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CAMBRIA IRON WORKS



STUDY OF ALTERNATIVES

JOHNSTOWN, PENNSYLVANIA

UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE

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INTRODUCTION



CAMBRIA IRON WORKS

The historic Cambria Iron Works in Johnstown, Pennsylvania, now part of Bethlehem Steel Corporation, is a nationally significant site that represents the growth, development, and impact of the iron and steelmaking industries in the United States since approximately 1850 to the present. The site is thematically related to the America's Industrial Heritage Project, and the National Park Service, through historians from the Denver Service Center and the Historic American Engineering Record, has documented the national significance of the ironworks.

This study of alternatives examines options for protecting and managing this nationally significant resource. Four alternatives are considered:

Alternative A: Continue operation and management of the Cambria Iron Works by Bethlehem Steel Corporation

Alternative B: Establish Cambria Iron Works National Historic District, with management by the Johnstown Flood Museum Association

Alternative C: Establish Cambria Iron Works National Historic Site, with management by the National Park Service

Alternative D: Establish Cambria Iron Works National Historical Park and Johnstown State Heritage Park

The study is intended to be used to determine what future steps, if any, are needed to ensure the protection of site resources and how to interpret the important accomplishments at Cambria to the American people.

This document does not, however, provide acquisition or operation cost estimates for implementing a specific alternative. The study also does not specify the logistical and operational arrangements between Bethlehem Steel Corporation and the site manager that would be required under alternatives B, C, and D for both visitor use and steel production to take place at the same site.

If alternative B, C, or D is selected for further consideration, cost and operational considerations should be identified as soon as possible. If either alternative C or D is selected, the cost and operational considerations, coupled with the management alternatives and historical significance documentation presented in this study, can form the basis of a preauthorization study.

RELATIONSHIP TO THE AMERICA'S INDUSTRIAL HERITAGE PROJECT

America's Industrial Heritage Project has three principal themes--the coal, transportation, and iron and steel industries. The growth, development, and impact of the iron and steel industry in America is an important aspect of the project. Various sites and resources within the nine-county project area represent this theme, and this important aspect of our national development can be commemorated in various ways to the American people.

Several iron furnace sites within the project area depict iron production technology and operating conditions during the early 1800s. These include the iron furnace complex at Mt. Etna in Blair and Huntingdon counties and the Eliza Furnace site in Vintondale, Cambria County. These and numerous other furnace sites in the region attest to the significance of the area's early iron industry and tell the first part of the story about the development of the region's iron and steel industry.

The next part of the story, the initial development of the steel industry between 1852 and 1880, can be told at the Cambria Iron Works site in Johnstown. Additional technological advances up to World War II could be demonstrated by interpreting the adjacent structures that belonged to the Cambria Iron Company and now belong to Bethlehem Steel Corporation. Steelmaking is still taking place adjacent to the site and at other nearby locations within the Conemaugh Valley, providing an opportunity to interpret the evolution and importance of the American iron and steel industry from the early 1800s to the present. Therefore, any future efforts to protect, enhance, and interpret the historic Cambria Iron Works site would be a major contribution to explaining one of the three major themes of the America's Industrial Heritage Project.

SIGNIFICANCE

The Cambria Iron Company in Johnstown, Pennsylvania, made an important contribution to the history of American industrialism. Nationally significant from its founding in 1852 until surpassed in production and corporate leadership by Andrew Carnegie's steel empire in the 1880s, the Cambria Iron Company attracted and employed the brightest minds in the world of iron and steel engineering. At the company's Cambria Iron Works (now known as the Lower Works) iron rails were rolled, experiments were made in steelmaking, the first commercially ordered steel rails in America were rolled, and technological advancements in the steel process were made. Significant in the areas of industry, engineering, and architecture, Cambria's Lower Works are eligible for listing on the National Register of Historic Places. Several people associated with the Cambria Iron Company at the Lower Works were also nationally significant, including Alexander L. Holley, John Fritz, William Kelly, Robert W. Hunt, and William R. Jones.

Major themes represented by the Cambria Iron Works fill several gaps in the thematic framework that has been established for the national park





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system. The themes and subthemes represented by Cambria Ironworks are listed in table 1.

Significant dates (see also appendix A):

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1852	-	establishment of Cambria Iron Company	
1853	-	initial construction of coke ovens, rolling mill	
1854	-	completion of earliest buildings, including pattern shop,	
		blacksmith shop, foundry, rolling mill (none of these remain)	
1855	-	lease to Wood, Morrell & Company	
1857	-	first use of three-high rolling mill	
1857-62	-	Kelly experiments	
1862	-	company reorganized as Cambria Iron Company	
1864-65	-	new octagonally shaped blacksmith shop and large foundry	
		erected (earliest surviving buildings of Cambria Iron	
		Company)	
1867	-	first Bessemer steel rails rolled	
1869-71	-	construction of Bessemer furnace	
1871	-	first blow from Bessemer furnace	
1876	-	Cambria largest U.S. steel rail producer	
1898	-	reorganized as Cambria Steel Company	
1916	-	takeover by Midvale Steel Company	
1923	-	takeover by Bethlehem Steel Company	

Table 1: Themes and Subthemes Represented at Cambria Iron Works

Theme	s and Subthemes Represented at	<u>Other Representative</u> Sites in the National Park System	
Cambr	ia Iron Works		
XII.	Business A. Extractive or Mining Industries 1. Iron and Ferro Alloys B. Manufacturing Organizations 4. Fabricated Metal and Glass Products	Saugus Iron Works National Historic Site Hopewell Furnace National Historic Site	
xvIII.	Technology (Engineering and Invention) D. Tools and Machines F. Extraction and Conversion of Industrial Raw Materials G. Industrial Production Processes	None None Edison National Historic Site Lowell National Historical Park	
xxx .	American Ways of Life C. Industrial Towns E. Ethnic Communities	Lowell National Historical Park Boston African American National Historic Site Castle Clinton National Monument Lowell National Historical Park Maggie L. Walker National Historic Site Martin Luther King, Jr., National Historic Site Statue of Liberty National Monument Touro Synagogue National Historic Site Tuskegee Institute National Historic Site	
xxxı.	Social and Humanitarian Movements H. Labor Organizations	None	

The Cambria Iron Company's history is represented today by structures that survive from the period of the company's greatest achievements in iron and steelmaking up to current steel production on site by Bethlehem Significant extant structures in the Lower Works Steel Corporation. include the blacksmith shop (ca. 1864), blacksmith shop annex (ca. 1884), pattern shop (ca. 1870), foundry (ca. 1865), foundry addition (ca. 1880), office building (ca. 1874), car shop (ca. 1881), and portions of the 1870 rolling mill. Second-generation buildings dating from the 1890s and associated with the original four blast furnaces still remain, as 1878-80 blast furnaces 5 and 6, and the do remnants of the The location of these 1906). second-generation machine shop (ca. structures is shown on the Significant Resources map.

INTERPRETIVE CONCEPT

The interpretive concept is to show the growth, development, and national impact of the iron and steel industry in America. The following themes are applicable:

- 1800-1850: Localized iron industry
- 1850s: Formation of large-scale, capital-intensive iron production based on domestic market demand and the need to compete with foreign markets and the technology of making iron rail; fully integrated plants
- 1860s: Conversion from iron to steel production to meet market demands
- 1860-1880: Advancement in steelmaking technologies (Bessemer and open-hearth processes)
- 1870-1900: Growth of industry Markets Socioeconomic impacts Post Civil War national industrial development Railroad growth Growth of cities (wrought iron and steel construction) Westward expansion
- 1900-1960: Mature industry
- Mid 1960s: Decline of industry
- 1980s: Revitalized industry

















HISTORY



OF THE CAMBRIA IRON COMPANY

Founded in 1852, the Cambria Iron Company was regarded as one of the greatest of the early modern iron and steelworks. In the 1850s, 1860s, and 1870s, Johnstown attracted among the best minds in the industry--William Kelly, George and John Fritz, Daniel J. Morrell, Robert W. Hunt, William R. Jones, and Alexander Holley. These men together and individually advanced iron and steel technology through invention and engineering design, making innovations that were widely adopted by other iron and companies. steel Their contributions included early experimentation with the Kelly converter, first use of the three-high rolling mill to produce iron railroad rails, early conversion to the Bessemer steel process, and first U.S. production of steel rails, which ended this nation's reliance on English-produced rails and allowed the momentous expansion of the railroad network. The Cambria Iron Company trained a generation of iron and steel innovators and was the most productive iron and steel company of the mid to late 19th century.

The site for the Cambria Iron Company was chosen because of the abundant coal and iron ore deposits, and the available water in and around Johnstown. Early iron forges in the area used these local resources and relied on Johnstown's geographic location to ship goods to far markets. Johnstown was the western terminus of the Allegheny Portage Railroad, where passengers and freight were transferred onto canal boats for transport west on the Pennsylvania Main Line Canal. Location and raw resources dictated the early success of iron-producing ventures.

FOUNDING OF THE COMPANY

The Cambria Iron Company had several predecessors, dating to early local efforts at producing iron. Local iron forges took advantage of the ore deposits and water transportation, and in the 1840s George Shryock King and a partner, Dr. Peter Shoenberger, operated four iron furnaces in the area. The two associates owned over 25,000 acres of land in Cambria and Somerset counties, including the ore in Prospect Hill overlooking Johnstown.

When the Pennsylvania Railroad entered the Conemaugh Valley, George King recognized the potential for producing iron rails. Articles of association for Cambria Iron Company were signed August 21, 1852, and after New York financing was acquired, construction of a rolling mill and four coke furnaces began in March 1853. The location chosen for the new plant was Millville Bottom, bounded by the railroad, the canal, Prospect Hill, and the Conemaugh River.

Further monetary problems resulted in the company's transfer from local and New York hands to those of Philadelphia Quakers. Wood, Morell and Company leased the Cambria Iron Company for five years, starting May 21, 1855. In 1862 the company took over the plant through default.

TECHNICAL INNOVATIONS AND DEVELOPMENT

Technical innovation was Cambria's early claim to fame. Engineer John Fritz developed and patented the three-high rolling mill; his brother George patented the steel blooming mill. On July 29, 1857, iron railroad rails were first rolled on John Fritz's mill, which economized on both labor and heat by allowing hot rails to be passed alternately through the rollers in both directions without removal. This mill burned immediately afterwards and was rebuilt by January 1858.

Other early experiments centered on the work of William Kelly. In 1857 Cambria's general manager, Daniel J. Morrell, brought Kelly to Johnstown, where he experimented with the pneumatic process at the same time that Henry Bessemer was perfecting the hot blast in England. Kelly had worked with small converters since 1851, and he produced enough steel to ask for a U.S. patent, which he obtained in 1857. At Cambria Kelly invented a tiltable converter and experimented with it before leaving Johnstown in 1862.

Daniel Morrell also hired chemist Robert Hunt as a professional scientist, a first in the industry. By the early 1860s the process for steelmaking was understood chemically, but its commercial use was still hindered because of inadequate machinery, lack of control over the process, and difficulty in finding suitable pig iron. Lake Superior ores eventually became the source of supply, and the sturdier, longer-lasting steel rails soon replaced iron rails. Ten years passed between Kelly and Bessemer's discoveries and the full commercial use of steel because of legal, technical, and financial problems.

Daniel Morrell and others obtained control of the Kelly patents, organizing the Kelly Pneumatic Process Company. In October 1864 the Kelly process was combined with Robert F. Mushet's patent for recarburizing pneumatic steel. In England Henry Bessemer patented his process and sold his American control to Alexander Holley and Associates of Troy, New York. Thus, the Kelly Company controlled the pneumatic principle and the Mushet patent while the Troy Company controlled the Bessemer patent.

Alexander Holley brought together the two groups and formed the Pneumatic Steel Association. The U.S. Patent Office recognized the Bessemer patent in 1866, and all the patents for the process and required machinery were consolidated. Members of the association designed and built a plant in 1867 at Steelton, outside Harrisburg, Pennsylvania, and began the business of making steel.

In 1867 the Cambria rolling mill produced the first Bessemer rails on commercial order in the United States, made from ingots forged at the Steelton plant. At the time Cambria was the largest iron rail producer in the country. By 1871 Alexander Holley had designed and installed Bessemer converters at Cambria. This was the sixth Bessemer furnace in America, and by 1876 commercial rail production at Johnstown reached 103,743 tons; 47,643 tons of iron rail and 56,100 tons of steel rail. In 1878 the plant extended over 60 acres, with the rolling mills alone covering 7 acres. Cambria-owned coal and iron ore land was spread over seven Pennsylvania counties, totaling 46,403 acres. Bessemer steel was the most important American steel until the end of the century. Cambria was a major producer along with Pennsylvania Steel, North Chicago Rolling Mill Company, Bethlehem Iron Company, Edgar Thomson Steel Company, the Lackawanna Iron and Steel Works, and the Joliet Iron and Steel Works. However, the even newer open-hearth methods provided steelmakers with greater control, and this method slowly gained on the Bessemer process, surpassing it in volume of production after 1900.

The Cambria Iron Company owned several subsidiary industries, principally the Gautier Steel Company. The Johnstown Mechanical Works specialized in fancy ironwork and wood-turned products. The Johnstown Manufacturing Company in Woodvale made bricks. Also affiliated were the Woodvale Flouring Mill and Woodvale Woolen Mills. The company owned coal and iron ore veins in the adjacent hills and counties, and it operated its own mines. The local iron ore was used until the 1870s, when purer iron ore from the Lake Superior region was needed for making steel.

INDUSTRIAL GROWTH

Efficient rail communication running east and west helped transform Cambria into a major iron and steel producer and Johnstown into a thriving city. Johnstown grew from a single borough of 1,300 people in 1850 to the focus for boroughs inhabited by 15,000 people in 1880. This population doubled within a decade. The Cambria Iron Company and its subsidiaries were the principal employers and the reason for the area's extraordinary growth. Cambria was the major determinant for Johnstown's development for over 100 years.

Conemaugh Borough was the location of the Gautier Works. Most of Prospect Hill's residents rented houses from the company. The main rolling mills, foundries, machine shops, and blast furnaces were in Millville. The majority of Cambria City's population was employed by Cambria. Woodvale had a Cambria Iron Company chemical works, woolen mill, tannery, flouring mill, and brickworks. East Conemaugh was built around the railroad yards. Other boroughs and villages--Kernville, Morrellville, Franklin, Coopersdale, and Moxham--were all connected economically to the Cambria Iron Company.

Continuing growth of the company's production was reflected in the expansion of the plant along the Conemaugh River. Increased competition and costs forced many independent steel companies to merge or reorganize, and in 1898 the Cambria Iron Company leased its properties to the Cambria Steel Company. Expansion accompanied the reorganization. An additional steel plant, as well as by-product coke ovens, were constructed at Franklin and Rosedale. Cambria opened its first open-hearth unit in October 1879; by 1919, 22 furnaces had been built. Rod and wire mills and car shops were also added.

In later years Johnstown's industrial advantage was reduced as increasing competition in transportation put the steel plant at a disadvantage. Isolated to some extent from the Great Lakes and the eastern seaboard, Johnstown's traditional role as a supplier to distant markets was diminished. The steel industry grew only slowly after World War I, and Cambria was not spared. In 1916 Cambria became a subsidiary of the Midvale Steel and Ordnance Company of Philadelphia and was taken over again in 1923 by the Bethlehem Steel Company (which still operates the plant today). Production of steel rail ceased, and the plant produced specialty steel, such as axles and railroad box cars.

THE LOCAL COMMUNITY

Labor for the Cambria mills came from several different sources. Farm labor and German and Welsh immigrants in the 1830s, 1840s, and 1850s supplied the initial manpower for the mills. Southern and eastern European immigrants came in waves after the 1870s. Southern black immigrants arrived after World War I. Over 70 percent of the total male blue-collar force in Johnstown was employed at Cambria mills and coal mines. There were very few opportunities for women's employment in Johnstown.

Cambria Iron Company's influence directed not only the economic sphere, but the social, political, and cultural worlds as well. From the very beginning the company's managers actively opposed labor organizations and successfully suppressed strikes by local miners and mill workers between 1866 and 1874. Cambria workers participated in national steel strikes in 1919 and 1937 to demand union recognition, but these also The company engaged in a paternalistic form of welfare failed. assuming the promotion of worker welfare and civic capitalism, The company built the first industrial hospital in America, improvements. funded the public library, built an opera house and club house, and ran a night school offering free classes for employees. The Cambria Iron Company was also the largest landlord in Johnstown, owning houses which it rented to workers, thereby fostering their dependence.

CONTRIBUTIONS TO NATIONAL ECONOMIC DEVELOPMENT

The Cambria Iron Company's history can be placed in the context of late 19th and early 20th century industrialism of the United States. Domestic production of iron and steel changed the look of America, contributed to western expansion and the growth of modern cities, fostered the development of transportation systems, and was a factor in America's becoming a world power. The iron and steel industry also radically affected human lives. The discipline of the mills imposed long workdays and workweeks, intensive labor, and low pay. Workers, regardless of whether they were American born or immigrants, were often powerless to control their destinies, and on occasion they became radical in demanding a better way of life. The Cambria Iron Company was the scene of some of the most dramatic and consequential events in the evolution of the iron and steel industry, and its history can still be found on the nation's front pages as America copes with the changing realities of modern economic life.

PHOTOGRAPHS



CAMBRIA IRON WORKS

PHOTOGRAPHS BY JET LOWE, HISTORIC AMERICAN INGINEERING RECORD, NPS, 1987



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1. Heart of the old Cambria Iron Works, with the old rolling mill (1855, rebuilt in 1872, with additions in the 1890s and 1920s) on the right, the blacksmith shop (ca. 1864) in the center, and the machine shop (1906) behind the blacksmith shop.

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3. Interior of blacksmith shop, showing electrically powered (formerly steam powered) drcp hammer manufactured (ca. 1910) by the Chambersburg Engineering Co. of Chambersburg, Pennsylvania.

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4. Interior of the blacksmith shop, showing central cast-iron column and drop hammers.



Pattern shop (ca. 1870), with the machine shop (1906) tehind. . م











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10. Hot-blast engine house (ca. 1870s, with addition ca. 1898) for blast furnaces 1, 2, 3, 4, all of which were demolished in the 1920s.

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14. Machine shop (1906).



15. Billet handling yard next to 11-inch mill (1960s).



ALTERNATIVES



CAMBRIA IRON WORKS

ALTERNATIVE A--CONTINUE OPERATION AND MANAGEMENT OF THE CAMBRIA IRON WORKS BY BETHLEHEM STEEL CORPORATION

Description

Alternative A would constitute the no-action alternative, and the ownership, operation, and management of the entire site, including the historic Cambria Iron Company structures, would continue by the Bethlehem Steel Corporation.

Operation and Management. Portions of the historically important Cambria Iron Works area would continue to be used for steel production and to support the adjacent 11-inch rolling mill. The pattern shop, car shop, and foundry would also continue to be used for storage. The blacksmith shop would probably still serve the mill for fabricating tools and other mill needs. Much of the rest of the historically important area would likely remain inactive, and some of it would be vacant. Portions of the site are scheduled for demolition in 1988 for their scrap value, including the engine house, the skip house, and the hot-blast stoves (see Significant Resources map). These historic industrial features all relate to two magnesium blast furnaces that were in operation for almost 100 years.

<u>Visitor Use</u>. Except for infrequent, company-sponsored tours, no visitor access to or use of the site would be available under alternative A.

<u>Resource Protection</u>. No historic structures would be actively protected. Regular use and maintenance of certain structures on the site, including the blacksmith shop, could continue, but no short- or long-term protection would be afforded. Scheduled demolition of industrial structures related to the magnesium blast furnace would result in their irretrievable loss.

<u>Site Maintenance</u>. Bethlehem Steel Corporation would continue to be responsible for maintenance of the entire site, including both historic and nonhistoric portions. Buildings would be used and maintained as needed under current mill operations.

Impacts

No visitor use of the historic Cambria Iron Works would be allowed, and no protection would be afforded any of its resources. The historic context of the engine house area would be lost as a result of scheduled demolition. Over time, additional historic structures would probably be lost as the site needs of Bethlehem Steel Corporation change. Maintenance priorities would also almost certainly allow certain historic properties to deteriorate at an accelerated rate. Current historic research efforts include contacting Bethlehem Steel Corporation about
nominating some of the more significant structures for listing on the National Register of Historic Places. However, other than receiving potential federal tax credits due to such a designation, there would be no incentive to retain or maintain the historic structures, and it could prove cumbersome to future site planning.

ALTERNATIVE B--ESTABLISH CAMBRIA IRON WORKS NATIONAL HISTORIC DISTRICT, WITH MANAGEMENT BY THE JOHNSTOWN FLOOD MUSEUM ASSOCIATION

Description

With the support of Bethlehem Steel Corporation, the Cambria Iron Works would be established as a historic district on the National Register of Historic Places under alternative B, and it would be locally managed and operated by the Johnstown Flood Museum Association. The National Park Service would provide technical assistance to the association in preparing forms to nominate the ironworks to the National Register. The Pennsylvania state historic preservation officer would determine the level of significance for the ironworks and would forward the nomination to the keeper of the National Register for final determination and listing.

Designation of a historic district could allow for the management and interpretation of all the historic buildings. A cooperative agreement for this purpose would be developed between the Johnstown Flood Museum Association and the Bethlehem Steel Corporation, which would retain site ownership. The association's current and projected financial resources preclude its acquisition and holding of fee title to the area and would also restrict the degree of visitor services and preservation activities provided at the site.

<u>Operation and Management</u>. As described under alternative A, the current production of steel products at the 11-inch mill would be expected to continue. Present uses of portions of the historic area would also be expected to continue, including use of the pattern shop, car shop, and foundry for storage. The blacksmith shop would probably still serve the mill for fabricating tools and other mill needs. The remainder of the historic area would be used by the Johnstown Flood Museum Association for interpretive purposes for the benefit of site visitors.

The association would be responsible for protecting, preserving, restoring, and interpreting the historic area and making it available to the visiting public. In consultation with the Bethlehem Steel Corporation, the association would develop a management plan to detail specific development and management actions and responsibilities for the area, including future planning, development, maintenance, and boundary determination.

Visitor Use. Alternative B would allow for visitor access to and use of the historic area. However, that access would probably be somewhat limited because portions of the site would continue to be actively used for

steel production and because the association might not have sufficient funds or technical expertise to fully interpret all resources. Those historical and educational programs that were offered at the site would enhance the visitor experience and help people understand the iron and steelmaking process.

<u>Resource Protection</u>. All nationally significant structures, plus late 19th century and early 20th century structures that contribute to the site's historical significance, would be included in the district, which could encourage more protection for nationally significant structures than under alternative A.

<u>Site Maintenance</u>. Specific responsibilities for site maintenance would probably be divided between the association and the Bethlehem Steel Corporation, in accordance with terms of the cooperative agreement. Because of the association's limited financial resources, the bulk of site maintenance would likely be the responsibility of Bethlehem Steel Corporation.

Impacts

Alternative B would provide for the limited protection, preservation, and interpretation of the historic Cambria Iron Works. These activities would be the responsibility of the Johnstown Flood Museum Association, whose financial resources and staff would probably result in a reduced level of preservation and interpretation. A cooperative management agreement between the association and Bethlehem Steel Corporation could be voided by either party at any time, so the long-term preservation of significant resources could not be ensured under this alternative.

ALTERNATIVE C--ESTABLISH CAMBRIA IRON WORKS NATIONAL HISTORIC SITE, WITH MANAGEMENT BY THE NATIONAL PARK SERVICE

Description

Under alternative C the historic Cambria Iron Works and portions of adjacent Prospect Hill would be designated by Congress as a national historic site under the jurisdiction of the National Park Service. The Park Service would acquire portions of the site from Bethlehem Steel Corporation in order to protect, manage, and interpret the nationally significant resources. Related structures within the area that were needed to interpret the technological evolution of iron and steelmaking would also be acquired.

<u>Operation and Management</u>. Cooperative agreements would be developed with Bethlehem Steel Corporation to allow the continued use of portions of the site for ongoing steel operations and visitor tours of the 11-inch mill. Visitor transportation to and from the site would be handled by the National Park Service and Bethlehem Steel Corporation, in cooperation with the Cambria County Transit Authority. <u>Visitor Use</u>. Under alternative C full visitor access would be provided to the historic Cambria Iron Works, except for those areas closed as a result of operational agreements with Bethlehem Steel Corporation. Including historic structures and adjacent areas within the historic site boundary would help the National Park Service manage and interpret these resources. Because of the various site resources, technological development from 1852 to 1923 can be portrayed to visitors on site. Audiovisual materials could be used to update the steelmaking story to the 1980s and would enhance the interpretive program.

<u>Resource Protection</u>. Full resource protection would be afforded the historic structures and associated industrial equipment under this alternative. If adequate funding was provided, all nationally significant structures would be protected, plus late 19th century and early 20th century structures that portray the technological evolution from iron to steel production and that contribute to the site's historical significance (see Significant Resources map).

<u>Site Maintenance</u>. The National Park Service would be responsible for maintaining that portion of the site that it owned in fee title. Maintenance responsibilities for any scenic easements acquired by the National Park Service for land protection purposes would be stipulated in the easement document.

Impacts

Alternative C would provide for long-term management, protection, preservation, and interpretation by the National Park Service of the historic Cambria Iron Works and adjacent steelmaking structures and artifacts. Full visitor access would be available to portions of the site, but no opportunities would be provided for visitors to experience and understand modern steelmaking technologies on site except through the use of audiovisual materials.

This alternative would focus on technological development of iron and steelmaking, but it would not adequately treat a second and equally important aspect of the iron and steel story--those who came to the area to work the mines and mills. Ethnic heritage, working conditions, and the labor union movement are all important parts of the industrial heritage of the area, and these themes would not be interpreted under this alternative.

Portions of the site now scheduled for demolition by Bethlehem Steel Corporation would be acquired by the National Park Service and protected.

Before any portions of the ironworks were acquired and opened to visitor use, the current site owner would have to fully inventory, document, and dispose of any hazardous or toxic materials that may exist on the site.

ALTERNATIVE D--ESTABLISH CAMBRIA IRON WORKS NATIONAL HISTORICAL PARK AND JOHNSTOWN STATE HERITAGE PARK

Description

A national historical park would be established by Congress in recognition of the significance of the Cambria Iron Works in the technological development of iron and steelmaking. To complement the national historical park, Pennsylvania would be encouraged to establish a state heritage park to link the Lower Works with other steelmaking sites in Johnstown along the Conemaugh River.

Resource protection would be similar to that described under alternative C, but this alternative would emphasize a community-wide approach to the preservation and interpretation of Johnstown's iron and steel heritage. A cooperative approach to resource protection would involve various local and state agencies, the National Park Service, Bethlehem Steel Corporation, and other elements of the private sector. The goal would be to ensure a quality visitor experience and to provide national and international visitors with an understanding and appreciation of the rich and diverse industrial heritage that can be found in the greater Johnstown area.

Like alternative C, the National Park Service would have primary responsibility for protecting the nationally significant important resources of the ironworks and for interpreting the significance of the Cambria Iron Company's accomplishments in the iron and steel industries. The Park Service would also be responsible for interpreting how the other structures at the site dating from the late 19th century and early 20th century were used. Even though these structures are outside the core area of nationally significant structures, they tell an important part of the steelmaking story and how the site changed as a result of technological innovations.

In addition to its management responsibilities at Cambria Iron Works, the National Park Service would also be involved in community roles and responsibilities. The Park Service would provide technical assistance in such areas as historic preservation, visitor use, interpretation, and visitor understanding of the lifestyles and ethnic heritage of the people who came to work in Johnstown's mills and mines. Coordination would be required with state and local agencies, as well as private organizations and groups, so that programs and policies that relate to both local and national interests at the ironworks and to related sites within the community could be developed. For example, the National Park Service's cooperative agreement with the Johnstown Flood Museum Association provides opportunities to enhance visitor appreciation of the community's rich cultural heritage. The interpretive themes would focus not only on the past, but also the present and future.

Through a cooperative agreement, Bethlehem Steel Corporation would take the lead in developing and operating visitor tours through their 11-inch mill operation adjacent to the national historical park. This would help visitors to gain an appreciation of various aspects of iron and steelmaking technologies from 1852 to 1923 and also to see a modern steel mill in operation. At the company's option, the tour could be extended to the important Gautier Works and the Franklin Works. The two electric furnaces at Franklin represent the most current steelmaking technology. Both of these sites are just upriver along the Little Conemaugh, relatively close to the Lower Works. The National Park Service could provide technical assistance for developing and coordinating the tours of the historic Cambria buildings and the 11-inch rolling mill.

A complementary feature of this alternative would be the establishment of a state heritage park to link the Lower Works with the Gautier Works and perhaps the Franklin Works upriver, thus incorporating all facets of the steelmaking story. This would require interagency cooperation between the Pennsylvania Department of Community Affairs, the State Historical and Museum Commission, and the Department of Environmental Resources, with assistance from the National Park Service.

Pennsylvania would have two primary responsibilities in the establishment of a state heritage park. The first responsibility would be to design, develop, and establish a linear greenbelt park along the Conemaugh River between the Lower Works and the Gautier Works, and possibly extending to the Franklin Works. This would provide a pleasant pedestrian experience along the river, and it would visually link the mills. It would also improve economic redevelopment potential adjacent to the park. A similar linear park might also be considered along Little Stonycreek River, and water recreational opportunities could be explored as well.

The second state responsibility would be to develop a range of programs and activities focused on community history, ethnic heritage and diversity, folklore and folklife, and other aspects of community life in the greater Johnstown area. This work would involve the Pennsylvania State Historical and Museum Commission and the Heritage Affairs Preservation Commission. Such programs and activities would focus on community life and human stories related to industrial activity.

The various municipal government and local agencies of the greater Johnstown area would also have an important role in implementing this alternative. Areas of involvement would include land use planning, historic preservation ordinances, public transportation, and urban redevelopemnt. The Cambria County Transit Authority would also be expected to provide transportation for visitors within the community and potentially through the Cambria Iron Works site.

Private institutions in the Johnstown area would have a major role in the planning and operation of the national historical park and state heritage park through cooperative agreements. The nonprofit Johnstown Flood Museum Association could help develop new program initiatives related to the community's heritage, including walking tours and sponsorship of ethnic heritage festivals. The association, which manages and maintains the Johnstown Flood Museum, is involved with the rehabilitation of the Cambria Iron Company's historic second office building, which is across the street from the museum. This building was not destroyed in the Johnstown Flood of 1889, and its rehabilitation by the association would enhance interpretive programs at the national historical park and provide administrative facilities for the museum association.

Another project that could be undertaken by the private sector is the establishment of a visitor welcome center by the Greater Johnstown Chamber of Commerce. The center would orient visitors to the community and acquaint them with what there is to do and see in the area.

Major opportunities for private investment in historic properties would be created as a result of preservation activities. Coordination of such activities would be required between the National Park Service, the Pennsylvania State Historical and Museum Commission, the Heritage Affairs Preservation Commission, the Johnstown Flood Museum Association, and city government. The adaptive reuse of historic structures for commercial, residential, or light industrial uses is a major element of the America's Industrial Heritage Project, and adaptive reuse would also be important to the implementation of alternative D. Such efforts would complement ongoing revitalization initiatives now taking place within the Johnstown community.

<u>Operation and Management</u>. The Cambria Iron Works and adjacent lands, including portions of Prospect Hill facing the ironworks, would be acquired and managed by the National Park Service. The National Park Service could enter into written cooperative agreements with Bethlehem Steel Corporation for continuing steel operations, meeting facility needs, and conducting visitor tours. The National Park Service and Bethlehem Steel Corporation would work with the Cambria County Transit Authority to transport visitors to and from the site.

The state heritage park would be cooperatively operated and managed by the commonwealth of Pennsylvania, the city of Johnstown, and the Johnstown Flood Museum Association. These entities would also seek appropriate transfers and acquisition for parklands along the Conemaugh River, and they could explore the feasibility of establishing recreation-related facilities along the Little Stonycreek River.

<u>Visitor Use</u>. This alternative would provide the most opportunities for visitor use. As described for alternative C, visitor access would be provided to all areas except those portions closed for safety reasons and ongoing steel production. This alternative would also provide visitors with the most comprehensive experience and promote a fuller understanding of the development, process, and importance of iron and steelmaking technologies.

To highlight modern steelmaking, tours of the 11-inch mill and perhaps other sites within the Bethlehem complex could be made available by the company. Audiovisual materials, possibly incorporating a large-screen format, would be produced by the National Park Service and others. Such materials could cover recent technological innovations and complement the steel mill tours.

The lifestyles, heritage, and working environment at the ironworks would also be part of the visitor program. A greater Johnstown heritage committee would be established under the lead of the Johnstown Flood Museum Association. This committee could then coordinate all cooperative programs that related to the national historical park and that took place outside NPS boundaries. This approach has been recommended by the Johnstown Flood Museum Association through their recently released management plan, which encourages revitalization efforts within the community and focuses attention on the area's rich industrial heritage.

The committee could include representatives from the National Park Service; Bethlehem Steel Corporation, various state agencies, area municipalities, the Cambria County Transit Authority, the Greater Johnstown Chamber of Commerce, and area businesses and organizations.

<u>Resource Protection</u>. In terms of resource protection, alternative D would be similar to alternative C in that full protection would be afforded the historic structures and associated industrial equipment, if adequate funds were provided. This would include all nationally significant structures, plus late 19th century and early 20th century structures that contribute to the site's historical significance.

<u>Site Maintenance</u>. The National Park Service and Pennsylvania would be responsible for maintaining their respective sites where they had fee title ownership. If scenic easements were utilized as a land protection measure, maintenance responsibilities would be stipulated in the easement document.

Impacts

Alternative D would provide for the long-term management, protection, preservation, and interpretation of the historic Cambria Iron Works and adjacent steelmaking structures and artifacts. Through cooperative activities with Bethlehem Steel Corporation, this alternative would provide opportunities for visitors to experience and understand both historic and modern steelmaking technologies through tours of historic facilities at the national historical park and tours of the adjacent modern 11-inch mill and other steel-producing sites within the Conemaugh Valley. Audiovisual programs would further tell the development of the American iron and steel industries.

The establishment of a public/private partnership would encourage local, state, and federal agencies, historical preservation societies, economic development and tourist promotion interests, and the private sector to share in the area's future and to be involved in a wide variety of programs and projects.

Compared to alternatives B and C, this alternative would foster a partnership between the National Park Service and the Johnstown community rather than a single entity approach to providing for resource protection and visitor use. The National Park Service would preserve the

historic ironworks and provide technical assistance and outreach programs within the community. These efforts would be complemented by Bethlehem Steel Corporation, which would be encouraged to give tours of working steel mills. Pennsylvania would establish and develop a state heritage park, and the Johnstown Flood Museum Association would implement various cultural heritage and history programs. Operation of the national historical park and the state heritage park would be further enhanced by implementation of the forthcoming Johnstown area comprehensive land use plan, which calls for municipal improvements, new visitor and other economic development initiatives, and historic preservation and adaptive reuse projects.

Portions of the site now scheduled for demolition by Bethlehem Steel Corporation would be acquired by the National Park Service and fully protected.

Before the National Park Service acquired any portions of the ironworks and opened them for visitor use, the present owner would have to fully inventory, document, and dispose of any hazardous or toxic materials that may exist on the site.

APPENDIXES / BIBLIOGRAPHY



CAMBRIA IRON WORKS

APPENDIX A: CHRONOLOGY OF CAMBRIA IRON WORKS

- 1852 George King and Peter Shoenberger founded Cambria Iron Company; charter signed by the governor of Pennsylvania on June 29, 1852.
- 1853 Company failed after completing only part of the ironworks; four coke-fired blast furnaces (1, 2, 3, and 4) were built at the northern end of the works, and part of the original T-shaped rolling mill was erected.
- 1854 David Reeves, Matthew Newkirk, John Fritz, George Trotter, and other local men leased the plant as it stood in its partially completed state; rolling mill was then completed and was in the shape of a Maltese cross (note: the original rolling mill was on the site of the present axle plant). During the fall the first rails were produced at Cambria.
- 1855 Cambria Iron Company leased by Wood, Morrell and Company for purpose of making railroad rails. First 30-foot rail ever produced in U.S. rolled.
- 1857 First three-high rolling mill, developed by company engineers George and John Fritz, put into operation (note: the three-high rolling mill was installed in the cross-shaped mill building, the site of the present axle plant); rolling mill was destroyed in a fire but rebuilt shortly thereafter.
- 1857-62 William Kelly conducted experiments with a Bessemer-like converter.
- 1861 First Bessemer converter of plate construction built by Kelly.
- 1862 The original seven-year lease of Wood, Morrell and Company expired, at which point the company was reorganized with corporate powers and renamed Cambria Iron Company.
- 1864 Octagonally shaped blacksmith shop erected.
- 1865 Foundry erected.
- 1866 Nation's first steel-tipped rails produced by Trenton Iron Company, Trenton, New Jersey.
- 1867 Nation's first commercially ordered, Bessemer steel rail rolled at Cambria; the steel made at the Pennsylvania Railroad's Steelton Plant in Steelton, Pennsylvania.
- 1869 Cambria Iron Company's first Bessemer plant erected, the sixth Bessemer plant in the nation.

- ca. 1870 George Fritz, Robert Hunt, and Alexander Holley designed the Bessemer plant.
- 1871 First blow with two six-ton converters and first Cambria rails rolled with Cambria steel.
- 1873 By 1873 Cambria Iron Company's steelmaking operation was one of the largest in the nation. It contained four coke-fired blast furnaces, two Bessemer converters, one blooming mill, one rail mill, and several bar mills
- 1874 Rolling mill office of brick and wrought iron erected near rail mill.
- 1876 Rail output greater at Cambria than at any other ironworks in U.S.; 10 percent of the rail produced in the U.S. came from Cambria; blast furnace 5 completed and blown in.
- 1878 Two 10-ton open-hearth furnaces were built; blast furnace 6 completed.
- 1880 Addition to foundry building.
- 1881 Car shop built.
- 1884-85 Blacksmith shop annex.
- 1890 Pattern shop extension, which included a tower for fire hoses.
- 1891-1911 The following 20-year period shows the changes to buildings at Cambria based on the Sanborn Insurance maps of 1891 and 1911: The open-hearth blast furnaces 1, 2, 3, and 4, and the related structures, were greatly altered between 1891 and 1911; most of the work was probably carried out ca. 1898. This includes the construction of the east boiler house (now pattern storage), west boiler house (now pattern storage), and hot-blast engine house (now electrical storage).

Other buildings appearing on both the 1891 and 1911 Sanborn Insurance maps include: wire rod mill (replaced by axle plant), rolling mill 4 (altered by 1911), rolling mill 1 (expanded by 1911), blast furnaces 5 and 6 (1891 and 1911, altered by 1911, now demolished), engine house, south boiler house (1891 and 1911), north boiler house (demolished by 1911), hot-blast stoves (altered by 1911).

Other buildings appearing on both the 1891 and 1911 Sanborn maps but no longer extant include: open-hearth works (additions by 1911) and Bessemer steel converter house (additions by 1911; last blows of Bessemer steelmaking units in 1952); both buildings replaced by the 11-inch mill in 1960.

- 1893 Cambria's first electric light plant erected (no longer extant).
- 1895 Roll shop erected.
- 1896 Brass foundry erected.
- 1898 Cambria Steel Company formed; from 1898 through 1923 some \$70 million expended in plant additions--much of this was spent at the Franklin Works and at the Gautier Works.
- 1901 Franklin Works begun.
- 1903 Bethlehem Steel founded.
- 1906 New machine shop erected.
- 1907-08 Electric plant erected; electric repair shop erected.
- 1909 New boiler shop erected (fire-proof building behind foundry).
- 1910 18-inch Morgan billet mill erected; rod and wire mill, begun in 1909, completed.
- 1916 Midvale Steel and Ordnance Company acquires Cambria Steel Company.
- 1923 Cambria acquired by Bethlehem Steel.
- 1924 Major expenditures by Bethlehem Steel: between 1923 and 1926, \$35 million expended by Bethlehem to upgrade Lower Works, Gautier, and Franklin.
- 1930-31 Steam plant for Lower Works erected (now abandoned).
- 1938 Axle plant, originally the Cambria rail mill, greatly expanded (Bethlehem ceased rolling steel rail at Cambria in the 1920s).
- 1952 Bessemer plant and open-hearth building demolished.
- 1959-61 11-inch mill erected and put into operation.
- 1960 Manganese shed erected; blast furnaces 5 and 9 (at Franklin) among the nation's leading manganese producers.
- 1977 Heavy rains cause serious flooding of Lower Works.
- 1985 Axle plant ceases operation.
- 1986 Johnstown's last blast furnace (no. 5) demolished.

APPENDIX B: HISTORIC AMERICAN ENGINEERING RECORD, CAMBRIA IRON COMPANY, CA. 1852-1898



JOHNSTOWN, PENNSYLVANIA · CA. 1852-1898



BASED ON U.S.G.S. 7.5 MINUTE SERIES, 1962, PHOTOREVISED



In 1852, a group of entrepeneurs from the Johnstown area, including ironmasters George S. Kino and Dr. Peter Schoenberger, merged several independent charcoal-iron furnace operations to form the Cambria Iron Company. With the advent of the Pennsylvania Railroad through Johnstown in 1850, Kinp foresaw the need for iron rail for the nation's expanding railroad system. Having obtained financial backing from New York in 1853, King and Schoenberger began erecting a cruciform shaped rolling mill. and four coke fired blast furnaces. They sought to produce a superior rail more economically than other American manufacturers and at a cost less than imported British rail. That same year, however, witnessed the failure of the company's principal investor and the ironworks remained only partially built. Subsequently, King and Schoenberger sold their interests in Cambria Iron. In 1854, Matthew Newkirk of Philadelphia became the company's second president, and John Fritz, who alono with his brother George emerged as one of the nations leading figures in the steel industry, was appointed mill superintendent. Finally in July 1854 the rolling mill and blast furnaces were completed and the company produced its first iron rail.

Cambria Iron Company continued to experience financial distress until about 1862 when it was reorpanized by Wood, Morrell and Co. of Philadelphia. With Daniel J. Morrell as company president, Cambria Iron prospered. From the early 1860s through the 1860s, Johnstown became one of the nation's leaders in iron and steel manufacturing. The construction of a Bessemer plant at Cambria in 1869 marked the sixth of its kind in America. Moreover, between 1857 and 1862, the ironworks was the site of William Kelly's experiments with a Bessemer like process for making steel and, during these early years, John Fritz developed his three-high rolling mill for the production of iron and steel rail. By the mid-1870s, Cambria Iron Company led the nation in rail production, manufacturing about 10 percent of America's rail.

Several buildings dating from the 1850s through the 1880s, a period when the Cambria Iron Works achieved national prominence in the iron and steel industry, remain standing. Four of them, the Blacksmith Shop, the Car Shop, the Pattern Shop and the Rolling Mill. Office, were drawn by HAER in the summer of 1987. This recording project is part of a longrange propram to document historically significant engineering and industrial works in the United States. The Southwestern Pennsylvania Survey and Recording Project was co-sponsored in 1987 by the Historic American Engineering Record (HAER) and the Allepheny Portape Railroad, National Historic Site, Randall Cooley, Superintendent.



CAMBRIA IRON CO

nan, 1987

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The field work, measured drawings, historical, reports and photographs were prepared under the general direction of Robert Kapsch, Chief, HABS/ MAER Division, and Gray Fitzsimons, Historian. The recording team consisted of Michael Drasnin, Architectural Supervisor; Ruth Goodman and Mattnew Heppner, Architectural Technizians. Formal photography was done by Jet Lowe; his torical documentation was done by Jets Pitzsimons.



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APPENDIX C

AN ARCHEOLOGICAL PLANNING OVERVIEW OF THE CAMBRIA IRON COMPANY, LOWER WORKS

Johnstown, Pennsylvania

by

Paula A. Zitzler

August 1987

Cooperative Park Studies Unit for Archeology

American University Washington, D.C. and United States Department of the Interior National Park Service Applied Archeology Center Rockville, Maryland

AN ARCHEOLOGICAL PLANNING OVERVIEW OF THE CAMBRIA IRON COMPANY, LOWER WORKS

JOHNSTOWN, PENNSYLVANIA

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ABSTRACT

Based on a review of the settlement pattern data for archeological sites in the Northeast, a probability statement for predicting the discovery of prehistoric resources at the Lower Works of the Cambria Iron Company is suggested. Based on an examination of historic maps of the site, a probability statement for historic resource discovery is also developed. The basis for an archeological management plan is established through the identification of nine study units. Recommendations for archeological testing and resource management are offered.
AN ARCHEOLOGICAL PLANNING OVERVIEW OF THE CAMBRIA IRON COMPANY, LOWER WORKS

JOHNSTOWN, PENNSYLVANIA

INTRODUCTION

The Cambria Iron Company, Lower Works is included in the "America's Industrial Heritage Project" a cooperative undertaking of the National Park Service, state and local governments, and private industry. The focus of the project is on the development, enhancement, and interpretation of iron and steelmaking, coal, and transportation themes within a nine-county region in south-central Pennsylvania.

No subsurface investigation was conducted as a part of this study. Prior to making plans for development of the area by the introduction of new facilities or the restoration of specific structures or landscapes, a Phase I survey, with limited subsurface testing, should be completed, and the results incorporated in a full archeological overview and assessment.

Location

The Cambria Iron Company, Lower Works, is located in south-central Pennsylvania in the Cambria County community of Johnstown (Figure 1). The site is situated on the east bank of the Conemaugh River, just north of the confluence of the Little Conemaugh River and Stony Creek. The Conemaugh River is entrenched in a steep-sided gorge at this location, with a narrow floodplain approximately 1500 feet wide.

Environmental Conditions

Johnstown is located within the Appalachian Plateau Physiographic Province. The soils at the Cambria Ironworks Lower Works are described as the "Urban land-Udorthents complex, gently sloping" (USDA 1985). The complex consists of areas that are covered by buildings, parking lots and industrial facilities and areas where the soils



Figure I. Vicinity map.

have been altered by grading. The original soils of the site were probably of the Atkins-Philo association, described as deep, nearly level, poorly to moderately well drained soils that formed in alluvial material on flood plains. The main limitations of this association are a seasonal high water table and susceptibility to flooding (USDA 1985:7).

Ecologically, Johnstown falls within the Northern/Upland Region of the Temperate Deciduous Forest Biome (Shelford 1963). Nearly all of this region was deforested historically. Prior to urbanization, this biome typically supported a large variety of plant and animal life.

CULTURE HISTORY

Prehistory

The diversity of environments throughout the state of Pennsylvania has provided the setting for a variety of human adaptations since before ca. 10,000 B.P. Human populations responded to changing environmental conditions by developing different adaptive strategies. These changing strategies are evident in the material remains and settlement patterns of these prehistoric groups. Archeologists have organized these changes into several periods, as discussed below.

For the purpose of this overview, emphasis has been placed on the settlement patterns for each period so that predictive statements can be made regarding the likelihood of finding a prehistoric site at the Cambria Ironworks. Settlement pattern is used here in its broadest sense, referring to the distribution of a group of temporally, and possibly socially, related communities over the landscape. Like most settlement pattern studies, it assumes a deterministic relationship between site locations and certain environmental and ecological characteristics. Minimally, these characteristics include various aspects of soil, climate, vegetation and fauna, such as nearness to water, soil fertility, availability of plant and animal resources, seasonal resource fluctuations, availability of lithic raw materials, and certain topographical and geomorphological features.

Paleo-Indian Period (ca. 15,000-8,000 B.C.). The Paleo-Indian Period represents the earliest human occupation in the New World. It began as the last continental ice sheets were retreating, which in Pennsylvania Paleo-Indian sites are identified by the occurred about 13,000 B.P. presence of a distinctive fluted projectile point that is distributed widely and with little technological variation across North America. In the usually Northeast, the Paleo-Indian lifestyle is described as free-wandering, depending on the local availability of food (Ritchie and 7). Generally, archeologists have identified the following Funk 1973: characteristics of Paleo-Indian site locations:

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1) Nearness to a major waterway or lake (Kinsey 1972, Lantz 1985:168, Mason 1959:73, Mayor Oakes 1955: 205, Ritchie 1980; 7, Witthoft 1952: 19);

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2) Availability of migratory big game, such as caribou, and possibly mastodon and mammoth, and recurrent occupation of sites near migration routes (Gardner 1978, Lantz 1985: 173, Ritchie 1980; 3, Ritchie and Funk 1973: 7, Witthoft 1952: 10);

3) Locally elevated sites and upland terrain (Lantz 1985:172, Mason 1959; 73, Ritchie 1980; 7, Ritchie and Funk 1973, Witthoft 1952: 19);

4) Proximity to sources of quality lithic raw material like jasper (Gardner 1978, Mason 1959; 73, Ritchie and Funk 1973: 7).

Paleo-Indian occupations have been discovered in both rockshelter and open settings.

Archaic Period (ca. 8,000-1,000 B.C.). The Archaic is differentiated from the preceding Paleo-Indian period by the presence of a greatly expanded artifact assemblage that includes not only tools for hunting, but also tools for procuring and processing a variety of plant (including seeds and nuts) and animal (including fish and shellfish) foods. The large, lanceolate projectile points of the Paleo-Indians were replaced by smaller, barbed projectile points, indicating a shift from dependence on Pleistocene fauna to modern Holocene fauna such as deer, turkey, and elk. Overall, the Archaic lifestyle has been described as "the seasonal movement of small bands of hunters-gatherers through a series of base camps, hunting/butchering stations, and special purpose camps adapted to a wide variety of animal and plant food resources" (Raber 1985 (vol. 2): 11).

The Archaic is sometimes subdivided into three periods: Early Archaic (ca. 8,000-6,000 B.C.), Middle Archaic (ca. 6,000-4,000 B.C.) and Late Archaic (ca. 4,000-1,000 B.C.). These subdivisions are based on observable differences in projectile point types. Generally, however, a basic Archaic lifestyle persisted throughout these subdivisions with little or no change.

Archaic sites have been discovered in many topographical and ecological situations through the Northeast, substantiating Witthoft's early view (1961:101) that "Archaic man came to occupy almost every sort of ecological niche available within temperate regions." Some archeologists (Kinsey 1972: 346, Mayer-Oakes 1955: 207) have suggested or implied a riverine orientation for the Northeast during the Archaic, similar to that described in the Southeast (Broyles 1971, Coe 1964, and others) and the Midwest (Winters 1969). Most archeologists agree that, while fishing may have provided a significant amount of food, other plant and animal resources were also exploited, and it is the seasonal pursuit of these resources that most likely accounts for the ubiquitous nature of Archaic sites (Dragoo 1961, Kent et al. 1971, Raber 1985, Ritchie 1980, Ritchie and Funk 1973, Witthoft 1961).

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The basic Archaic site types have been summarized as follows (Ritchie and Funk 1973: 337-338):

1) small open camps, usually inland from large waterways, and frequently on small streams, marshes, or springs;

2) large camp sites invariably situated on major bodies of water, near good fishing grounds;

3) quarry-workshop sites located at or near outcrops of high-quality lithic raw materials; and

4) rockshelters and caves.

While this classificaton was developed primarily for New York state, it is probably valid for Pennsylvania (and the entire Northeast) as well.

Transitional Period (ca. 1,800-1,000 B.C.). The Transitional Period "denotes a developmental sequence . . . in which stone pots came into use among very late Archaic cultures, followed by the introduction of true ceramics" (Ritchie and Funk 1973: 71). In addition to the stone pots, the Transitional assemblage is also characterized by several distinctive projectile point types known collectively as broadspears and fishtails. It has been suggested that the shape of these tools, while limiting their effectiveness for killing game animals, makes them very

efficient as fishing spearpoints (Kinsey 1972:346). Broadspear points are almost invariably made of rhyolite or jasper, indicating a willingness to travel or trade for preferred lithic materials (Kent et al. 1971: 93). Some archeologists, noting that Transitional sites tend to be located on riverbanks, have suggested that riverine travel was improved by the use of canoes (Witthoft 1953: 177, Kinsey 1972: 346).

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<u>Woodland Period (ca. 1000 B.C. - 1600 A.D.).</u> The addition of pottery and a variety of distinctive projectile point types to the artifact assemblage are key differences between Woodland and Archaic sites. A more sedentary lifestyle with a more complex social organization based on agriculture supplemented by hunting and gathering is also indicated by the archeological evidence. Like the Archaic, this period consists of three subdivisions: Early (1,000 B.C.-500 A.D.), Middle (A.D. 500-1000), and Late (ca. A.D. 700-1600).

Ritchie and Funk (1973) have identified several site types for the Woodland Period in New York. During the Early Woodland, two site types are known: 1) camps and 2) cemeteries. Most camps are associated with large bodies of water (Ritchie and Funk 1973: 98). In eastern Pennsylvania, Early Woodland sites have low archeological visibility. The lifestyle has been described as one of small family groups moving about the river bottoms and adjacent hills; sites consist of single houses, or small clusters of two or three houses (Kent et al. 198). Early Woodland sites in western Pennsylvania appear to be 1971: local manifestations of the Adena culture centered in the Ohio Valley (Kent et al. 1971, Dragoo 1960).

The Middle Woodland settlement pattern is apparently more complex, as indicated by the following known site types:

1) recurrently occupied camps consisting of both small, seasonal and large, semi-permanent sites;

- small, temporary camps;
- 3) cemeteries;

- 4) burial mounds;
- 5) workshops (Ritchie and Funk 1973: 349).

It has been suggested that sites were located along waterways where many species of fish could be obtained in abundance (Ritchie and Funk 1973: 119). In eastern Pennsylvania, Middle Woodland people lived in small groups, along rivers and streams, often isolated from their neighbors in nearby valleys (Kent et al. 1971: 263-265). Western Pennsylvania sites exhibit a marked Hopewellian influence during this period, derived from that culture's center in Ohio and Illinois. This influence has not been observed in the eastern Pennsylvania sites, as noted by Kent et al (1971: 266): "No matter how much new information may come to light . . . , eastern Pennsylvania is and will remain peripheral to the more spectacular cultural developments [of the Hopewell culture]."

During the Late Woodland period, site locations were influenced by two factors:

- the requirements and possibilities of an agricultural economy (e.g., flat, arable land, fertile soils) and
- 2) the need for defense against hostile neighbors.

Consequently, preferred site locations were well back from major streams along small creeks and brooks and on high hills or knolls. Several site types have been identified in New York (Ritchie and Funk 1973: 359):

- undefended or palisaded semi-permanent villages consisting of two or more large houses;
- semi-permanent farming hamlets, consisting usually of a single house;
- 3) recurrent camps, such as spring-summer fishing stations;
- 4) temporary camps, such as fall-winter hunting posts;
- 5) ceremonial dumps;
- 6) cemeteries and ossuaries;
- 7) workshops.

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History

The history of the Cambria Ironworks, Lower Works is currently being researched by Sharon Brown (NPS-DSC). This information will be available in a separate report, so a detailed history has not been included in this archeological overview.

THE EXISTING RESOURCE BASE

The Regional Context

The most current description of the existing cultural resource base on a scale found in A Comprehensive State Plan for the regional is Conservation of Archeological Resources (Raber 1985). The Plan is organized by study units based on physiographic province; Johnstown is included in Study Unit III, "Appalachian Plateau and Lake Erie Coastal This study unit includes all of the 29 western counties of Plain." Pennsylvania, and is the largest of the four study units identified in the State Plan. Cambria County is situated on the eastern edge of the study unit and borders Study Unit II, the Ridge and Valley province. There is a discrepancy in the State Plan regarding the number of recorded sites within the study unit; Lantz listed the total as 4,949 (1985: 170), but Davis puts the total at 5,168 (1985: 194). The number of sites recorded for Cambria County also varies: 139 according to Lantz, 137 according to Davis. Of the total sites recorded for the county, 15 are historic; the remaining 124 or 122 are prehistoric.

For Cambria County, only four cultural resources management reports were on file with the Pennsylvania Historical and Museum Commission (Cosgrove et al. 1986, Mitchum 1984, NPW Consultants 1984a and b). None of these surveys included the Johnstown area.

Prehistoric Cultural Resources

No prehistoric cultural resources have been recorded at the site of the Lower Works, according to information in the site files of the Pennsylvania Historical and Museum Commission (William Penn Memorial Museum, Harrisburg). However, several prehistoric and one historic Indian site have been recorded in the immediate Johnstown vicinity (36CB1, 36CB5, 36CB19). Very little information was available about these sites other than that most had been destroyed by flooding, particularly the 1977 flood, or by urban expansion.

Historic Cultural Resources

No historic cultural resources have been recorded at the Lower Works according to information in the site files of the Pennsylvania Historical and Museum Commission. However, the offices of the Cambria Iron Company (now Bethlehem Steel) have been recorded and are listed on the state register of historic sites. The site was recorded by J. Richardson and S. Lantz (June 6, 1979) and has been assigned site number 36CB23. Other recorded historic sites in the vicinity include:

- Johnstown Inclined Railway, 36CB20, nominated to the National Register of Historic Places;
- Cambria Public Library, 36CB21, nominated to the National Register of Historic Places;
- -- Grand Army of Republic Hall, 36CB22, nominated to the National Register of Historic Places;
- -- Staple Bend Tunnel, 36CB24;
- -- Conemaugh Viaduct, 36CB25;
- -- South Fork Dam, 36CB26;
- -- Nathan's Department Store, 36CB27.

The Lower Works of the Cambria Iron Company were not registered in the state site inventory as of July 1987. The site consists of many buildings and associated features, some which may date as early as the 1820s. Many of the earliest structures on the site, such as the Pennsylvania Canal and number of early furnaces and mining operations are no longer visible and must be discovered archeologically. The earliest currently standing structures on the site date to the establishment of the Cambria Iron Company in 1854.

THE EXPECTED RESOURCE BASE

The discovery of historic, and especially prehistoric, cultural resources at the Lower Works will largely be determined by the extent of historic and modern impacts to the site. On the basis of field observations, the impacts seem to be of three types: 1) intrusive, 2) superimposed, and Intrusive impacts include construction activities that 3) infilling. involved excavation, such as building foundations, road cuts, buried utility lines, and other activities that disturbed the provenience and context of preexisting cultural resources. Superimposition of older features by more recent activities includes areas where ramps were constructed leading to trestles, where concrete was poured without extensive excavation for parking lots and floors, and where railroad grades have been built up. Impacts of this nature are generally not as damaging to preexisting resources, although some deformation may result from compaction. In fact, superimposition has preserved cultural resources in locations where they would normally have been destroyed by extensive construction, urban development, or natural forces. For example, at the Blue Rock site along the Susquehanna River, Heisey and Witmer (1964: 480) noted:

[The Blue Rock site] . . is on the first terrace and on the river bank, but it is separated from the water's edge at present by a railroad embankment . . . The railroad embankment, an abandoned roadbed, and a fence row have trapped large amounts of silt washed down from above. As much as two feet of overburden was removed with power equipment, and in some places another 12 inches could have been removed safely. Although the modern surface appears to decline evenly toward the river, the subsoil line showed a break in profile and a fairly steep bank on the lower side of the area.

Both prehistoric and historic resources were discovered through archeological testing of the Providence Cove Lands in Rhode Island as part of the Northeast Corridor Improvement Project sponsored by the Federal Railroad Administration (1983). Some of these resources were located in a railyard in downtown Providence, buried under as much as 2 to 10 meters (6.5 to 32.5 feet) of fill. Much of the fill had been added to raise and level track grades in the 19th century, effectively sealing the earlier deposits below it. The presence of the tracks

TABLE 1

SUMMARY OF LOCATIONAL CHARACTERISTICS OF PREHISTORIC SITES

PERIODS

ENVIRONMENTAL CHARACTERISTIC	Paleo- Indian	Archaic	Trans.	Wood- land	Lower Works
1. Nearness to major waterway	x	x	x	X	×
2. Availability of migratory big game, such as extinct Pleistocene fauna	x				?
3. Locally elevated sites	x			x	
4. Upland terrain, away from major water- ways ("back country")	x	x		x	
5. Nearness to sources of quality lithic material	x	x		x	
6. Rockshelters	x	x		x	
7. Availability of Holocene game animals (deer, turkey, elk)		x			x
8. Availability of fishing grounds		x	x	x	?
9. Nearness of small streams, marshes, lakes		x			x
10. Fertile soil	·			x	x
11. Locally flat terrain	x	x	x	x	x
12. Defensible locations				x	

X = Characteristic has been observed/documented for sites of that period, or was probably an attribute of the site in the prehistoric times.



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consequently prevented other urban development, and the earlier resources were preserved. It is possible that a similar situation exists at the site of the Lower Works.

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There are numerous examples of archeological resources that have been discovered within urban, and more specifically, industrial contexts. One example that is particularly pertinent to archeological research at the Lower Works site was the discovery of prehistoric storage pits, burials, and middens at the 19th century New Jersey Steel and Iron Company site along the Delaware River. According to information summarized by Marshall (1984: 13-14), "the industrial buildings disturbed portions of the prehistoric site but did not obliterate [all] archeological features. Recorded stratigraphic profiles indicated a combination of industrial fill and alluvial deposits, sometimes intermixed."

The Probability of Discovering Prehistoric Cultural Resources

As discussed earlier in this report, prehistoric site locations are generally determined by several environmental characteristics. Certain attributes are common to prehistoric site locations of any period, such as proximity to a reliable water source and the presence of relatively flat or level ground. To evaluate the potential for discovering prehistoric sites at the Lower Works, the environmental characteristics of the site have been compared to the documented settlement patterns of each major prehistoric period (Table 1). The site exhibits some characteristics of known prehistoric sites. On the basis of the settlement pattern data, therefore, the probability of discovering prehistoric material is low.

The Probability of Discovering Historic Cultural Resources

The probability of discovering buried historic cultural resources at the Lower Works is very high, based on the examination of several 19th century maps. These maps were collected by Sharon Brown (DSC-TEA) from several repositories. It was often difficult to match specific locations from the historic maps with existing structures and features due to varying scales and levels of accurate detail, but it was possible

· TABLE 2

ARCHEOLOGICAL STUDY UNITS

STUDY UNIT	POTENTIAL RESOURCES*	PROPOSED TESTING METHODS
A	Domestic sites (1853, 1864)	Backhoe
	Late 19th-early 20th c. industrial	Backhoe
В	Pennsylvania Canal (1853)	Walkover Hand excavation
	Inclined railway, including bridge or trestle remains at point where it crossed canal (1853)	Backhoe Hand excavation
С	Earliest furnaces (pre-1853)	Backhoe Walkover Hand excavation
	Coke and coal yards (1853, 1864)	Walkover Backhoe
	Inclined railway (1853)	Walkover
	Stone quarry (1853, 1864)	Walkover
	lron ore mines (1853, 1964)	Walkover
	Coal mines (1853, 1864)	Walkover
	Ore railroad (1853, 1864)	Walkover
D	Rolling mill (1853-20th c.)	Backhoe Hand excavation (interior and exterior) Jackhammer ?
E	Brickyard (1853)	Backhoe
	Grist (?) mill (1864)	Backhoe
F	Machine and blacksmith shops (1853)	Backhoe
	Foundry (1853)	Backhoe

TABLE 2 (continued)

STUDY UNIT	POTENTIAL RESOURCES	PROPOSED TESTING METHODS	
	Stock house (1853)	Backhoe	
	Office (1853)	Backhoe	
G	Numerous structures (1864, 1890-91)	Backhoe Hand excavation	
	Railroad grades (1853-20th c.)	Walkover Backhoe	
	Mill Street (1864)	Walkover Backhoe	
Η	Numerous structures (1890-91)	Backhoe Hand excavation	
	Railroad grades (1853-20th c.)	Walkover Backhoe	
	Mill Street (1864)	Walkover Backhoe	
I	Inclined railway (1853)	Walkover Backhoe	
	Numerous structures (1890- 20th c.)	Backhoe	
	Furnace Street (1864)	Walkover Backhoe	

*Dates in parentheses indicate presence of a resource on a particular historic map.

to identify archeological study units that represent the approximate locations of former structures and features (Figure 2). Systematic testing in these areas using a backhoe, hand-excavated units, and walkover techniques should provide presence/absence data regarding these structures. Information collected archeologically will not only be valuable to archeologists, park interpretative staff, and historians, but will be useful in planning future development at the site by locating buried foundations, utilities, drains, and other features that might impede or should be avoided by construction activities.

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Testing all these areas will provide survey-level data for the entire site. From this data it will be possible to develop an intensive testing strategy for each unit based on the development and planning needs of the park. The approach to the study units can be prioritized to accommodate development and construction plans, and to concentrate on the site's "period of significance," tentatively defined, based on the historic data, as 1854 to 1880.

The Archeological Study Units are summarized in Table 2 and are detailed below. As each study unit is tested, prehistoric resources may be discovered. Conditions that may have effected the prehistoric archeological record adversely or favorably may be uncovered that will 'lead to recommendations for additional testing of a particular location. A systematic series of soil borings may be the most efficient method for locating areas where there is the potential for discovering prehistoric sites.

<u>Study Unit A.</u> There is a possibility that domestic sites may be found at this location based on information on the 1853 and 1864 maps. On both of these maps, this area was subdivided into small blocks and, although no structures are shown here in 1853, as many as 16 are present on the 1864 map. By 1890, this area had been incorporated into the industrial complex as it was expanded. If domestic/residential sites are found intact beneath the existing industrial site, this could provide the best data about living conditions of mid-19th century workers in historic Johnstown. The use of this area changed radically sometime

between 1864 and 1890, probably as a result of the 1889 flood, and with this change the domestic archeological deposit was replaced by the The domestic deposit may have been sealed under the industrial. industrial complex where it could not be disturbed or contaminated by This is a significant distinction from other worker later activities. housing in Johnstown which has been continuously occupied from the 19th century through the present; these sites have been subjected to 100 years of remodeling, repairing, and modernizing. The archeological record is often mixed and blurred in this situation, making the identification and interpretation of a specific time period difficult. However, domestic deposits in Study Unit A would represent a relatively short period of 30 to 40 years (or less?), and should be easily distinguishable from the later industrial impacts. If discovered, it represents an important and potentially significant resource.

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<u>Study Unit B.</u> According to the 1854 map, the Pennsylvania Canal crossed the site area at the location of an existing railroad grade. This grade should be examined to determine its relationship to the canal: a) was the canal filled and the railroad constructed on the fill? b) was masonry work in the canal bed removed prior to filling? c) does the railroad actually run in the canal bed, or on a towpath? At one point, an inclined railway from the iron ore and coal mines overlooking the site crossed the canal. Is there any evidence of a bridge or trestle at this location?

<u>Study Unit C.</u> Backhoe testing in this area could expose the ruins of the earliest iron works on the site, dating to 1853. It was at this time that George S. King began construction of four coke-fueled furnaces and a rolling mill along the Conemaugh River. Expected structures and features that may be found include the remains of the furnaces, the cast house, the bridge house, the blast machinery, and a raceway leading to and from the blast machinery, possibly from Hinckston Run or even the Pennsylvania Canal. It is not clear whether or not coke was being produced at the site or was trucked-in from a nearby coke operation. If coke was produced on site, evidence of the coke ovens may be discovered. Railroad grades, including a inclined railway, or traces of

them, may also be discovered. The extractive processes associated with the local iron industry may be examined by including the hillside above the furnaces where iron and coal were mined and stone was quarried.

<u>Study Unit D.</u> The evolution of the rolling mill is very complicated, as indicated by the historical record and the features of the existing structure. Archeological testing around foundations, or at estimated foundation locations, both inside and outside of the building may provide details of the structure's evolution, including evidence of the 1853 rolling mill.

<u>Study Unit E.</u> Two structures were shown at this location on the 19th century maps: a brickyard, measuring 173 by 176 feet, in 1853; and a "G. Mill" (grist?) in 1864. The mill may have been waterpowered, so a raceway may be discovered leading from either the Conemaugh River, the Little Conemaugh River, or following the route of the Pennsylvania Canal.

<u>Study Unit F.</u> Several structures were shown at this approximate location in 1853, including:

- 1) a machine and blacksmith shop (120 by 30 feet);
- 2) a foundry (84 by 60 feet);
- 3) a stock house (84 by 40 feet); and
- 4) an office (58 by 20 feet).

The locations of these buildings may be misplotted on the historic map, since other discrepancies have been noted on this document. The structures may actually be present in extant buildings located west of Study Unit F.

<u>Study Unit G.</u> Numerous structures are shown in this location in 1864 and 1890-91. Some appear to survive on the site, while others have been modified or removed. The location of railroad grades and Mill Street could be verified by archeological testing.

Study Unit H. Numerous structures are indicated at this location 1980-91, as well as railroad grades and a portion of Mill Street.

Study Unit I. The remains of an inclined railway (see Study Unit B) may be present in this area according to the 1853 map. By 1864, Furnace Street had been constructed. Since 1890, several structures have been built in this area.

RECOMMENDATIONS

The Lower Works site of the Cambria Iron Company contains significant resources that could be incorporated into a National Historic Site and associated historic district. The following recommendations outline an action plan for the responsible management of these resources.

1. Determine the presence of undisturbed soils and archeological deposits through the implementation of a systematic survey strategy that may include surface reconnaissance and mapping, shovel testing, mechanical soil borings, and backhoe trenching for Study Units A through 1.

2. Inventory any artifacts that are currently scattered across the site and identify those artifacts that are indigenous to the site. Develop an artifact plan for the conservation, interpretation and curation of the material culture of the site.

3. Record the site of the Pennsylvania Historical and Museum Commission. Obtain a state site number.

4. Consider <u>any</u> prehistoric material discovered on the site in an undisturbed context to be potentially significant since most, if not all, of the known prehistoric sites in the immediate vicinity of Johnstown have been destroyed by flooding or urban expansion.

5. Develop an archeological resources management plan for Johnstown and the surrounding boroughs that will lead to a systematic contextual analysis of the data collected from not only the Cambria Iron Company, but also for other sites within the America's Industrial Heritage Project (AIHP).

6. Coordinate archeological and historic research at the Cambria Iron Company (and other appropriate AIHP sites) with the Pennsylvania Industrial Survey being conducted by the Pennsylvania Historical and Museum Commission, and the National Iron and Steel Sites Survey being

conducted by the Society for Industrial Archeology/Historic American Engineering Record. (Initial contacts have been made with both survey organizations). Contact other archeologists who are currently or have in the past performed industrial site surveys in Cambria County. Obtain survey reports, if available.

7. Establish an industrial archeology facility with or in addition to the proposed Center for Industrial Research (Comer 1987: Appendix A). Industrial archeology, a relatively new field in the United States, is currently very popular, as evidenced by all the surveys noted above. Currently there are few institutions (probably 5 or less in the entire country) which offer any formal training in industrial archeology. The AIHP provides an unequalled opportunity for the training of professional and amateur industrial archeologists. The methods developed during the course of the AIHP will define the state-of-the-art, and are likely to establish precedents that will guide the discipline into the 20th century.

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