift. Four gravity fed hoses connected to the underside of the tank could service locomotives on either track simultaneously. At some point after 1930, the platform was covered by corrugated metal sheeting.

Air pressure conveyed sand to the top of the tank through 2-inch steel piping from the Sand House, located approximately 200 feet south of the tank. The development of this pneumatic sand handling system, which included the Sand Tank, Sand House, sand lines, driers, motors and air compressors was part of the Berwind-White Company's general efforts to increase the speed and minimize the costs of its mining operations.

References:

"Eureka Number 40. Plan for steel tank foundations...." 13 September 1928; "Sand is Conveyed 200 feet by Air Upgrade Through Two-Inch Pipe," Coal Age 96 (January 1930): 53-54; see also: Sand House.

Sand House
not standing
size in plan: 70' x 20'
dates: built c.1924 (?)

The Sand House was a brick structure which stood adjacent to the railroad tracks and, after 1928, served as the main sand storage and drying facility for Eureka Number 40. It may originally have been built in 1924 as a warehouse.

Sand was delivered by railroad car to the Sand House, dried in a furnace, and then shovelled into a "sending cylinder." The cylinder consisted of a six foot section of 20-inch diameter high pressure pipe, sunk into the ground so that one end extended about a foot above the floor. A compressor operating between 50 and 90 p.s.i. and driven by a 10 h.p. motor forced air into the cylinder through a supply pipe and blew the sand out through a discharge tube connected to a two inch sand line. The line rose 30 feet and then conveyed the sand 200 feet to the Sand Tank. In 1930, a trade journal reported that the system handled "four carloads of sand per month." Presumably, the reference was to railroad cars and not mine cars--i.e.; approximately 120 tons of sand per month as opposed to 8 tons of sand. Due to wear, the 2-inch sand line was replaced each year.

References:

"Eureka Number 40. Topography of site for proposed warehouse," 2 April 1924 (C5-3009); "Map of Eureka No. 40 for the Insurance Department," 31 March 1915, revised: 3 September 1923, 2 April 1930, 11 February 1936; "Eureka Number 40. Surface features," January 1934 (G4-4277); "Sand is Conveyed 200 ft. by Air Upgrade Through 2-inch Pipe," Coal Age, 35 (January 1930): 53-54.

Ventilation

Fan Setting
standing
size in plan: 56' x 43'
dates: built 1910

The Brick Fan setting was constructed in 1910 to house a 16' double inlet Capell fan which was rope driven by a 200 h.p. 50 volt d.c. motor. The fan complex force ventilated the workings of Eureka Number 40 through a 10' x 10' airshaft which reached a depth of 45 feet.

The new fan was the third to be installed at the mine. When Eureka Number 40 began operation in 1905, it was force ventilated by a 7' Stine fan driven by compressed air. This was a temporary installation, however, and was replaced the next year by an electrically operated 20' Capell fan. Both of these early fans were probably situated near the drift mouth.

Although different fans were used at the mine, the basic ventilating system remained the same. At most mines, the air flow was directed through the headings by airtight doors. This system usually operated poorly because the doors would leak or accidentally be left open. At the Windber mines, however, the Berwind-White Company employed a recently developed system which dispensed with doors entirely. The air current from the fan circulated through two airways lying on either side of the main heading. Side airways split off at each cross heading and ventilated the rooms where the coal was worked. Once carried passed the working face, the air returned to the drift mouth by following the cross and then the main headings. The main airways were able to bridge each cross heading by means of wooden or brick and concrete overcasts. This system allowed each section of the mine to be vented independently and automatically, and the Berwind-White Company was widely praised for its installation.

Even with this improved system, however, the company faced difficulty ventilating its mines. Most of its workings were in thin coal seams, reducing the height of the airways and requiring more extensive operations to recover a profitable amount of coal. Air could not circulate efficiently through such long and narrow spaces, and as the headings were driven deeper, the air quality dropped precipitously. In 1909, only four years after Eureka Number 40 had opened, the bituminous inspector reported that all of the company's mines were inadequately supplied with fresh air.

To remedy the situation at Eureka Number 40, the company constructed the new fan setting, enlarged the airways and replaced leaking overcasts. These efforts were never fully successful and in 1914 the company began to sink new airshafts at many of its mines. Eureka Number 40 was connected to a new shaft in 1916.

Over three miles distant from the drift mouth, the so-called 'Yoder Shaft' was fitted with its own fan and served as both an air inlet and exhaust. In addition, it was equipped with an electric substation to boost the power underground and air compressors for pickhammer mining operations. The fan setting built in 1910 appears to have operated in conjunction with the Yoder shaft facility until the mine's closing in 1962.

References:

"Eureka Number 40. Fan Setting. Plan for rope drive," 1910 (B6-1460); "Eureka Number 40. Fan Setting. Foundation plan for motor," 13 December 1910 (B6-1461); "Eureka Number 40. Plan of fan foundation," 6 August 1910 (D6-1479); "Eureka Number 40. Plan of Capell Fan Setting," 3 October 1910 (D6-1487); Donald J. Baker, "Ventilating an Extensive Thin-Coal Mine," <u>Coal Age</u>, 18 (15 July 1920): 103-105; J.S. Cunningham, "The Windber Mine," <u>Mines and Minerals</u>, 21 (March 1901): 340-341; "The Eureka Collieries," <u>Engineering and Mining Journal</u>, 77 (2 June 1904): 879-880; W.M. Weigel, "Coal Mine Ventilating Equipment," <u>Coal Age</u>, 1 (17 February 1919): 610-613; see also annual reports of the Deparment of Mines of Pennsylvania for the following years: 1905, 273, 310; 1906, 334; 1909, 238; 1910, 323; 1911, 901; 1912, 948, 950; 1914, 906; 1915, 894; 1916, 1130; see also: Yoder

Shaft, Substation, and Cooling Facility.

Yoder Shaft, Substation and Cooling Facility
(location not shown on map)
size in plan: not available
dates: shaft and substation completed by 1916; pumphouse, dam and spillway built 1930

The Yoder Shaft and Substation were completed by 1916 to provide ventilation and electrical power to Eureka Number 40. As first constructed, the facility consisted of a shaft, headframe and housing for a fan and substation. The exact layout of the plant is not known, but it was reportedly modeled upon the Eureka Number 35 shaft and substation, which provides the basis for this description. In 1930, the company also installed an air compressor to power pickhammer operations in the mine. To cool the compressor, a dam and pumphouse were also built.

Yoder Shaft and Headframe:

The Yoder Shaft was sunk approximately 700 feet deep to reach a point near the end of the main heading for Eureka Number 40. The two compartmental shaft was concrete lined and had an elliptical cross section measuring roughly 24' x 12'. One compartment served as an air inlet and the other as an exhaust. Lines for compressed air and electricity also entered the mine through the shaft.

A low headframe straddled the top of the airway and could lower a single cage into the mine, either for maintenance or to remove men in the event of an accident. Unlike the headframe at Eureka Number 35 shaft, which was constructed of steel, the Yoder structure was built of wood. The cage was hoisted by a 75 h.p. 50 volt d.c. Vulcan motor which wound a 1" cable onto a 7' drum. In 1939, the company installed a new cage manufactured by the Connellsville Manufacturing and Mine Supply Company (Connellsville, PA). In the 1970s, the Berwind-White Company leased the facility to the Jandy Coal Company. Jandy removed the headframe, which had deteriorated, and replaced it with a pivoting steel post with projecting arm. The arm supported a one man cage which could be swung over the shaft and lowered for repairs or to remove miners. The shaft was sealed at some point after the mine ceased operation in the 1960s.

Yoder Substation and Fan House:

The housing for the fan and electrical equipment was probably constructed of brick with steel roof trusses. Inside the building, the Berwind-White Company installed a 9' Jeffrey fan driven by a 450 h.p. 660 volt d.c. Allis-Chalmers motor. In an unusual arrangement, a rope drive connected the fan to the motor. The company preferred rope drives over belts, due to their low cost and simple operation. To maintain proper tension, the company designed a spring-controlled travelling sheave which automatically adjusted the slack in the rope. Berwind-White also installed a 400-kilowatt Westinghouse rotary converter and a battery of three transformers in the housing. The substation probably drew its current from the generating plant at Eureka Number 40. Eventually, the company connected the substation to a central power plant at Windber that it had completed in 1920.

The Berwind-White Company was concerned by the possibility that either the fan or the substation would stop operating, forcing a temporary closure of the mine. To guard against this occurrence, it went to the extreme of installing a spare Allis-Chalmers motor, Westinghouse converter and set of transformers in the substation. Furthermore, a second high-tension powerline connected the substation to the power plant at Eureka Number 35.

Compressor and Cooling Facility:

In 1930, the company installed an Ingersoll-Rand compressor to provide compressed air for pickhammer mining in Eureka Number 40. The compressor was water cooled, and a dam and spillway were built across a nearby stream to form a reservoir. A pump manufactured by the American Pump Company drew water from the reservoir to the compressor and was housed near the dam.

Discussion:

The Berwind-White Company constructed the Yoder substation and shaft as part of its continuing efforts to improve the ventilation of its Windber mines. This undertaking stemmed from the fact that the coal seam in the Windber district was only three to four feet thick, requiring large areas to be worked to recover a given amount of coal. Ventilating such extensive and thin workings was extremely difficult.

When it first planned its operations, therefore, the Berwind-White Company made an effort to employ the most modern ventilating system available. No doors were used to direct the air flow through the headings. Instead, airways were driven parallel to each heading and overcasts were used to control the air current. The company also attempted to maintain and improve the system. In 1907, the bituminous inspector observed that one of Berwind-White's methods was to "sink shafts at or near the face of the workings, making them outlets for a portion of the air. By this plan, the distance that the air current must travel is very much shorter."

These shafts probably did not reach a depth greater than 100 feet, but by 1914 the principal was applied on a much grander scale. By that year, the main heading of Eureka Number 35 stretched more than three miles underground. The inlet fan at the portal could not force an air current over such a distance, and the company faced the prospect of installing a larger fan and heightening the airways and main heading their entire lengths. Rather than accept that expense, Berwind-White sank a 650 foot shaft to reach the workings near the end of the main heading. An exhaust fan at the top of the shaft operated in conjunction with the inlet fan at the drift to ventilate the mine. The company also built a substation at the shaft to boost the electrical power underground.

The Eureka Number 35 substation and airshaft operated successfully, and Berwind-White sank shafts at other mines. In 1916, the Yoder shaft was connected to the workings of Eureka Number 40.

In the late 1950s, Berwind-White began to aggressively expand its operations at Mine 40. As part of its redevelopment, the company converted part of the Eureka Number 35 shaft for use as a portal to Number 40 (the workings of the two mines having been connected earlier). The use of the Number 35 shaft, Coal Age reported, "added 30 min. to productive time." The Yoder shaft continued to be used for ventilation and power supply.

References:

"Eureka Number 40. Concrete lined ventilation shafts at 35, 36 [and 40]," 22 August 1914 (A4-1122); "Eureka Number 40. Pipe clamp for compressed air in ventilation shaft at Number 40 and Number 36," 26 July 1930 (A3-3945); "Eureka Number 40. Plan and section showing location of concrete pier and...elbow at bottom of Yoder shaft for compressed airline for Berwind-White pickhammer mining," 27 August 1930 (B1-3956); "Eureka Number 40. Foundation plan for American 5x6 pump and motor...." no date (B1-3958); "Eureka Number 40. Plan and sections of dam and pipeline for cooling compressor," 6 October 1930 (F1-3963); "Eureka Number 40. Platform cages," 12 January 1939 (D2-4199); Donald J. Baker, "Ventilating an Extensive Thin-Coal Mine," Coal Age, 18 (15 July 1920): 103-105; "Berwind-White Gears Up, Hits Production Peaks," Coal Age 65 (December 1960):80-82; see the Pa. Dept. of Mines Annual Bituminous Report for the following years: 1907, 263; 1915, 894; 1916, 1130.

Coal Prepartion

Old Tipple
not standing
size in plan: approximately 300' in length
dates: built 1905; razed 1928

The original tipple at Eureka Number 40 was built c.1905 and, like all of the other tipples around Windber, was modeled after the one erected at Eureka Number 30, the company's first mine in the area. As such, the tipple was constructed of white oak and designed to handle 3000 tons of coal each day.

The enclosed tipple was composed of a curved approach approximately 120 feet long leading to the tipple proper, which measured approximately 80 feet and crossed over three lines of railroad track. A covered track extended 80 feet beyond the mine car kickback, crossing the Little Paint Creek to carry refuse to the main rock track.

Mine cars loaded with coal could enter the tipple on either of two tracks and run by gravity to two Phillips automatic cross-over dumps. Weigh scales were probably located on the tracks inside the curved approach, approximately 14 feet before the tipple proper. The coal probably emptied onto screens set below the dumps before being loaded into railroad cars. While on the screens, slate may have been hand picked from the coal. Cars carrying rock ran on their own track through the tipple to a dump on the opposite side of the Little Paint Creek.

The tipple operated until 1928 when a new tipple and separator were constructed which had a greater capacity and more elaborate coal preparation facilities.

References:

"Eureka Number 40. New tipple and separator," 31 May 1928 (photograph, Bob Barrett Collection); "Eureka Number 40. Tipple, tracks and improvements. Sections in vicinity of tipple," 11 August 1927 (J11-3499); see the Pa. Dept. of Mines Annual Bituminous Report, 1897 380.

Tippleman's Shack
not standing
size in plan: 8' x 7'
dates: unknown date of construction; razed 1928

One room wooden shack with gable roof and chimney, provided shelter to the tipple operators. It is not known how many men operated the tipple or their specific duties were, but there was probably a weigh master, a dump operator and at least one man to handle and inspect the mine cars.

References:

"Eureka Number 40. New tipple and separator," 31 May 1928 (photograph, Bob Barrett Collection); "Eureka Number 40. Tipple, tracks and improvements. Sections in vicinity of tipple," 11 August 1927 (J11-3499).

<u>Tipple and Separator Facility</u>

standing

size in plan: tipple proper measures approximately 50' x 50'
main conveyer measures approximately 20' x 50'
separator building 36' x 42'
dust collector 40' x 50'
rock bin 16' x 20'
rock house 16' x 16'

dates: built 1928

In 1928, the Roberts and Schaefer Company of Chicago, Illinois, designed and built a reinforced concrete tipple and separator facility for the Berwind-White Company at Eureka Number 40. In plan, the plant resembled a reversed 'L' with its major axis oriented north to south. The main conveyor ran from the dump, at the northernmost end of the plant, to the main screen house and wet cleaning plant, located at the angle of the 'L'. The Separator building extended west of the screen house and formed the cross axis of the reversed 'L'. Three lines of railroad track lay immediately south of the plant. Across the tracks and Little Paint Creek, the Rock Bin and Hoist House stood in a direct line with the dump and conveyor.

Tipple:

The Tipple included the tipple-proper housing the dump and scales, the run-of-mine conveyor, the courthouse, and the main screen house. Mine cars would first run to a covered area in front of the tipple-proper where they were uncoupled. They would then enter a rotary dump to be weighed and emptied. The dump was manufactured by the Heyl and Patterson Company of Pittsburgh. From the dump, the cars would roll to a concrete kickback and then pass back through the tipple-proper on their way to the empty car yard. In 1954, the company installed a new welded steel kickback set closer to the rotary dump. Cars had tended to lose momentum running to the original kickback and would get stuck in the switches along the track. In the 1970s, the Jandy Coal Company leased the mine from Berwind-White and installed a circular track to return the cars.

When the plant was first built, a second dump was located alongside the tracks at the point where the cars re-entered the Tipple. The company would occasionally select a car coming out of the mine and empty it in this dump. The coal would slide down a chute to the "courthouse," or open area beneath the main floor of the Tipple, where it would be checked for rock. If excess rock were found, the miner who had loaded the car would lose some of his wages. When the Windber mines unionized in the 1940s, the miners demanded that the second dump be removed.

Beneath the rotary dump, a mechanical flapgate would direct the load of coal or rock to its respective conveyor. The coal was then carried to the main screen house, where it was discharged down a chute onto the top deck of the main "Marcus" shaking screen. Apparently manufactured by the Roberts and Schaefer Company, the Marcus screen measured 25' x 6' feet and was composed of three stacked screens or decks. The top deck removed coal larger then 4 inches round while the second deck sized coal down to 4" x 1.5". The third deck may have separated the finest sizes of coal to facilitate cleaning.

Coal sized larger than 4" was hand "picked" or cleaned as it past over the Marcus Screen and discharged directly down a chute to the railroad cars as run-of-mine product. Coal passing over the second deck was taken to the wet cleaning plant. The smallest sizes were carried to the Separator building for air cleaning. If either cleaning facility suffered a shutdown, the coal could be loaded directly over the Marcus screen with the hand-picked sizes as run-of-mine product.

In 1941, Roberts and Schaefer attached a junction house, measuring 20' x 16', and a crusher house, measuring 26' x 17', to the main screen house. The junction house was located just northwest of the plant and was probably an electrical switching station. The crusher stood to the east of the screen house and broke coal into fine sizes for cleaning.

Menzie "Hydro" Plant:

Coal which was too small to be hand cleaned and too large for dry cleaning was processed in the Menzie hydrotator and classifier located in the main screenhouse, beneath the Marcus screen. It is not known exactly how this section was equipped, although a sludge-recovery tank did stand just north of the screen house. The tank served as a settling pool, where fine coal particles were removed from used cleaning water. Little else is known about the facility's operation, but in 1929 one source noted that "the 'hydro' separator is an upward-stream washer. It operates most satisfactorily on a sized-feed, and the application in the Pennsylvania field can be followed by the installations now being made for the Berwind-White Coal Mining Company at Windber, Pa."

Separator:

In the dry cleaning process, air is forced upwards through a bed of coal and refuse. The coal will rise to the surface because it has a lower density. However, small rock fragments are also light enough to rise, while large pieces of coal tend to "sink". As a result, the material must be sized before cleaning.

In the Separator building, the coal was sized by screens installed on the third floor. The raw product then descended to the second floor where the company had installed 12 Arms air-concentrator tables. One table was reserved for cleaning coal sized 1-1/2" x 13/16"; one was for 13/16" x 5/8"; two for 5/8" x 5/16"; four for 5/16" x 5/32"; and four tables for 5/32" square sizes. Each table was equipped with a fan and connected to an eccentric gear. The fan forced a current of air through perforations in the table's deck and raised the coal above the level of riffles mounted across the surface. The eccentrics generated a shaking motion which aided in separation and moved the coal down the length of the table while channelled the refuse between the riffles to a separate conveyor.

The shaking and blowing raised a large amount of dust which was captured by a hood installed over each table. In most cleaning plants, the dusty air from each table was then drawn to a dust collector. This process, however, required an enormous power expenditure because, as an engineer explained, "the velocity [of the air] is reduced [as]...it passes from the table into the dust hood [and]...the dust collecting fans must start all over again and pick that air up practically from a state of rest and pass it into the dust collecting system." In addition to drawing as much air as was used to clean the coal to the dust collector, the fans also had to carry an extra 20-30 per cent to compensate for leakage. In general practice, more power was needed to clean the dust from the air than to clean the coal.

At Eureka Number 40, the Roberts and Schaefer Company sought to reduce the power consumption of the cleaning plant by lowering the volume of air sent to the dust collector. In an innovative system, the plant's 12 Arms tables were divided into groups of four. In each group, the air from the table cleaning the smallest sized coal was used for cleaning on the table with the next largest size. Thus, the air recirculated and only the air from the last table in the group was carried to the dust collector. Roberts and Schaefer reported that "by using this system, we were able to eliminate nearly 30 per cent of the horsepower." The recirculating system had an additional benefit in that the dusty air was actually "more effective as a separating medium because of a slight increase in specific gravity due to the burden of dust."

The cleaned coal was carried by ground floor conveyors to elevators leading to bins on the fourth floor. Rock and other refuse was carried to the main rock conveyor leading out of the tipple for disposal.

In 1941, the Berwind-White Company erected a new crusher and wet processing plant near the Tipple and Separator. In the same year, Roberts and Schaefer built a 15' x 12' second floor extension to the west end of the separator. The addition appears to have housed a Roberts and Schaefer Super AirFlow coal cleaner capable of handling extremely fine sizes of coal. These units may have eventually replaced the original air tables. By 1960, the company also installed on the second floor a Bird Solid-Bowl centrifugal filter to mechanically dry wet coal. The additions indicate the company's increasing production of fine sizes and growing reliance on wet cleaning.

Pangborn Dust Collector:

The dust collector was installed in 1928 to extract coal dust from the air inside the new tipple and separator. Manufactured by the Pangborn Company of Maryland, it was apparently a new system and distinct from either Cyclone or bag-type dust collectors. Although its exact mechanics are not known, it seems to have been composed of four main collection units which drew air from various points in the plant through large ducts. The air entered at the top of the units and passed through a series of screens. The coal dust eventually collected in bins underneath the main units and was then carried by screw conveyors to a central discharge point.

Dust collectors were considered important elements in proper tipple and dry cleaning plant design. The air tables and screens generated considerable amounts of dust, especially with the friable Windber coals, posing an explosion hazard. In 1927, a vice president for Roberts and Schaefer reported that:

> some of our earlier dry cleaning plants were not very presentable and the dust question was a very serious obstacle in the sale of our dry cleaning plants. We have had some of our prospective clients stick their noses inside of the door and then "beat it." There was too much dust there for them to even

> consider the installation of a dry cleaning plant. They had the fear of an explosion.

The Pangborn was installed to limit this danger and also as an improvement over the collection system the company had employed at an earlier dry cleaning plant. Built in 1926, the earlier plant was equipped with Cyclone dust collectors which generally failed to remove all of the coal dust from the air. Berwind-White anticipated that its new system would operate more satisfactorily. The main collectors of the Pangborn were originally exposed, but in 1955 Berwind-White roofed them over.

Rock Bin:

Built in 1928, the Rock Bin was set on concrete piers on the opposite side of Little Paint Creek from the new plant. The main conveyer carried rock from the rotary dump and the cleaning facilities across the creek to the bin. The refuse emptied out of the bin into a 6-ton larry and was dumped on the rock pile.

Rock Hoist House:

The Hoist House was a corrugated metal shack set on concrete piers. It housed a drum and motor, measuring nearly 3' in diameter. The drum wound a cable connected to the rock car or larry. After the car had run down the rock track and dumped its load, the hoist pulled it back to the bin.

In the 1920s, the Berwind-White Company altered its methods of coal preparation with the construction of mechanical cleaning facilities at two of its mines. By producing a more standard and cleaner product, the company hoped to attract a broader market and offset the declining demand for coal. Charles Enzian, the company's chief mining engineer explained that:

> the economic conditions of the bituminous coal industry which have existed in the past, and no doubt will exist in the future, require exceptional alertness on the part of the operator to create additional demand through the improvement of the product from his mines so that he may be insured of retaining the market already supplied and a reasonable hope of gaining new markets.

Prior to this undertaking, Enzian began a "comprehensive engineering and operating coal research program" which included a survey of market demands and an analysis of the area coal's physical characteristics. Selecting a suitable cleaning method also consumed a large portion of Enzian's study. At one point he claimed "that we went through a stage of about four years of experimenting before we decided what system was most suitable for our product."

The company eventually chose a pneumatic or "dry" cleaning system which was relatively new; air cleaning having been applied to coal sometime around 1924. Wet cleaning methods, which were more established, were determined to be unsuitable because they lowered the heat output of the coal by raising the moisture content and caused freeze-up problems during shipment in cold weather.

Berwind-White's first Windber cleaning plant was designed and built by the Roberts and Schaefer Company of Chicago, Il. The plant was erected at Eureka Number 37 in 1926 and became fully operational in June 1927. Equipped with Arms air concentrator cleaning tables and Cyclone dust collectors, the facility could process 400 tons of coal per hour. Up to that time, this was the largest plant ever built by Roberts and Schaefer.

Shortly after the Eureka Number 37 plant was completed, Berwind-White began to plan another which was to be built at Eureka Number 40. Enzian stated that "the principal accomplishments expected of the new plant may be summarized as follows: (1.) Smaller operating personnel than old tipple. (2.) Fire-proof and steam-heated modern tipple and cleaning units. (3.) Uniform quality of resultant dry product. (4.) Elimination of dust inside and outside of the plant." The Eureka Number 40 Tipple and Separator was designed and built by Roberts and Schaefer at a cost of $1003 per ton hour capacity, or approximately $401,200.

The plant began operation on 1 September 1928. It had a capacity of 400 tons per minute and was expected to reduce the ash and sulphur content of the coal by 20 and 31 per cent, respectively. In cleaning the coal, the plant was designed to "reject" or remove approximately 4.6 per cent of the total input. In addition, Enzian wrote, "the loading and mixing facilities in the new plant are practically duplicates of the [Eureka Number 37]...plant. The shipped product may consist of run-of-mine, lump, egg and stove, stoker or combinations of any or all of the above sizes."

Although largely modelled upon the facility at Eureka Number 37, the new Separator differed from the earlier plant in several important areas. First, it utilized a much more efficient and innovative system of air circulation and dust collection. Dust control was an important but costly operation in all dry cleaning plants. An engineer for Roberts and Schaefer explained:

> One of the criticisms of air cleaning has always been the handling of the dust....The mere fact that you are working a dry coal and blowing it about with air is the ideal combination of circumstances to create dust. The removal of dusty air...is comparatively simple. You need only apply a sufficient volume of air...[equal to] the entire volume of air that is used to clean the coal, and...roughly a surplus of 25 percent in order to make sure that leakages in the dust-collecting system are included....At the original No. 37 plant, we were forced to handle in the neighborhood of 180,000 cubic feet of air a minute to accomplish the cleaning. That is more air than an ordinary sized coal-mine requires for its entire ventilation. That air passes through the plant at a high velocity...and sometimes with tremendous friction loss. It requires a lot of power and considerable expense for the removal of the dust from this volume.

To make matters worse, the Cyclone dust collectors at Eureka Number 37 only removed 98 percent of the dust from the air. While, as one engineer noted, this "may sound very good,...the nuisance value of the 2 percent of black flour that goes away in the exhaust is nearly as great as that caused by the remaining 98 percent....[The system] is...not good enough to meet the requirements of most colliery companies."

To improve the effectiveness of the system at Eureka Number 40, Roberts and Schaefer installed a Pangborn dust arrester instead of the Cyclone collectors. To lower the cost of operating the dust control equipment, the company also developed a recirculating air system which reduced the volume of air needing to be processed. An engineer explained:

> In the new plant...we use some air that was formerly passed directly to the dust collecting system as a recirculating medium....We start with a series of four tables, each with its own size of coal. Starting at the smallest end which has the smallest air requirement, we use the dust-laden air from the hood as the cleaning medium for the second table and so down to the end. The only air which needs to go to the dust-collecting system is the air from the last table plus its 20 or 30 per cent

> surplus necessary for leakage through the hood....By using this system, we are able to eliminate nearly 30 percent of the horsepower.

Where the old plant had 1031-1/2 connected horsepower, the new plant had only 762-1/4 connected horsepower.

In addition to new dust collection and air circulation systems, the Eureka Number 40 facility differed from the earlier plant in that it was equipped with a wet cleaning section. At the Eureka Number 37 plant, Berwind-White had discovered that the Arms air-tables could not efficiently clean sizes larger than 1-1/2 inches. After experimentation, it concluded that these sizes, which made up approximately 16 percent of the total input, could be cleaned by a Menzie "hydro" separator -- the coal's moisture content only being increased by "about one-half of one per cent, which is just about the practical limit of moisture we have set for our plant product."

Berwind-White's inclusion of a wet plant was representative of a growing industry acceptance of wet cleaning. The company increasingly relied on the process, and in 1941 built a separate wet cleaning plant at Eureka Number 40. To remove excess water from its product, in 1955 the company also constructed a drying plant just north of the Separator and at another time installed a mechanical drier in the Separator itself.

With such extensive cleaning facilities, Eureka Number 40 became one of the company's most important mine sites. In 1948, Berwind-White began to haul coal from many of its other Windber mines to Number 40 for processing. When the company ceased operations in 1962, the surface works of most of its mines were dismantled. At Eureka Number 40, however, the cleaning plants were such valuable assets that Berwind-White was able to lease the mine to another coal operator in the 1970s. The mine and cleaning facilities operated until about 1980, when they were closed for a final time.

References:

"Eureka Number 40. New tipple and separator," 31 May 1928 (photograph, Bob Barrett); "Eureka Number 40. Tipple, tracks and improvements. Sections in vicinity of tipple," 11 August 1927 (J11-3499); "Eureka Number 40. New cleaning plant plans," 3 February 1928 (E18-3594) [not located]; "Eureka 40. Rock hoist and house," 24 March 1928 (E18-3609); "Eureka Number 40. Cleaning plant foundation," no date (E18-3613); "Eureka Number 40. Special track work for new rotary dump," 17 April 1928 (B3-3620); "Eureka Number 40. Kickback foundation," 17 July 1928

(B8-3647); "Eureka 40. Plan showing fire protection system in Number 40 tipple and separator," 26 September 1928 (E18-3687); "Eureka Number 40. Alterations in railroad tracks to accommodate new tipple and separator," 9 October 1928 (A8-3694); "Eureka Number 40. Plan for office and toilet. Southwest corner of table floor. Number 40 tipple and separator," 24 October 1928 (B8-3703) [not located]; "Eureka Number 40. Plans for Barclay rotary dump at Number 40 mine. Phillips Mine and Mill supply Company," no date (J16-3706); "Eureka Number 40. Railroad facilities as of November 1930, showing new cleaning plant and capacity of loaded and empty tracks," 15 November 1930 (H13-3974); "Eureka Number 40. Cleaning plant flow sheet," May 1935 (A6-4246) [not located]; "Eureka Number 40. Marcus screen plate," 26 February 1935 (A1-4369); "Eureka Number 40. Surface features east of cleaning plant," 20 June 1941 (N2-4690); "Eureka 40. Surface features," 3 March 1955 (N2-5176); "Eureka Number 40. Proposed plan for roof over dust collectors at Number 40 cleaning plant," April 1958 (C7-5259); "Berwind-White Tools Up, Hits Production Peaks," Coal Age 65 (December 1960): 80-82; Charles Enzian, "Dry Cleaning of Coal at the Berwind-White Operations," The Mining Congress Journal 13 (June 1927): 427-430+; Charles Enzian, "Pneumatic or Dry Cleaning of Bituminous Coal," Proceedings: Engineers' Society of Western Pennsylvania (February 1929): 38-56; C.W.H. Holmes, "Dry Cleaning," Colliery Engineering 18 (December 1941): 284-287; J.B. Morrow and J.R. Campbell, "Cleaning of Coal in the Bituminous Fields of Pennsylvania," Proceedings: Engineers' Society of Western Pennsylvania (February 1929): 10-37; E.J. Newbaker, "Dry Cleaning at the Berwind-White Coal Mining Company," The Mining Congress Journal 14 (July 1928): 540+; "Welded Kickback Solves Car Running Problems," Coal Age 59 (December 1954): 104.

Fairmont Wet Cleaning Plant
standing
size in plan: 56' x 32'
dates: built 1941

In 1941, the Fairmont Machinery Company of Fairmont, W. Va, constructed a steel wet cleaning facility east of the Tipple and Separator (Fairmont job #411790-C). The plant handled coarse coal sizes, washing them in a 10' Chance-Cone system. The exact layout and operation of the plant is not known.

References:

"Eureka Number 40. Surface features east of cleaning plant," 20 June 1941 (N2-4690); "Berwind-White Tools Up, Hits Production Peaks," Coal Age 65 (December 1960): 80-82.

Crusher
not standing
size in plan: 26' x 18'
date: built 1941

In 1941, the Roberts and Schaefer Company of Chicago, Il. built a crusher facility between the new Fairmont wet cleaning plant and the Tipple and Separator (Roberts and Schaefer job #4120). The addition undoubtedly reflected a growing demand for slack and fine sizes of coal.

It is not known how the plant was equipped, although in 1960 Coal Age reported that at the Eureka Number 40 mine there were "the usual complement of screens, conveyors and crushers...which permit considerable flexibility in sizing to meet market requirements."

References:

"Eureka Number 40. Cleaning plant. Surface features," 2 March 1955 (N2-5176); "Berwind-White Tools Up, Hits Production Peaks," Coal Age 65 (December 1960):80-82.

Drying Plant
not standing
size in plan: 50' x 40'
dates: built c.1955

Sometime around 1955, the Berwind-White Company constructed a plant to dry coarse slack coal cleaned in the hydrotator and classifier plant housed in the tipple. Finer sizes of wet cleaned coal were mechanically dried in a centrifuge installed in the Separator building. The new plant was equipped with two 24' x 12' Multi-Louvre driers manufactured by the Link Belt Company of Chicago, Il. The driers were coal fueled and fired by an 8-retort Taylor-type underfeed stoker manufactured by the American Engineering Company. A Bigelow-Liptake furnace was also used in conjunction with the Link-Belt driers. Four 16'-diameter Raymond Cyclone Collectors equipped with Crites tubes were installed to collect coal dust from the driers.

References:

"Eureka Number 40. Improved surface features," no date (see N2-5176); "Berwind-White Tools Up. Hits Production Peaks," Coal Age 65 (December 1960): 80-82.

Rock Disposal

Rock Car Barn
not standing
size in plan: 40' x 20'
dates: c.1925

Wooden building which housed the rock car or "larry." The building may have been razed in the 1970s when Berwind-White leased its site and the rock pile to a company for coal-recovery operations.

References:

"Eureka Number 40. Location of rock car barn," 7 November 1925 (B5-3256).

Coal Handling

Shifter's Shanties
not standing
size in plan: 12' x 10'
dates: built on south side of railroad tracks before 1927; built on north side of tracks before 1930

Wood framed shacks, stood near the railroad tracks and served as an office and shelter for the "shifter," who was responsible for loading coal into the railroad cars.

References:

"Eureka Number 40. Tipple, tracks and improvements. Sections in vicinity of tipple," 11 August 1927 (J11-3499); "Eureka Number 40. Surface features," January 1934 (G4-4277).

Railroad Car Repair Shop
standing
size in plan: 28' x 16'
dates: built before 1930

This wood-frame structure with a gable roof served as a repair shop for railroad cars. A 16' x 10' concrete pad on the east side of the building was probably used as a repair floor.

Most coal operators did not own cars to ship coal to market, instead relying on the railroads to supply them. Invariably, there were car shortages which delayed shipment and halted mining operations. To avoid these problems, the Berwind-White Company made an early effort to maintain its own railroad car fleet. In

1888, Charles Berwind purchased 500 cars from the Powelton Coal and Iron Company. Berwind-White continued to expand its car fleet and by 1912 owned at least 2000 cars.

To maintain its rolling stock, in 1905 Berwind-White purchased land in Hollidaysburg for a repair shop. The company also opened a shop in Windber, but its most difficult jobs were still handled in Hollidaysburg.

The small repair shop at Eureka Number 40 probably made minor repairs to the company's coal cars. In the 1960s, Berwind-White sold its fleet of cars and closed its mines. The shop at Eureka Number 40 undoubtedly closed at this time as well, although the main shops in Windber and Hollidaysburg continued to operate as independent contractors.

References:

"Eureka Number 40. Railroad facilities as of November 1930, showing new cleaning plant and capacity of loaded and empty tracks," 15 November 1930 (H13-3974); Richard Burg, "When Empty Return to Windber," The Keystone, 19 (Autumn 1986): 7-24.

Operations

Powerhouse
standing
size in plan: overall size is 150' x 100'
dates: completed 1906; crusher, boiler and engine house altered 1929

The Berwind-White Company began work on a powerhouse at Eureka Number 40 in 1905 and finished in 1906. The powerhouse produced direct current for Mine 40 as well as mine Nos. 30, 31, 32, 35 and 37. The building was constructed of brick with a double gabled roof and wooden clerestories. Half of the plant housed the boilers and the other half the motors and generating equipment. A crusher and a fan setting were attached to the south side of the building.

The crusher supplied broken coal to the boiler house for fuel. Built of brick and attached to the southwest corner of the power plant, the crusher housing measured 32' x 18'. Mine cars conveyed run-of-mine coal to the crusher over tracks leading from the tipple. It is not clear whether the cars dumped their coal inside the building or into an outside hopper. Which ever the case, an automatic hopper-fed Heyl and Patterson toothed-roll crusher, driven by a 10 h.p. Westinghouse motor, broke the delivered coal. A chain-and-bucket elevator raised the fuel to an 18-inch belt conveyor which carried it into the boiler house.

The boiler room measured 150' x 45' and could accommodate four batteries of two 300 h.p. Stirling watertube boilers. A double grated furnace equipped with a Roney stoker fired each boiler. When the plant began operation in 1906, only three batteries were installed. The belt conveyor from the crusher carried coal to a steel trough which passed over the top of each furnace. Twelve inch feed tubes directed coal down from the trough to the furnace grates. The boilers drew water from a single Cochran water heater and purifier. Ashes from the boilers fell into pits beneath the boiler house floor. They were then loaded into mine cars and used in the headings for track ballast.

The generator room measured 150' x 55'. To generate electricity, it was equipped with two 550 volt d.c. General Electric dynamos direct-connected to Cooper-Corliss cross-compound engines and a 500 k.w. 550 volt 910 ampere Westinghouse dynamo driven by a 1000 h.p. Cooper-Corliss engine. To operate puncher machines and pumps in the mine, Berwind-White installed two Ingersoll-Sargent compressors driven by Cooper-Corliss engines.

The Eureka Number 40 powerhouse was the first major direct-current generating plant built by Berwind-White. The company's other stations, the Engineering and Mining Journal observed in 1904, were wooden "frame structures", having a "temporary look". Berwind-White probably modeled the new plant upon another large brick generating station it had built at Eureka Number 38 sometime around 1904. This plant produced alternating current, which was typical of most large powerhouses because direct current could not be economically transmitted more than two miles due to power loss. However, the new plant at Mine 40 lay within one and a half miles of the other mines, making it practical to produce direct current. This was an advantage because the company only used direct-current power underground and thus saved the expense of converting alternating current.

By 1916, the Mine 40 station had switched to producing alternating current. At that time, many of the company's mines extended more than three miles underground and it was impractical to transmit electricity as direct current.

In 1918, the Berwind-White Company began to construct a large central power plant near Windber. Operated by the Windber Electric Company, a subsidiary of Berwind-White, the plant opened in 1920. It supplied alternating current to the town and surrounding company mines. The independent stations at each mine probably closed at this time.

Sometime after 1927, a fan house was built on the south side of the old boiler. The plant was not producing power at this time and it is not known what function the fan served. In 1929, the company subdivided the plant for use as a supply house and converted the crusher to store oil. In the process the company added a shed roof to the crusher housing and may have removed the power plant's clerestories.

References:

"Eureka Number 40. Tipple, tracks and improvements. Sections in vicinity of tipple," 11 August 1927 (J11-3499); "Eureka Number 40. Oil house," 2 January 1929 (C3-3726); "Eureka 40. Surface features," January 1934 (G4-4277); William L. Affelder, Mines and Minerals 28 (March 1908): 363-364; Donald J. Baker, Coal Age, 18 (15 July 1920): 103-105; Engineering and Mining Journal 77 (2 June 1904): 880-881; A.S. M'Allister, Mines and Minerals 21 (October 1900): 110-111; A. Tappan Sargent, "Enduring Coal Enterprise....Berwind-White...." The Black Diamond, 96 (28 March 1936): 26; see the Pa. Dept. of Mines Annual Bituminous Report, 1918 1273.

Wash House
standing
size in plan: 80' x 40'
dates: built before December 1923; shed roof lean-to added 1930; concrete block additions 1957

The brick building stands above a stone foundation and is composed of a tall one-story, gable roofed washroom flanked by one-story, hip roofed wings which probably served as offices. It is not known whether the side wings are later additions or part of the original structure.

In 1923, the Berwind-White Company proposed to build basement stairs along the west side of the building and convert the lower space to a laundry. In 1930, stairs were added to the east side and those on the west were apparently rebuilt. In addition, the company added a lean-to with a shed roof to the rear (south side) of the wash house below the level of the first floor to shelter the basement entrance. At this time, the basement may have been converted to a lamp house, where miners' lights were recharged. In 1957, concrete block offices for the mine foreman and motor foreman were added to the front (north) facade of the building.

The Berwind-White Company may have built the wash house in 1922 and then added the laundry the next year in an effort to improve its labor relations. There were numerous strikes through out the bituminous coal fields in the first decades of the twentieth century. In 1922, miners at Eureka Number 40 led a major strike to protest working and living conditions around

Windber. The miners went so far as to picket in New York City, where the company had an office and where most of the Windber coal was sold for the steamship bunkering trade and to the city's subway system.

Concerned by the demonstrations, the New York City mayor appointed a committee to investigate conditions at Berwind-White's Windber mines. Released in 1923, the report declared that company miners worked and lived in settings "worse than the conditions of the slaves prior to the Civil War." The company may have built the wash house and laundry to offset these criticisms and meet some of its workers' demands.

References:

"Proposed laundry. Eureka Number 40 Wash House," 26 December 1923 (C5-2984); "Eureka Number 40. Shed roof lean-to and concrete steps," 18 July 1930 (E1-3943); "Eureka Number 40. Wash House/Bath House. Addition for offices of Mine Foreman and Machine Foreman," 16 August 1957 (C2-5244);"Map of Eureka Number 40 for the Insurance Department," 31 March 1915, revised: 3 September 1923, 2 April 1930, 11 February 1936; "Berwind-White Mine Workers Worse Off Than Slaves, Says Report of Investigators," Coal Age, 23 (4 January 1923), 26.

Miner's Supplies
not standing
size in plan: 16' x 12'
dates: built before 1924; razed after 1934

Despite its name, this small wooden building did not serve as a storehouse for picks, shovels and other mining equipment. Rather, it housed a small shop run by the Eureka Department store, where miners could buy baked goods, candy, tobacco, etc. The Berwind-White Company allowed the Eureka stores to establish outlets at each of its mines, and a past employee recalls that miners would often buy their lunch or a snack at these shops and take it underground.

References:

"Eureka Number 40. Warehouse. Proposed topography for same," 2 April 1924 (C5-3009); "Eureka Number 40. Surface features," January 1934 (G4-4277); Sewell Oldham, interview, 16 August 1988.

Supply House
not standing
size in plan: 38' x 24'
dates: built before 1927; razed before 1934

Used as a warehouse, it is not known what was stored in the building.

References:

"Eureka Number 40. Tipple, tracks and improvements. Sections in vicinity of tipple," 11 August 1927 (J11-3499); "Eureka Number 40. Surface features," January 1934 (G4-4277).

<u>Repair Shop</u>
not standing
size in plan: 60' x 26' with 14' x 12' shed attachment
dates: built before 1927; razed after 1934

The Repair Shop was a metal building which stood along the line of empty track near the Motor Barn. The structure probably housed a machine shop, but its exact function and layout are not known.

References:

"Eureka Number 40. Tipple, tracks and improvements. Sections in vicinity of tipple," 11 August 1927 (J11-3499); "Eureka Number 40. Surface features," January 1934 (G4-4277).

<u>Pump House/Shifter's Supplies</u>
not standing
size: 36' x 26'
dates: built before 1927; razed after 1934

The brick structure was used as a pumphouse before 1927. The pumps may have drained the mine or carried cooling water to the powerhouse from the Little Paint Creek. By 1930, the building was used as a storage house by the shifter.

References:

"Eureka Number 40. Tipple, tracks and improvements. Sections in vicinity of tipple," 11 August 1927 (J11-3499); "Eureka Number 40. Railroad facilities as of November 1930, showing new cleaning plant and capacity of loaded and empty tracks," 15 November 1930 (H13-3974); "Eureka Number 40. Surface features," January 1934 (G4-4277).

<u>Hose House</u>
not standing
size in plan: 8' x 6'
dates: built before 1927; razed c. 1928

Small wooden shack with gable roof, apparently used to store hoses. Building was probably removed in 1928 to make way for tracks leading to the new tipple.

References:

"Eureka Number 40. New tipple and separator," 31 May 1928 (photograph, Bob Barrett Collection); "Eureka Number 40. Tipple, tracks and improvements. Sections in vicinity of tipple," 11 August 1927 (J11-3499).

Repair Floor
not standing
size in plan: 108' x 32'
dates: built after 1927

The outline of the Repair Floor appears in an untitled and undated tracing of the Eureka Number 40 site made sometime after 1928. Presumably the floor served as an open air repair shop. However, the floor does not appear on plans made in 1934 or 1955, raising a question as to whether it were ever built. Field inspection of the site revealed that concrete piers were set in the ground in the area the Repair Floor was to have been built. Sewell Oldham, a longtime employee of the Berwind-White Company, claimed in a recent (1988) visit to the mine that the piers were the remnants of a coal drying plant constructed in the 1950s. However, plans for the drying plant do not indicate that any section was to be built in that location.

References:

Untitled tracing of Eureka Number 40 surface features, no date (drawer G4); "Eureka Number 40. Surface features," January 1934 (G4-4277); "Eureka Number 40. Cleaning Plant. Surface features," 2 March 1955 (N2-5176).

<u>Heater</u>
standing
size in plan: 36' x 22'
dates: built 1948

Concrete block building with barrel roof, housed an "Economic Boiler" manufactured by the Erie City Iron Works (Erie, PA). In addition to heating the Separator building, the boiler heated oil which was then sprayed onto shipped coal to reduce dust and prevent freezing.

References:

"Eureka Number 40. Heating plant," 30 March 1948 (D5-4962);
"Eureka Number 40. Oil treating system," 3 May 1949 (D2-5034).

<u>Cap Magazine</u>
standing
size in plan: 3.5' x 3.5'
dates: unknown date of construction

A small 3.5' x 3.5' brick structure sheathed in concrete with a 1' x 1' iron door. Explosive caps were stored in the magazine and it was constructed at some distance from the mine site along a road leading to the Powder Magazine. A sign warning against open flame is mounted on a pole above the magazine.

References:

"Map of Eureka Number 40 for the Insurance Department," 31 March 1915, revised: 3 September 1923, 2 April 1930, 11 February 1936.

<u>Powder Magazine</u>
standing
size in plan: 12' x 10'
dates: unknown date of construction

Concrete block shack served as a magazine for explosives. Building is located along an abandoned road. A sign warning against open flame is mounted on a pole above the magazine.

References:

"Map of Eureka Number 40 for the Insurance Department," 31 March 1915, revised: 3 September 1923, 2 April 1930, 11 February 1936.

Car Shed
standing
size in plan: 115' x 20'
dates: built after 1934

The Car Shed served as a covered storage area for mine cars, locomotives and other mining equipment. It was constructed of timber framing and sheathed in corrugated steel. A spur line connected the shed to tracks leading to the empty drift.

References:

"Eureka Number 40. Surface features," January 1934 (G4-4277).

Gas Storage
standing
size in plan: 12' x 10'
dates: built after 1934

Single room, concrete block shack with corrugated metal shed roof. Appears to have been used to store gasoline cans. May have been built by the Jandy Coal Company which leased the mine site from Berwind-White in the 1970s.

References:

(no written sources; observation in field, summer 1988.)

Substation
standing
size in plan: 10' x 10'
dates: built after 1934

Concrete block building with shed roof, used to house transformers. May have been built by the Jandy Coal Company which leased the mine site in the 1970s.

References:

(no written sources; observation in field, summer 1988.)

Saw Mill
not standing
size in plan: 32' x 12'
dates: built between 1927 and 1934

The saw mill was a metal structure built over a stone foundation. The foundation apparently now supports two oil tanks.

References:

"Eureka Number 40. Tipple, tracks and improvements. Sections in vicinity of tipple," 11 August 1927 (J11-3499); "Eureka Number 40. Surface features," January 1934 (G4-4277).

<u>Oil House (#1)</u>
not standing
size in plan: 12' x 10'
dates: built before 1927; razed before 1934

Building served as an oil store house, its description is not known.

References:

"Eureka Number 40. Tipple, tracks and improvements. Sections in vicinity of tipple," 11 August 1927 (J11-3499); "Eureka Number 40. Surface features," January 1934 (G4-4277); see also: Oil House (#2), Powerhouse.

<u>Oil House (#2)</u>
standing
size in plan: 10' x 10'
dates: built after 1934

Concrete block shack with shed roof. Used to store oil. May have been built by the Jandy Coal Company which leased the mine site in the 1970s.

References:

(no written sources; observation in field, summer 1988.)

Safety

First Aid Shack
standing
size in plan: 8' x 8'
dates: built after 1934

Single room, concrete block building. Located near the drift mouth and identified by Tom Faust, property-man for Berwind-White (1988), as a first aid station. May have been built by the Jandy Coal Company, which leased the mine site from Berwind-White in the 1970s.

References:

(no written sources; observation in field, summer 1988.)

Mine Fire Car Building
not standing
size in plan: 20' x 12'
dates: built 1927; razed after 1934

The building was a single bay, wood-frame structure with a gabled roof that housed the fire car for the mine. The building was planned in 1927 and probably constructed shortly thereafter. It may have stood directly to the west of the Miner's Supplies building.

References:

"Eureka Number 40. Mine Fire Car Building," October 1927 (B1-3533); "Eureka Number 40. Mine Fire Car Building," November 1927.

Miscellaneous Structures

Covered Shaft
standing
size in plan: 10' x 10'
dates: built after 1934

Concrete block structure. Stands near a grate which discharges a continual stream of water. Appears to be the cover to a shaft and may have been built by the Jandy Coal Company which leased the mine site from Berwind-White in the 1970s.

References:

(no written sources; observation in field, summer 1988.)
none.

Brick Foundation
only foundation remains
size in plan: 15' x 8'
dates: built after 1934

It is not known when the building which stood on the foundation was built or what function it served. The foundation first appears on a plan in 1948 and may have been a complete building. A plan made in 1955 noted that the foundation had a concrete roof and was used for storage.

References:

"Eureka Number 40. Surface features," January 1934 (G4-4277); "Eureka Number 40. Heating plant," 30 March 1948 (D5-4962); "Eureka Number 40. Cleaning plant. Surface features," 2 March 1955 (N2-5176).

Unknown building (#1)
not standing
size in plan: 7' x 7'
dates: standing in 1924; razed by 1934

This structure stood immediately east of the Miner's Supplies building. Its function is unknown.

References:

"Eureka Number 40. Warehouse--Proposed. Topography for same," 2 April 1924 (C5-3009); "Eureka Number 40. Surface features," January 1934 (G4-4277).

Unknown building (#2)
not standing
size in plan: 7' x 7'
dates: standing in 1924; razed by 1934

This structure stood to the east of the Miner's Supplies building, just to the east of another unidentified building. Its function is unknown.

References:

"Eureka Number 40. Warehouse--Proposed. Topography for same," 2 April 1924 (C5-3009); "Eureka Number 40. Surface features," January 1934 (G4-4277).

<u>Warehouse</u>
not standing
size in plan: 64' x 24'; with a 28' x 16' shed attachment
dates: built before 1930; razed after 1934

Wood-frame building, stood on a railroad siding just south of the Eureka Store. Probably held goods shipped by railroad for sale in the store.

References:

"Eureka Number 40. Railroad facilities as of November 1930, showing new cleaning plant and capacity of loaded and empty tracks," 15 November 1930 (H13-3974); "Eureka Number 40. Surface features," January 1934 (G4-4277).

APPENDIX B:
INVENTORY OF DRAWINGS OF
EUREKA NUMBER 40

Berwind-White Drawings of Eureka Number 40

The following is a complete list of drawings prepared by Berwind-White and relating to Eureka Number 40. Most of the drawings were prepared by Berwind-White's engineering department and are kept in the second-floor vault of the old Berwind-White headquarters, now the Windber Borough office.

The citation for an engineering plan consists of the title, date and a code in parentheses (for example, G4-4277, where '4277' is the number of the drawing and 'G-4' the drawer or cubbyhole location). The list was compiled through consultation of the vault index. Unfortunately, all of the drawings have not been examined and some cannot be found. The missing items were included because they can provide important construction information for certain structures. The engineering plans have been listed in order of their plan numbers, which is generally chronological.

Engineering Drawings

"Eureka Number 40. Scalp Level, Cambria County, PA. Plan of streets-lots....Dwellings-sewer lines from houses etc.," 25 May 1905 (C9-397).

"Eureka Number 40. Plat with relation to mine improvements...." no date (D2-398).

"Eureka Number 40. Plan of elbow for fan," June 1910 (B6-1459).

"Eureka Number 40. Fan. Plan for rope drive," 1910 (B6-1460).

"Eureka Number 40. Plan of fan foundation," 6 August 1910 (D6-1479).

"Eureka Number 40. Plan of Capell fan setting. Plan, elevation and sections," 3 October 1910 (D6-1487).

"Eureka Number 40. Fan house. Foundation plan for motor," 3 December 1910 (B6-1461).

"Eureka Number 40. Concrete lined ventilation shafts at Eureka Number 35, 36, 40," 22 August 1914 (A4-1122).

"Eureka Number 40. Sand house. Foundation for compressor and motor plan and elevations," 27 March 1916 (C4-1490).

"Eureka Number 40. Rock car bumper details," November 1916 (B5-2704).

"Eureka Number 40. Power. Turbine foundations, condenser pit and wells," 11 January 1917 (D3-1857).

"Eureka Number 40. Rock dump. Pipe supports for hoisting rope plan of above. Half size," 30 May 1918 (D2-1890).

"Eureka Number 35, 36, 37, 40, 42. Map showing territory of the above Berwind-White Coal Mining Company," 7 January 1908 (I6-2176).

"Eureka Number 40. Proposed laundry. Eureka Number 40 wash house," 26 December 1923 (C5-2984).

"Eureka Number 40. Warehouse--Proposed. Topography for same," 2 April 1924 (C5-3009).

"Eureka Number 40. Steel timbers for main loaded and empty drifts," 2 April 1924 (A3-3010).

"Eureka Number 40. Location of rock car barn," 7 November 1925 (B5-3256).

"Eureka Number 40. Proposed revision of telephone line," 8 September 1926 (A1-3383).

"Eureka Number 40. Tipple, tracks and improvements. Sections in vicinity of tipple," 11 August 1927 (J11-3499).

"Eureka Number 40. Working adjacent to R.L. Vail Mine...." 27 April 1927 (D7-3442).

"Eureka Number 40. Mine fire car building," October and November 1927 (B1-3533).

"Eureka Number 40. Original contour lines. Outline of cleaning plant and proposed grading," 2 February 1928 (E18-3592).

"Eureka Number 40. New cleaning plant plans," 3 February 1928 (E18-3594).

"Eureka Number 40. Rock hoist and house," 24 March 1928 (E18-3609).

"Eureka Number 40. Cleaning plant foundation," no date (E18-3613).

"Eureka Number 40. Two blue prints and two photostats. Dimensions checked on dump at Eureka Number 36 #2 dump by Latta and Berkey. This dump to be installed at Eureka Number 40," 4 April 1928 (D8-3614).

"Eureka Number 40. Special track work for new rotary dump," 17 April 1928 (B3-3620).

"Eureka Number 40. Proposed rock dump track," 19 April 1928 (E18-3626).

"Eureka Number 40. Power. Churn drill holes for power cables," 25 April 1928 (C7-3627).

"Eureka Number 40. Section of B and C' seams on line of proposed 2-left heading. C' seam," 7 June 1928 (E7-3631).

"Eureka Number 40. Retaining walls to support slope at Eureka Number 40 cleaning plant," 7 June 1928 (E18-3632).

"Eureka Number 40. Foundation plan. Outdoor substation at Eureka Number 40," 16 July 1928 (C2-3648).

"Eureka Number 40. Kickback foundation," 17 July 1928 (B8-3647).

"Eureka Number 40. Plan showing derrick guy lines, etc. at Number 40 tipple and separator in connection with Oliver Fry fatal accident," 31 July 1928 (J12-3658).

"Eureka Number 40. Plan for concrete cribbing units for Number 40 rock dump," 31 August 1928 (A8-3671).

"Eureka Number 40. Plan setting 36" sheave at Number 40 rock dump," 13 September 1928 (E18-3679).

"Eureka Number 40. Plan for steel sand tank foundations at Eureka Number 40," 13 September 1928 (E18-3681).

"Eureka Number 40. Plan of automatic mine car control. Roberts and Schaefer Company Car Dumper Department drawing #2835-A...." 25 September 1928 (E18-3685).

"Eureka Number 40. Plan showing fire protection system in Number 40 tipple and separator," 26 September 1928 (E18-3687).

"Eureka Number 40. Alterations in railroad tracks to accomodate new tipple and separator," 9 October 1928 (A8-3694).

"Eureka Number 40. Plan for office and toilet. Southwest corner of table floor. Number 40 tipple and separator," 24 October 1928 (B8-3703).

"Eureka Number 40. Plans for Barclay rotary dump at Number 40 mine. Phillips Mine and Mill Supply Company," no date (J16-3706).

"Eureka Number 40. Plan for wharf improvements and relocation of tracks," 5 November 1928 (E8-3711).

"Eureka Number 40. Sand line," 22 November 1928 (H2-3714).

"Eureka Number 40. Dump support," 14 December 1928 (B3-3721).

"Eureka Number 40. Plan for toilet. Eureka 40 tipple," December 1928 (B8-3722).

"Eureka Number 40. Oil house," 2 January 1929 (C3-3726).

"Eureka Number 40. Plan for tunnel and air slope to C' seam," Decmeber 1928 (J8-3728).

"Eureka Number 40. Sand lines--details," 7 February 1929 (E3-3740).

"Eureka Number 40. Approved plan showing places cut by undercutting machine...." 8 February 1929 (D5-3741).

"Eureka Number 40. Section through west end of tipple. Section through west end of...Marcus pier," 26 April 1929 (I6-3767).

"Eureka Number 40. Property. To the Berwind-White Coal Mining Company, Scalp Level Boro...." 23 May 1929.

"Eureka Number 40. C' tunnel," no date (K4-3792).

"Eureka Number 40. Power cable support for Eureka Number 36 and 40," 23 July 1929 (C3-3813).

"Eureka Number 40. In old boiler bouse. Oil and supply rooms," 25 July 1929 (B3-3814).

"Eureka Number 40. Profile of tunnel showing where C' coal was found," 1 August 1929 (K4-3819).

"Eureka Number 40. Drainage scheme--empty track at drift," September 1927 (I2-3826).

"Eureka Number 40. Wharf improvements--Comparative sections," 3 September 1929 (B3-3833).

"Eureka Number 40. Wharf improvements. Culvert extensions," 5 September 1929 (B3-3837).

"Eureka Numbber 40. C' seam. Mine tracings showing coal analysis, sections of seam and clay veins," 15 February 1930 (In sheet iron box-3902).

"Eureka Number 40. C' seam. Method of working main, panel and room headings and back headings at Eureka Number 37 and 40C' seams," 24 March 1930 (C3-3912).

"Eureka Number 40. Shed roof leanto and concrete steps," 18 July 1930 (E1-3943).

"Eureka Number 40. Pipe clamp for compressed air line in ventilation shaft at Number 40 and Number 36," 26 July 1930 (A3-3945).

"Eureka Number 40. Bends for compressed air lines in shafts," August 1930 (A6-3947).

"Eureka Number 40. Yoder air shaft. Temporary rigging for installation of new 8" WS column airline," 25 August 1930 (B1-3955).

"Eureka Number 40. Plan and sections showing location of concrete pier and 90 degree 8" elbow at bottom of Yoder shaft for compressed air line for Berwind-White pickhammer mining," 27 August 1930 (B1-3956).

"Eureka Number 40. Yoder Substation. Foundation plan for American (5x6) pump and motor," 2 September 1930 (B1-3958).

"Eureka Number 40. Yoder Substation. Plan and sections of dam for Ingersoll-Rand compressor," 24 September 1930 (B2-3960).

"Eureka Number 40. Yoder dam. Plan and section of pipe connections for pump," 4 October 1930 (C4-3962).

"Eureka Number 40. Yoder substation. Plan and sections of dam and pipeline for cooling compressor," 6 October 1930 (F1-3963).

"Eureka NUmber 40. Yoder Substation. Water supply," 24 October 1930 (D3-3964).

"Eureka Number 40. Yoder Substation. Air compressor foundation--Ingersol-Rand installation at Yoder Substation 'as built,'" 4 September 1930 (D2-3965).

"Eureka Number 40. Yoder Substation. Ingersoll-Rand air compressor installed at...Yoder Substation. In place 1 November 1930. Capacity 2200 cubic feet," 4 September 1930 (D2-3966).

"Eureka Number 40. Ingersoll-Rand after cooler installed at ...Yoder Substation," 5 September 1930 (A2-3967).

"Eureka Number 40. Air receiver--standard 60"x14' installed at Eureka Number 40 Yoder Substation," October 1930 (A2-3968).

"Eureka Number 40. Reed air filter installed at Number 40 Yoder Substation," October 1930 (A2-3969).

"Eureka Number 40. Yoder Substation. General drawing showing installation of Ingersoll-Rand air compressor. Cap. 2200 cubic feet per minute," 15 September 1930 (E1-3970).

"Eureka Number 40. Railroad facilities as of November 1930, showing new cleaning plant and capacity of loaded and empty tracks," 15 November 1930 (H13-3974).

"Eureka Number 40. Shaft coupling casting for dust valves on Pangborn," 3 February 1931 (A1-3988).

"Eureka Number 40. Plan showing conveyor mining at Number 40 in conjunction with chain machine and pickhammer. Conveyor room, 26 left main," February 1931 (A6-3994).

"Eureka Number 40. Yoder Substation. Housing over intake air shaft," April 1931 (D6-4001).

"Eureka Number 40. Sidewalk grades," no date (K6-4087).

"Eureka Number 40. Blue print plan and sections showing present and proposed method of surface water drainage near drift mouth and mine car dump," 27 August 1931 (K6-4091).

"Eureka Number 40. Map showing tracts cut out by C' fault that has been developed by Numbers 37 and 40 C' mines, Lorain Steel Company C' Mines, C' mine of the Valley SMokeless Coal Company and D.D. Holes of the latter company," 18 March 1932 (C3-4138).

"Eureka Number 40. Pickhammer piping in Eureka mines and Maryland shaft," June 1932 (G6-4161).

"Eureka Number 40. Details of Headframe and cage at air shaft," 9 November 1932 (D2-4199).

"Eureka Number 40. Cleaning plant flow sheet," May 1935 (A6-4246).

"Eureka Number 40. Telepoise weighing device location plan," November 1933 (C1-4267).

"Eureka Number 40. Surface features," January 1934 (G4-4277).

"Eureka Number 40. Continuous profile over proposed drainage course from 26-left east Number 40 to Maryland shaft via. number 35," January 1934 (K6-4279).

"Eureka Number 40. Marcus screen plate," 26 February 1935 (A1-4369).

"Eureka Number 40. Rock dump and surface features," 2 June 1935 (I17-4384).

"Eureka Number 40. Number 12 frog for hoist rope on rock plane," April 1928 (C3-4432).

"Eureka Number 40. Jeffrey run-around conveyor outside links for #1092 STR chain," 6 June 1936 (A5-4486).

"Eureka Number 40. Cleaning lant. Bushing and pin for Arms screen, detail of. Full size," 17 November 1936 (A6-4505).

"Eureka Number 40. Treated timber for main heading on bick arch near 14 left," 19 October 1936 (B1-4509).

"Eureka Number 40. Mine track grades near scales and dumps at Numbers 35, 36, 37, 40, 42, and Maryland," 7 September 1937 (L7-4566).

"Eureka Number 40. Profile of railroad tracks," 30 September 1938 (I11-4591).

"Eureka Number 40. Barrier pillar between Industrial Collieries Corporation Mine 74 and Berwind-White Coal Mining Company Mines 37-40," December 1938 (L7-4599).

"Eureka Number 40. Platform cages. Ordered from Connellsville Manufacturing and Mine Supply Company for Eureka Number 36 and 40 air shafts," 12 January 1939 (D2-4605).

"Eureka Number 40. Longitudinal sections of inferior coal area 3 main 27 left," January 1934 (H13-4606).

"Eureka Number 40. Cleaning plant, rack for gate #2 loading track," 6 March 1939 (A1-4611).

"Eureka Number 40. Map showing new haulage between Number 35 and Number 40 main headings," February 1940 (K8-4648).

"Eureka Number 40. Profile Number 35-40. New Haulage," 30 July 1940 (K8-4661).

"Eureka Number 40. 45 degree V type elevator and conveyor buckets," 4 March 1941 (A1-4677).

"Eureka Number 40. Inventory. Map showing location of track, wire and pipe lines inside and outside of mines 35B, 35C', 36B, 37B, 37C', 40B, 40C', 42B and Maryland shaft," May 1941 (K12-4687).

"Eureka Number 40. Surface features east of cleaning plant," 20 June 1941 (N2-4690).

"Eureka Number 40. Dust allaying experiment station," July 1941 (C2-4692).

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"Eureka Number 40. Walkway fram Chance Washery to slope," 27 October 1941 (C2-4697).

"Eureka Number 40. Yoder Shaft intake air compartment. Proposed sections to be repaired," November 1941 (M5-4705).

"Eureka Number 40. Sand Storage bin for Cleaning Plant--Chance Washery," 22 January 1942 (C2-4711).

"Eureka Number 40. Cleaning Plant. Roof over transformer," 23 May 1942 (C2-4728).

"Eureka Number 40. Plan for tipple to load coal from trucks to mine cars," October 1944 (L3-4824).

"Eureka Number 40. Profile. New haulage road, 7 left through to 12 right Eureka Number 37," 19 August 1947 (K7-4945).

"Eureka Number 40. Elbow--6" cast iron flange, 30 degrees," 6 November 1947 (B1-4951).

"Eureka Number 40. Classifier column for 10'-0" diameter Chance Cone. Reference drawing United Engineers and Constructors, Inc. No. 6140-H-32," n.d. (B1-4952).

"Eureka Number 40. Heating Plant," 30 March 1948 (D5-4962).

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"Eureka Number 40. Cleaning plant haulage sheave for rock dump," 22 November 1949 (A1-4998).

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"Eureka Number 40. Substation, supply house and repair shop for loading machines (formerly power house). Roof trusses, size and weights," n.d. (A1-5121).

"Eureka Number 40. Map showing land to be conveyed to Richland Township Water Company," August 1954 (A3-5156).

"Eureka Number 40. Surface features," 3 March 1955 (N2-5176).

"Eureka Number 40. Map showing plan of lots and utility service lines for Number 40...." February 1956 (D9-5206).

"Eureka Number 40. Map showing water lines in connection with the Number 40 plan of lots to be conveyed by the Berwind-White Coal Mining Company to Richland Township Water Company," February 1956 (B4-5209).

"Eureka Number 40. Map showing property to be conveyed to Joseph J. and Justina J. Novak...Scalp Level...." August 1956 (A3-5213).

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