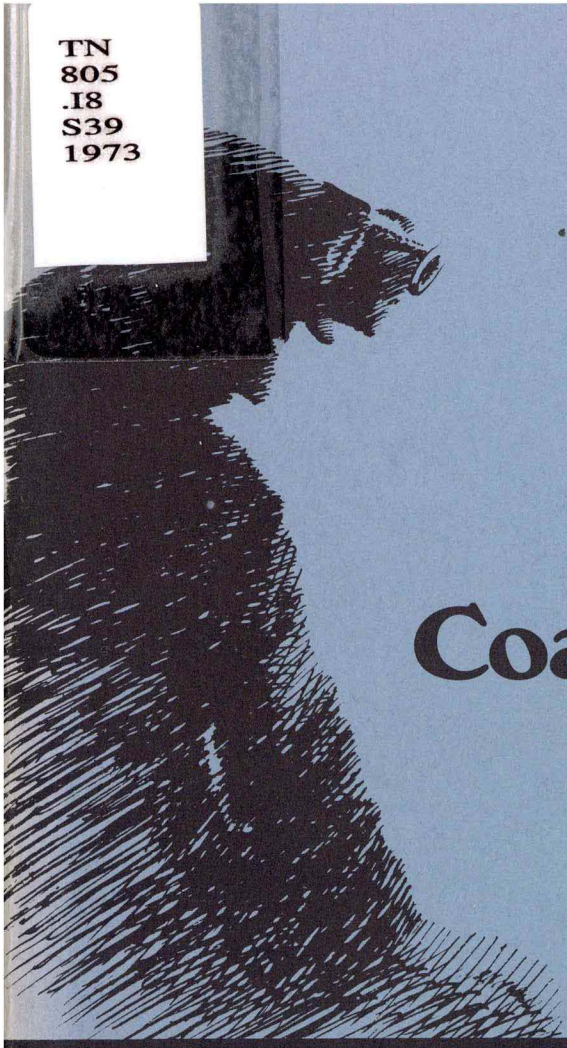

Iowa's Coal Mining Heritage

including supplementary material

for the film

THE LAST PONY MINE

by

Dorothy Schwieder

Richard Kraemer

IOWA STATE UNIVERSITY

published by

THE STATE OF IOWA

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STATE MINING BOARD

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Foreword

This booklet is an outgrowth of the interest of a number of Iowa teachers who have had occasion to view and use the film The Last Pony Mine. *Because it deals with an often neglected segment of Iowa's economic past, the film has generated considerable interest in the role coal mining has played in the development of this region of the United States. Largely for this reason, what started merely as a short film guide has been expanded into a simplified general reference on coal mining for use in schools. The authors hope that it can serve as a useful source in a study of mining on either an elementary or a secondary level.*

The authors are indebted to a large number of people and organizations who provided materials and information for incorporation into this booklet. Our appreciation extends to those teachers who have used the guide in its rough draft form and have made comments concerning text and suggestions concerning student activities. We are particularly grateful to Dr. Samuel J. Tuthill, State Geologist, Dr. John Lemish, Professor of Geology at Iowa State University, and Mr. W. Dean Aubrey, State Mine Inspector, for their guidance in maintaining integrity and accuracy of content, and to the State Mining Board for making possible the dissemination of this material to teachers and other interested persons. Last but not least, our thanks go to Wayne Arbogast, owner of the New Gladstone Mine, and to the miners who appear in the film—Louie Nobile, Frank Massa, Charles Fox, Joe Buyan, Lubo Radosevich, and Martin Fenton—for sharing with all of us their fascinating world of work.

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CONTENTS

I. INTRODUCTION

The Last Pony Mine depicts a day in the life of the miners at the New Gladstone Mine. The New Gladstone was considered to be the last mine in the United States to use mine ponies for underground haulage, and from this practice derived the name "pony mine." The mine was located about 8 miles west of the city of Centerville in Appanoose County, Iowa. In the early spring of 1971 the mine was shut down as a consequence of the relocation of Iowa Highway 2. The new route went directly over the entrance to the mine slope, and although an adequate coal reserve remained below the surface, the mine owner did not believe it would be economically feasible to relocate the mine opening. Fortunately for both present and future generations of Americans who will never have the opportunity to visit a pony coal mine, the Iowa State University Film Production Unit spent over a week underground filming not only the mining process, but a life style that was soon to end.

During the late 1800s and early 1900s, pony mines were widespread throughout the bituminous coal areas. Many mines had low roofs, on the order of 5 feet high, and a small pony or mule was the only draft animal that could maneuver easily through the roadways. Many larger operations utilized a dozen or more ponies, and in some mines the ponies were kept underground during the entire season, or in some cases for the entire working life of the animals. With the closing of the New Gladstone this type of mining came to an end.

Another distinction earned by the New Gladstone was related to the mining method used. The miners utilized the "advancing longwall" method of coal extraction, and, according to Iowa State Mine Inspector Dean Aubrey, this mine might well have been the last in the country to use that method. Because of these factors viewers of *The Last Pony Mine* not only will see an obsolete method of mining but, perhaps more important, will see and hear through the miners' actions and conversations a moving and realistic view of the problems, the concerns, and the world of work that once existed in the coal mining industry.

A topside view of the New Gladstone mine. The headhouse is at the right and the dumping platform is in the foreground. Dirt piles like the one in the background are reminders of the many coal mines that once operated in the area. (Photo courtesy *Coal Mining and Processing.*)

II. THE WORLD OF WORK FOR CHESCO, LOUIE, CHARLES, AND JOE

The work experience of the New Gladstone miners reveals the hard labor that was typical of mining operations almost 50 years ago. With the exception of the electrically operated undercutter, the New Gladstone was not automated, so the various tasks such as loading and coupling had to be done manually. As we see the men go about their daily routine, we sense the skill gained from their many years of mining experience.

Throughout the film the men, whose lives have centered around mining for decades, tell in their own words what mining and the impending shutdown mean to them. Louie, almost 70, emigrated from Italy when he was 15. He spent a lifetime working underground; commenting on the mine's closing, Louie wondered what he would do after the shutdown, but speculated that perhaps it was time to quit. Charles began working when he was 12 and had accumulated 48 years in the mines. Retirement was a prime concern of everyone, as all the miners were past 60 years of age. Each miner, as he went about his specific task, represented a lifetime of accumulated knowledge and expertise. With the closing of the last pony mine and the resulting abandonment of the old longwall method, the end of the New Gladstone truly marked the passing of an era in the American coal mining industry.

As you watch the film, you will probably think of many questions about the mine and the work of the miners. Here is a description of some of these processes and conditions so you will have a better understanding of what went on during the last days of the New Gladstone:

Mining in the New Gladstone was seasonal; the men worked only during the fall and winter months when there was a local demand for the coal. After the end of work in early spring, the mine stood idle. When the miners returned in the fall, they had to clean up the debris that had fallen from the mine roof during the intervening period. This marked the first step in reopening the mine for another year's operation. Beginning at the bottom of the mine slope,

the men worked their way slowly back through the roadways, clearing the tracks and hauling out the debris. Once finished with this work, which usually took several weeks, they were ready to begin the actual mining of coal.

A workday for the New Gladstone miners began around six o'clock in the morning. Chesco arrived first, as he had the responsibility of starting the fire in the headhouse stove and feeding and watering Bill, the mine pony. The other miners arrived during the next half hour. As the men congregated in the headhouse, their conversations turned to problems encountered the previous day, their health, and the eventual closing of the mine. Taking their caps and lamps from the hooks where they had been placed at the end of the previous day's work, the miners proceeded to clean, fill, and light their carbide lamps, making ready to go underground for another day of coal mining. Before their descent, however, Chesco led Bill down the slope and harnessed him; then he rang the bell which signaled the men to crawl into the cars and be lowered down the slope. Once underground, each man headed toward his place at the face to resume work where he had left off the day before. Each man worked alone most of the day. In the film we see Charles and Joe using the undercutter, Joe and Chesco hooking up the cars, and Chesco laying new track so the cars could be brought up close to the face for loading. In earlier times when the New Gladstone operation was larger, each man had a specific job assignment. However, during the last days of the mine the work force had dwindled greatly and each miner swapped off with another to complete the various jobs.

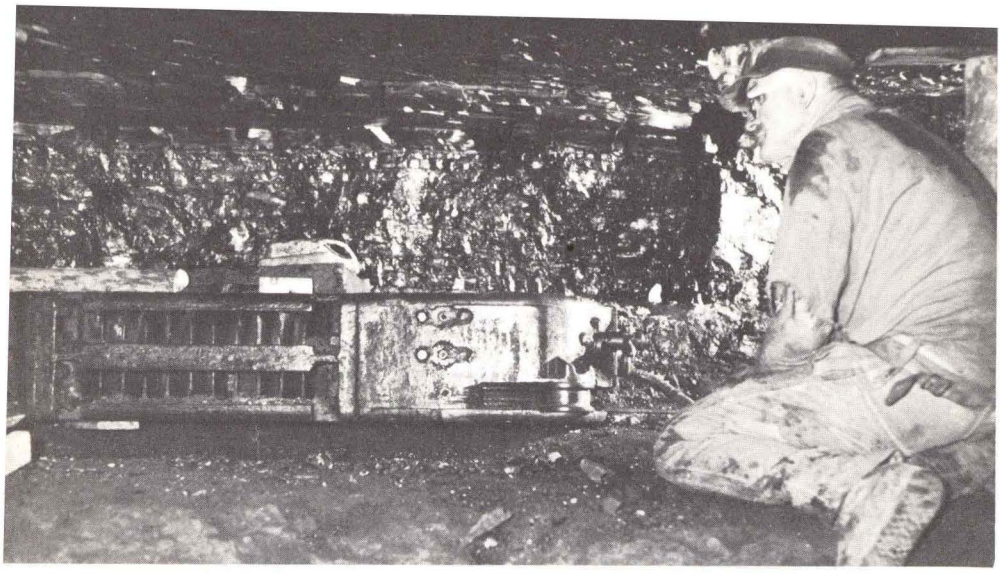
The only member of the work force whose job remained the same was Bill, the mine pony. In the days just before the closing of the mine, Bill was the only pony used. Forty inches high, he just cleared the roof of the mine. Bill would stand where he was left until he was needed to haul loaded cars out or empty cars in. Each loaded car held about 1,500 pounds of coal, and Bill could haul up to three full cars with relative ease, since the underground roadways were very close to level. At the bottom of the slope, however, Bill was unhitched from the cars, and a

Bill performs his task of pulling cars to the slope bottom. Joe and Chesco oversee the operation. (Photo copyright The Des Moines Register and Tribune Company.)

winch and drum driven by an old truck engine in the headhouse was used to hoist the full cars to the weighing and and dumping platform aboveground. In an average day, with only four men working underground, Bill would haul around twenty cars of coal and three or four cars of rock debris (''dirt,'' to the miners) to the slope bottom.

Over and over during the day, the various activities were repeated. Finally, at three in the afternoon, Bill was unharnessed and walked up the slope by himself. The miners remained at the bottom until Bill reached the top; they then rang the bell to be pulled up the slope. Dumping the unused carbide from their lamps before putting them away, they ended their work day and headed their separate ways toward home.

The mining method used in the New Gladstone was the advancing longwall or ''long face'' method. The miners



Charles operates the undercutter, which removes the dirt from beneath the 28-inch-thick coal seam. (Photo courtesy *Coal Mining and Processing.)*

used an electrical cutting machine similar to a chain saw—a Sullivan CLE-2 undercutter—to cut back several feet into soft rock underneath the coal so that the weight of the roof would break the coal down. In the New Gladstone the men began to mine along the wall of coal, or face, at the bottom of the mine entrance slope. As they removed coal, the wall (face) receded so that they were gradually moving farther and farther away from the entrance. As the men continued to remove coal, the mine took on a fanlike shape with the entrance located at the ''handle'' end of the fan. The length of the face determined the number of ''places'' or work areas to be worked by each miner; each usually worked a 40-foot section of face. The longer the face, the more places and workers required, and the greater the total possible coal production.

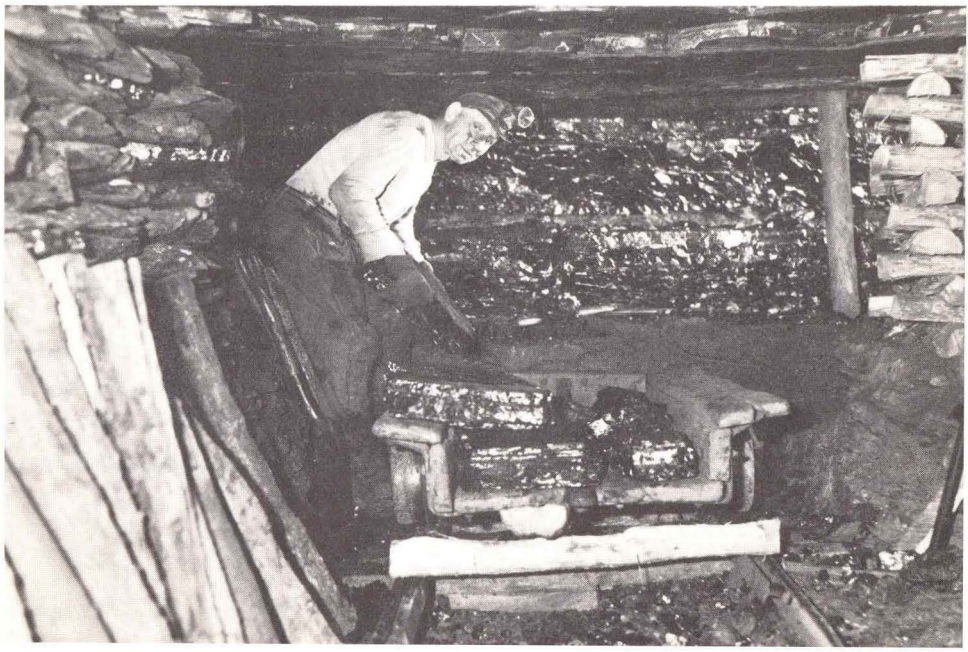
As the men continued to mine out a larger and larger area, it was necessary to erect supports to prevent the complete lowering of the mine roof. The miners first placed wooden timbers near the face. As they continued to remove coal, more and more debris collected; they used this to build packwalls starting about 4 feet back from the face. The name ''packwall'' is derived from the procedure of packing the debris tightly from bottom to roof to prevent settling of the roof behind the miners. The men also built cribs, which were square-shaped wooden supports packed

with debris, at points of greater stress, such as the corner where two entries or tunnels came together. This construction formed entries (in which tracks for the cars were laid) with the roof supported by cribs, props, and packwalls on each side of the roadways. The roof continued to settle somewhat for several months, but the packwalls eventually prevented any further sinking.

Just before its closing, with only four men working below, the output of the New Gladstone was 15 to 16 tons of coal per day. Most of this went to local schools and residences. During this last season the miners were paid by the day rather than by the ton, since the type of work they did was so varied. In the days of full operation, the mine produced from 40 to 60 tons of coal in a day, with four ponies, and 10 to 12 men who each did one specific job, such as load coal, lay track, undercut the seam, or drive ponies. The loaders were paid $2.25 per ton of coal loaded, while the others were paid by the day.

Although mining demanded a great deal of physical exertion and was a dirty operation, the temperature of the mine provided a more pleasant aspect. No matter how hot or cold it was outside, the temperature in the New Gladstone remained around 60° Fahrenheit winter and summer.

Louie loads coal by hand. The illustration also provides a good view of the packwall, the coal seam, a prop, and a crib. (Photo courtesy *Coal Mining and Processing.)*



III. HOW COAL IS FORMED

The story of Iowa's coal began over a quarter of a billion years ago in the geological period called the Pennsylvanian. This period lasted for about 50 million years. The special physical and climatic conditions necessary for the formation of coal were all present in that geological period.

The *Random House Dictionary of the English Language* defines coal as "a black or dark brown combustible mineral substance consisting of carbonized vegetable matter, used as a fuel." Perhaps we can use the simpler definition given in Dr. Hubert Olin's book, *Coal Mining in Iowa,* which describes it as "an accumulation of plant material in the form of peat which has been subjected to changes converting it into coal."

Three basic steps can be discerned in the formation of coal. The first is prolific plant growth under swamp conditions to allow formation of peat; the second is burial of the peat under later deposited layers of sediment; and the third is geochemical change of peat into coal (coalification).

In the first step or time period there must have been heavy plant growth which lasted over thousands of years. This plant growth consisted of huge ferns and trees that grew abundantly in the damp and steamy air. As one group of plants died, others grew up and eventually, as they accumulated and partially decomposed, formed a substance called peat. The formation of peat (which looks much like rotted wood) required an oxygen-free or reducing environment in order that the vegetable matter would not decay completely. Some authorities estimate that it requires 20 feet of vegetable matter to compress into 3 feet of peat, which in turn can be further compressed into 1 foot of coal. On the basis of this estimate and the knowledge that Iowa's coal beds range from 2 to 6 feet in thickness, it would probably have taken from 7,000 to 18,000 years for the necessary amount of peat to accumulate.

The second step took place as the peat was covered by other substances. Geologists believe that sediments such as silt, clay, and sand were deposited on top of the peat.

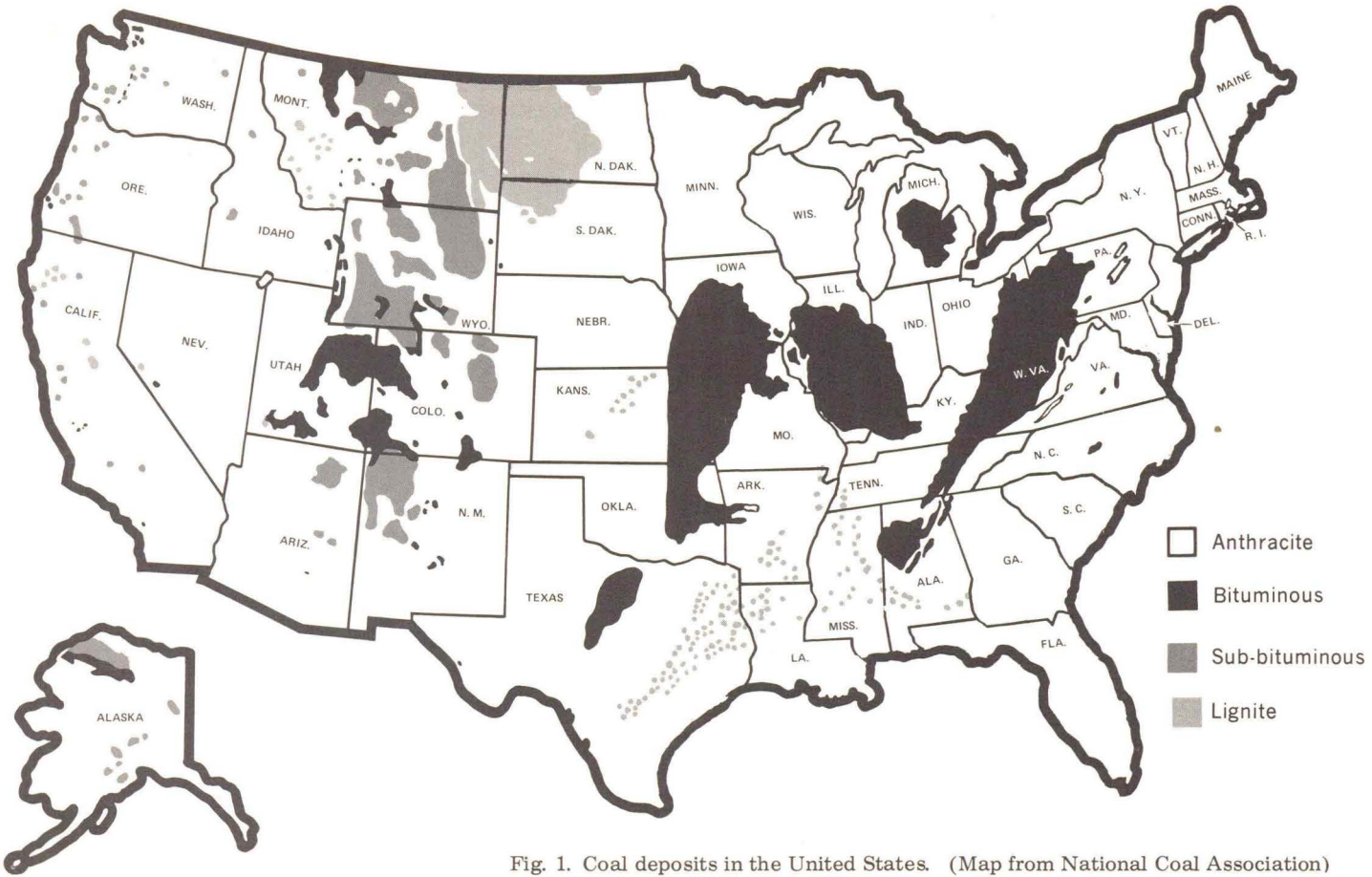


Fig. 1. Coal deposits in the United States. (Map from National Coal Association)

This process was important for two reasons: first, it prevented the peat from being destroyed by oxidation or erosion; and second, it provided the pressure necessary to convert the peat into coal.

The third step occurred as the layer of peat was compressed by the weight and pressure of the overlying sediments. High temperatures were generated which caused a loss of volatile materials such as methane, water vapor, and carbon dioxide, and an increase in the carbon content of the peat. Over a period of time, the peat was turned first into lignite and then into bituminous or soft coal.

In some other areas where coal was formed, later mountain building forces caused folding of the coal beds, subjecting them to even more intense pressure and heat. This additional pressure caused a further loss of volatile materials and produced what is known as anthracite or hard coal. In the United States, anthracite coal makes up only a small part of the nation's coal reserves.

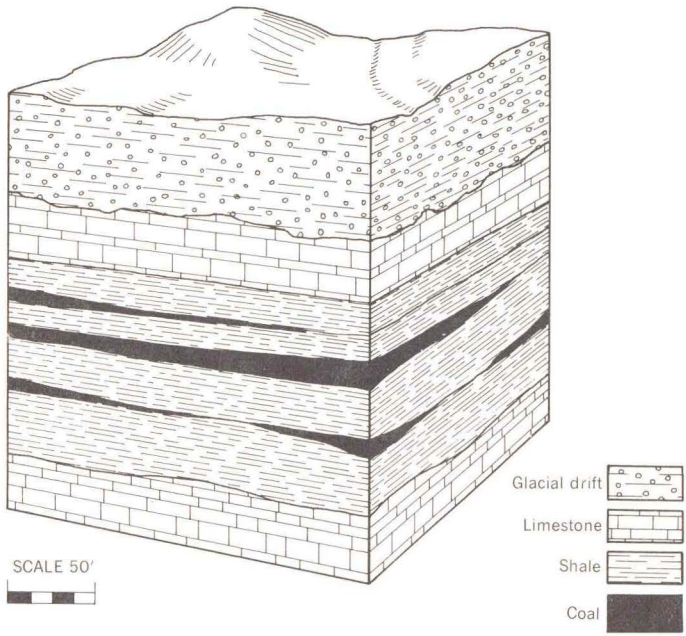


Fig. 2. Coal beds and overburden.

The utility of coal deposits is dependent on subsequent uplift of the coal beds with attendant erosion of the overlying deposits. This uplift and erosion brought the coal beds close enough to the surface so that they could be mined economically. Most of the coal in Iowa lies within several hundred feet of the surface; however, in certain areas of Great Britain and Continental Europe, coal has been mined as deep as 4,000 feet beneath the surface.

Iowa coal is bituminous coal. It is rather soft and can be quite sooty if not burned properly. It contains around 14 percent ash, primarily from silts washed into the peat beds during their formation, and around 5 percent sulfur, which originated from the organic matter forming the coal. It is found in beds, or seams, which are roughly lens-shaped.

Along the margins, the seam of coal becomes very thin, and this part is often too thin to mine; sometimes only the center of the lens-shaped seams may be thick enough to work profitably. Many seams are over 4 feet thick in the center and can be mined with machinery. The minable portion of an extensive coal seam (such as the Mystic seam, where the film was made) may cover an area of over 1,500 square miles.

IV. HISTORY OF IOWA'S COAL MINING INDUSTRY

A proper introduction to the film should include a short history of coal mining. Although coal mining is less significant today in Iowa's over-all economy, there was a time when it was "big business" and the industry contributed millions of dollars annually to the state's income.

Coal was first discovered in eastern Iowa in 1835, but it remained unimportant to Iowans until the decade of the 1850s. At that time "railroad fever" struck the Hawkeye State and every community of any substance began to plan for railroad service. Railroads consumed tremendous amounts of coal, and the practice developed for each railroad com-

pany to operate its own mines, called "captive mines," or to contract with private producers for the needed fuel. As railroad lines began to extend farther and farther into Iowa, coal production rose proportionately. Of great significance was the fact that at that time Iowa's mines represented the last region where railroads could secure an adequate coal supply before their locomotives started off on the long journey across the Great Plains.

The greatest amount of railroad building took place in Iowa in the 5-year period after the Civil War. From 1861 to 1865 while the war between the states raged, all railroad construction came to a halt. Following the war, however, it was resumed at a frantic pace. During the closing days of that conflict, Abraham Lincoln designated Council Bluffs as the eastern terminus for the transcontinental Union Pacific Railroad. Each of the four major railroads building across the state—North Western, Rock Island, Burlington, and Illinois Central—worked unceasingly to be the first to tie up with the Union Pacific at Council Bluffs. Following the completion of the major lines across the state, many smaller spur or feeder lines were also constructed. This building added up to thousands and thousands of miles of railroad track, and locomotives steaming over these roads consumed millions of tons of coal each year.

As more railroad lines were constructed and as Iowa's population increased, the demand for coal rose steadily; railroads and manufacturers needed steam power and home owners needed fuel. With these additional demands, more and more mines were opened across southern Iowa, and coal mining continued to be a dominant Iowa industry until well into the twentieth century. In 1917, when the United States entered World War I, coal production in Iowa reached its peak as total tonnage that year rose to 9 million. Since that date, however, production has gradually declined as the demand has grown less and less. About the time of World War II, railroads began using diesel engines, and more people began using oil and gas to heat their homes. Today there is still a local demand for Iowa coal, but it is only a tiny percentage of the demand that existed during the late 1800s and early 1900s.

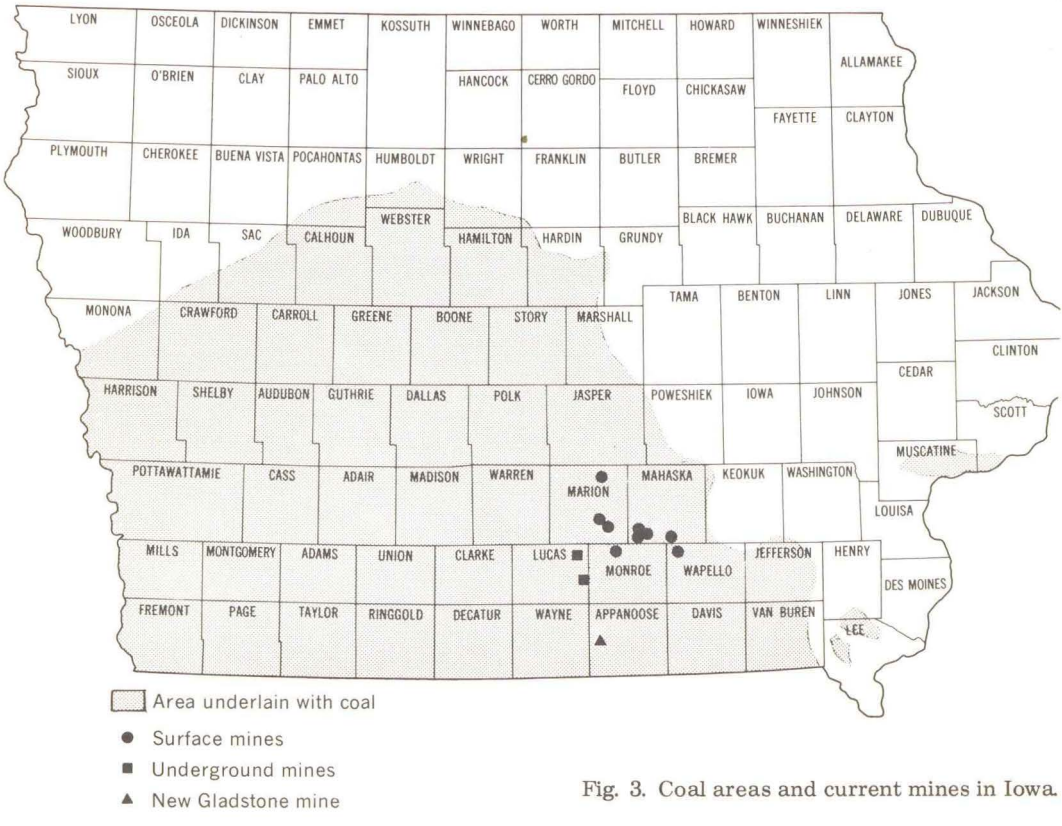


Fig. 3. Coal areas and current mines in Iowa.

V. IOWA'S COAL MINES

At one time or another coal was mined in most of central and southern Iowa. A survey of the entire state shows about one-third of Iowa underlain with coal deposits.

Counties where coal is mined today are Lucas, Monroe, Marion, and Mahaska. The two underground mines still in operation are the Lovilia Mine at Lovilia and the Big Ben Mine at Knoxville. Nine strip mines are currently producing coal, and Iowa coal operators presently produce an average of 1 million tons per year, which is used almost exclusively for the production of electrical energy.

The first step in the mining process is to gain access to the coal seam. There are several different methods used. Where the coal seam lies horizontally and emerges as an

A strip mining operation near Oskaloosa, Iowa. Compare the size of the dragline with the trucks and people in the background.

outcropping on a hillside, an entry can be driven directly into the seam. This is called a *drift mine.* Where the seam is below ground, but not more than a hundred feet or so, a sloping tunnel may be driven downward to intersect with the seam, and the mine is called a *slope mine.* Where the coal is so deep that a slope would be excessively long or difficult to construct, a vertical shaft is sunk down to the seam—a *shaft mine*—and entries are then driven along the seam in various directions. Where the coal seam is close to the surface and the rock above it can be easily removed, the overburden is dug away to expose the seam—a *strip mine.*

When the coal seam has been reached in an underground (drift, slope, or shaft) mine, either of two methods can be used for removing it—the longwall method or the room and pillar method. The method used depends on the thickness of the seam, the depth of the coal, and the type of rock that forms the roof of the mine.

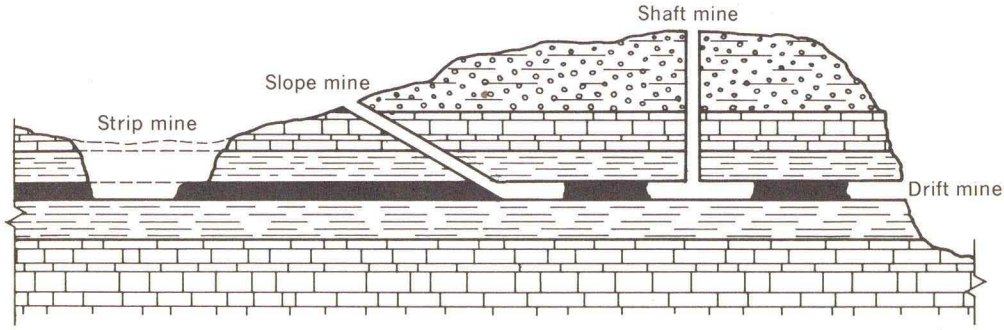


Fig. 4. Comparison of drift, slope, shaft, and strip mines.

The New Gladstone used the advancing longwall method to remove the 30-inch thick Mystic seam. The undercutting machine was used to cut out a 4-inch thick portion of the bottom rock (fireclay) from beneath the seam of coal. The structure of the slate roof with its limestone caprock above it permitted the roof to weigh down upon and break off the undercut coal without itself breaking. The miners could then crawl back to the face area, break up the larger pieces with picks, and load them into the cars. Debris from the bottom and the material which was cut out from below the

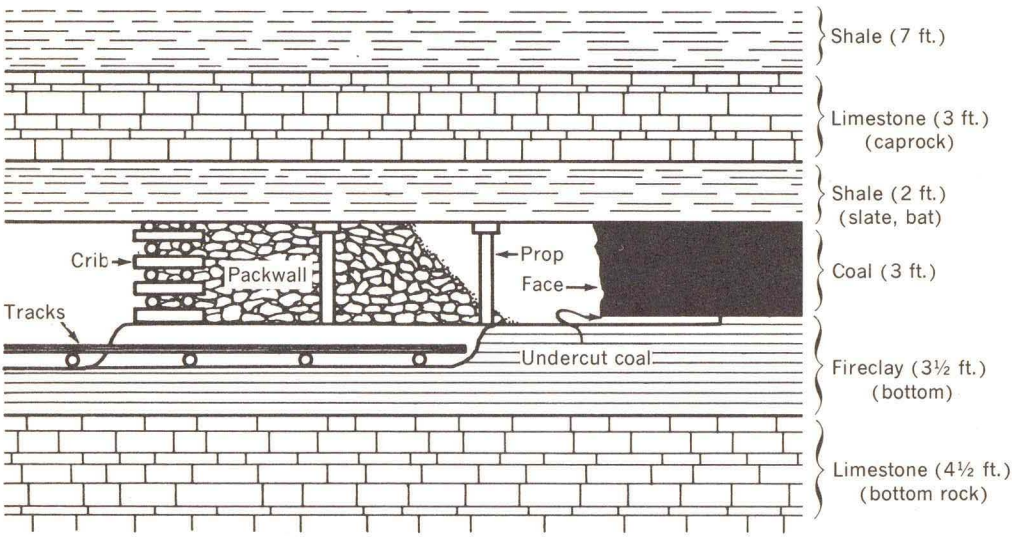


Fig. 5. Side view of longwall mine (face area).

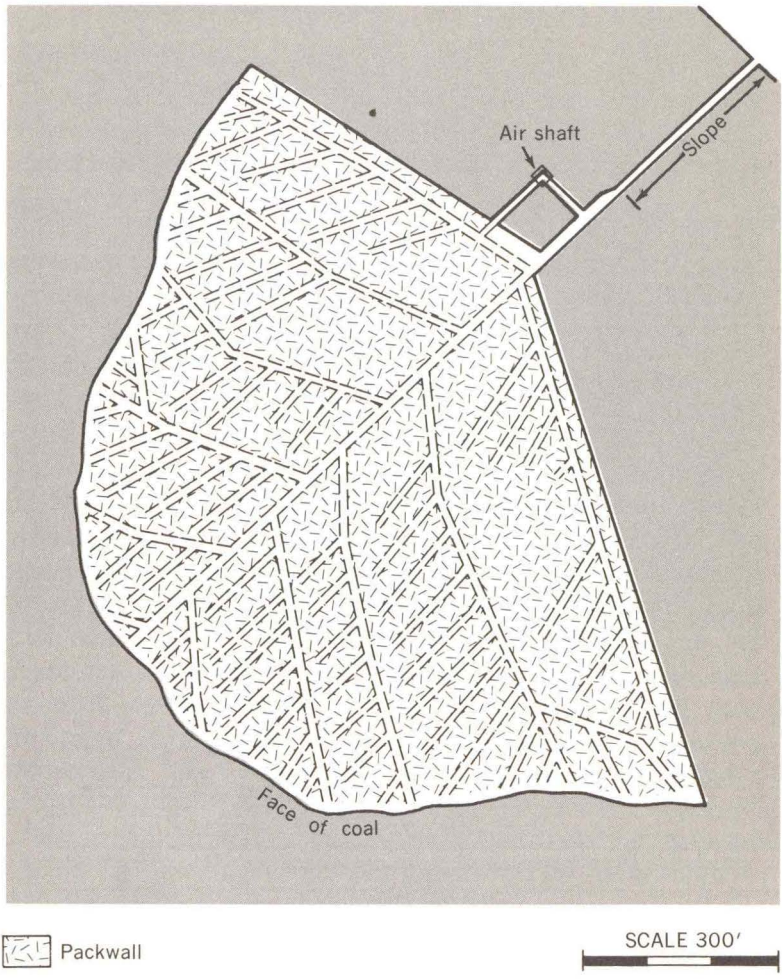


Fig. 6. Top view (plan) of longwall mine (New Gladstone).

coal seam was piled and packed from bottom to roof back away from the face and, with the props and cribs, supported the roof throughout the mine. As the face of the coal was successively undercut, the mine took on a fanlike shape, with the mine entrance located at the "handle end" of the fan.

The room and pillar method is usually used in shaft and slope mines and with thicker seams of coal. At the base of the shaft or slope at least two parallel main entries are

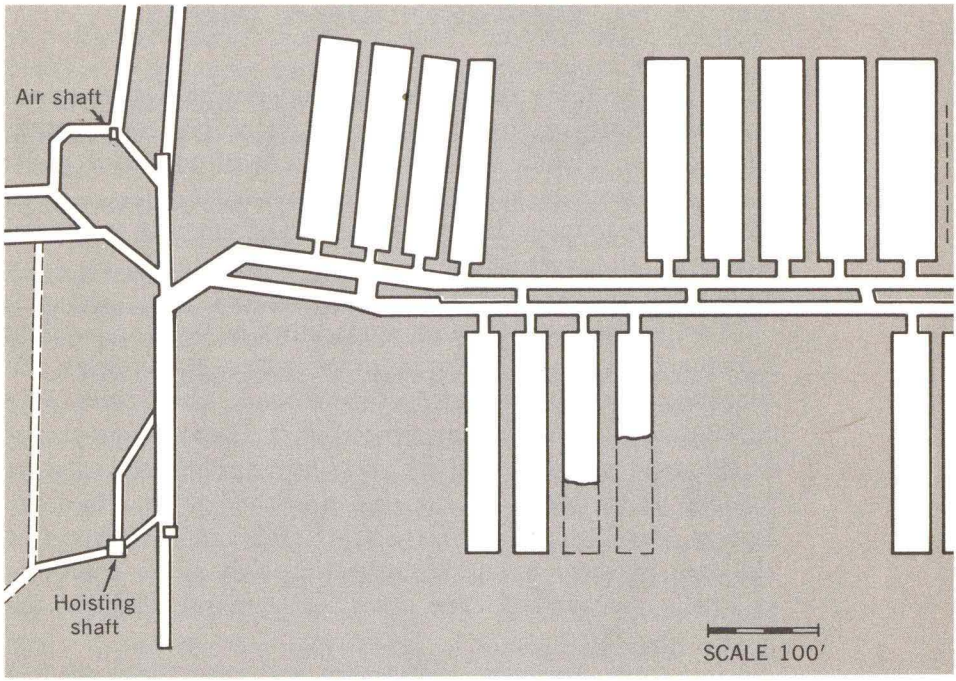


Fig. 7. Top view (plan) of a room and pillar mine.

driven into the coal seam. Cross entries are then turned off the main entries about every 300 feet. Miners begin working between the two sets of cross entries and in this way "work out" a room. Rooms are about 30 feet wide, and an 8- to 10-foot pillar is left between them for roof supports.

Although the room and pillar is the standard method in use today, it is not as efficient as the older advancing longwall method. In longwall mining, all the coal is removed, with props, cribs, and packwalls providing the necessary roof support. In the room and pillar method, the pillars of coal are usually left in place and no attempt is made to recover this coal.

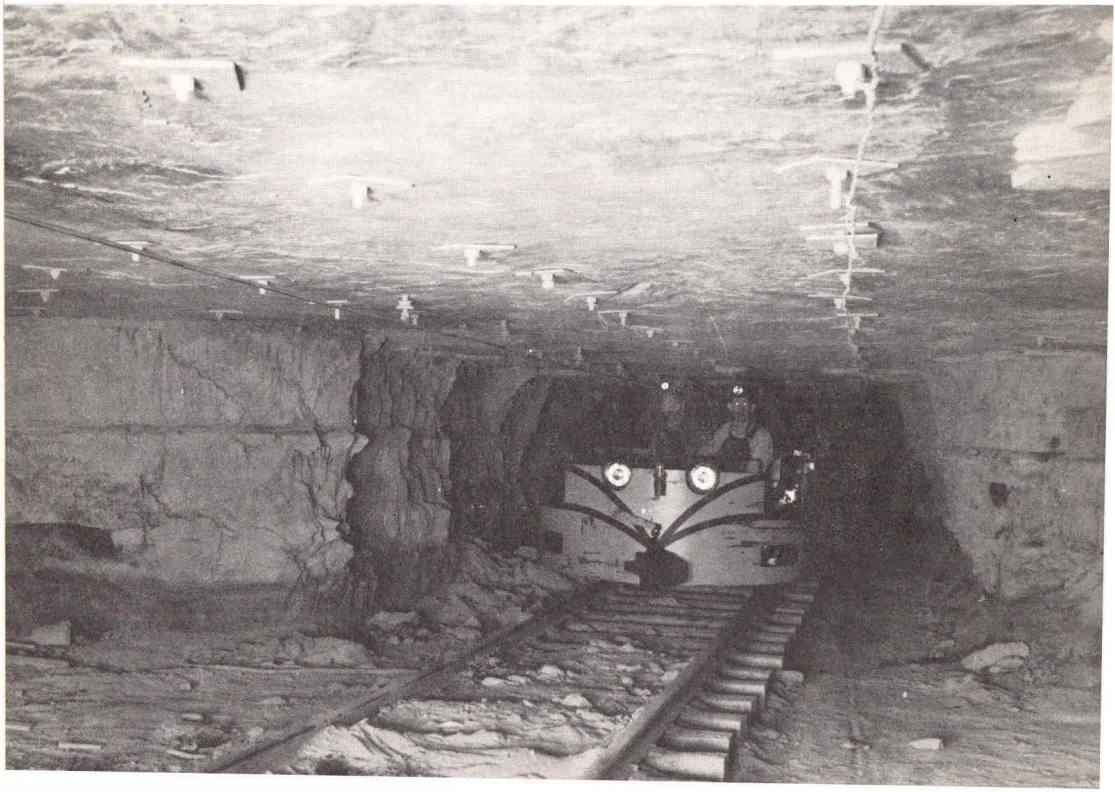
The New Gladstone Mine is believed to have been one of the last, if not the last, advancing longwall mines in the United States. The two remaining underground mines in Iowa use the room and pillar method.

VI. COAL MINING IN IOWA TODAY

Today in Iowa there are two underground shaft mines and nine strip or surface mines in operation. All together these mines produce about 1 million tons of coal each year, most of which is used to produce electrical energy. Even though this tonnage is only a fraction of the coal produced early in the twentieth century, it still adds up to a $4,000,000 yearly industry within the state.

The largest underground shaft mine is the Lovilia Coal Company at Lovilia. The mine employs 21 workers, 16 working underground and 5 aboveground. They carry on a full-time operation, mining year round; their average output is 800 tons per day, and in 1971 they produced a total of 245,890 tons. Most of the coal produced is sold to Iowa Power and Light and Iowa State University. Reflective of the coal industry today throughout the nation, the operation is totally mechanized. The other underground mine, the Big

An entry in a modern coal mine. Notice the roof bolts, which replace props, and the electric engine which hauls the cars of coal. (Photo courtesy U.S. Bureau of Mines.)



Ben Coal Company, is located near Knoxville and operates on a slightly smaller basis. In 1971, the Big Ben Company employed 12 people and produced 172,245 tons of coal.

The remaining coal produced in the state comes from strip mines. The largest mine—the Beard Coal Company located at Knoxville—produced 114,791 tons in 1971. In this process, a large power shovel removes the overburden to expose the coal bed. The coal is then broken up, usually by explosives, and loaded into trucks. It is a cheap method of extracting coal when compared with underground mining. All the strip mines are located in south central Iowa.

In recent years both the Iowa State Legislature and the United States Congress have passed more stringent laws governing the rehabilitation of land where strip mining has taken place. In Iowa an advisory board has been established to work with the mining companies and the State Mining Board. The present state law requires that the mine operator must first apply for a license to conduct the mining and then post a bond or security. The amount of the bond shall "equal the estimated cost of rehabilitating the site" once the mining has been finished. Following the termination of mining, the operator has 24 months to rehabilitate the land. After the reclamation work is completed, the state surface mine inspector inspects the site and if it is satisfactory, the bond is returned to the mine operator.

Besides the registered mines—the 11 mines described—there may still be some very small mining operations called "dog holes." These are often family operations where perhaps the father and one or two of his sons mine coal on their own land. The government cannot forbid this type of operation, but these sites are not officially recognized as mines.

It is now estimated that Iowa has 21 billion tons of coal resources lying under its land. If these estimated coal resources were mined at the present rate of 1 million tons per year, they would provide fuel for hundreds of years to come.

In 1965 the State of Iowa published a booklet entitled *Coal Resources in Iowa,* prepared jointly by the United States Geological Survey and the Iowa Geological Survey.

The study contains the estimated coal reserves for each county in Iowa known to have coal beneath it. In fact, the study was made on a bed-by-bed basis. In addition to general location and the length of the beds, the surveyors also estimated the thickness or depth of the coal seams. This was the first time a study of this nature had been undertaken. The surveyors reported, for example, that there are 37 counties with coal reserves. These are located in southeastern, south central, and western Iowa. Monroe County has the greatest reserves with an estimated 885 million tons, and Polk County is a close second with 750 million tons of estimated reserves.

At present there is some controversy about the value of coal as a fuel because of its pollutant qualities. Iowa coal has a high sulfur content. One possibility, and one that is receiving more and more attention, is "coal gasification," a process by which coal is converted into clean synthetic gas. The Office of Coal Research has been working on the problem of coal gasification for the past 10 years, but has not yet perfected the process.

Today, with the fuel crisis, more and more people are looking to coal as a possible solution to the nation's fuel problems. Authorities estimate that the United States has used only 5 percent of its coal reserves, so the industry's potential is still great. In the film, as the miners are being hoisted up the slope at the end of their work day, Charles comments that he believes the industry will come back some day, but that men will use different methods of taking coal from the ground. It is an interesting prophecy from a veteran coal miner who had worked for 48 years beneath the surface of the earth!

VII. MINE SAFETY

A major concern of any underground miner is his own survival. The miners at the New Gladstone were certainly not exempt from this concern, and so mine safety was of vital importance to them. From the moment they ap-

peared at the mine in the early morning hours until they were bidding their coworkers goodnight and heading home, the men were constantly concerned with proper equipment, conditions in the mine, and adequate mine ventilation.

Throughout the film there are many examples of the miners' concern with safety. In the opening scene we see the men assembling in the headhouse preparing for their descent into the mine. Charles comments that someone besides himself should know how to operate the undercutting machine, because as he put it, "you never know when you'll have to take someone out of there." Later in the film we see Louie crawling back toward the coal face, but before he goes very far, he stops to tap the mine roof with his pick. Satisfied that it is solid, he moves on back and begins to lift out coal. As he tests the roof, we hear the comment, "You learn to take care of yourself in there."

As we watch the film we can see several devices that act as safeguards in the various mining processes. In one scene loaded coal cars are being pulled up the slope, and it appears that a rail is broken. The rail is "broken" intentionally; this is called a derail and in the event that a car or cars break loose and roll backward, this separation in the rail would throw them off the track to stop their descent. In another view of the coal cars being hoisted up the slope, a "dog" or two-pronged device has been attached to the rear of the last car. Again, it is a safety device intended to stop the car if it came loose and started to roll downhill.

Another area of mine safety that concerned the workers was proper ventilation of the mine and the possible buildup of methane gas. Because of its explosive properties the miners fear the presence of methane gas, but it has never been detected in an Iowa coal mine. Good ventilation is still crucial, however, because of the possible buildup of carbon dioxide, which miners refer to as "blackdamp." The New Gladstone was well ventilated so that blackdamp was not a problem. At the surface a large fan forced air down an air shaft and directed it through the right side entries to the mine face. To control the flow of air, check

curtains and doors were installed. The air was then forced along the face to the last active roadway on the left side of the mine. Finally the air returned along the main road and flowed back up the slope entrance to the surface.

Another prime concern of the miners was the amount of coal dust in the mine and its effect on them. The constant inhalation of coal dust, plus the cramped position that many were in during their shift, created lung problems, sometimes even causing the disease "black lung." Many miners retired with permanent back trouble as a result of the bending, lifting, and cramped positions encountered for so many years. As one of the miners comments in the film, "You can always tell a miner because he's bent over—he has trouble with his back."

The New Gladstone was not lighted electrically, except just at the slope bottom, so each miner had to provide his own light. The miners, largely because of habit, preferred carbide lamps. The use of carbide lamps is now outlawed by the federal government, but the New Gladstone men, working in an otherwise dark area, felt that these lamps gave a more uniform illumination. The lamp

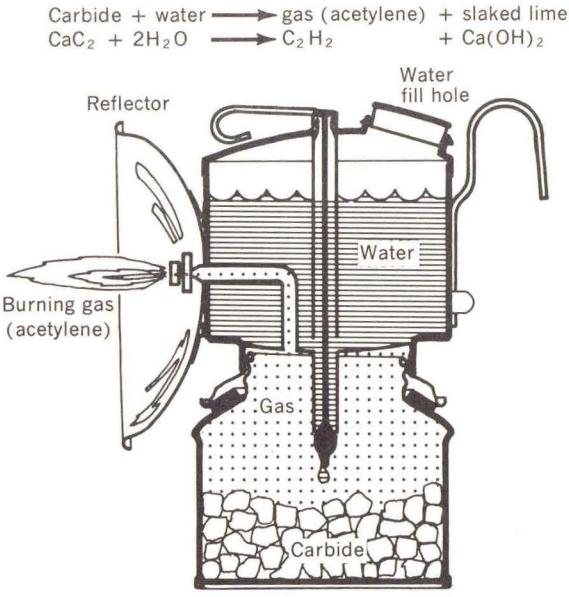


Fig. 8. Carbide lamp cross-section.

operated on a simple principle. The bottom part contained chunks of carbide (each about the size of a pea), and the top section contained water that dripped down very slowly onto the carbide. As water dripped on the carbide, acetylene gas was released through a small jet and was lighted with a flint to produce the flame. Because each miner needed to replenish his water and carbide supply several times each shift, each man carried a supply of carbide with him. As an additional safeguard, they placed extra supplies of carbide at various places in the mine—usually in pipe tobacco cans. The miner's bucket actually served two purposes because the top part contained his lunch and the bottom held water for drinking and refilling his carbide lamp.

Although the New Gladstone miners proudly noted that in 31 years of mining they had never had any reason

The state mine inspector measures air flow in an underground mine. Notice the electric lamps on the hard hats and the safety lamp that is used to test for the presence of gas.

to use the stretcher tucked away for use in a mine accident, Iowa mines were not always so free of accidents. The *Report of the State Mine Inspector* for 1970 and 1971 noted that the total number of fatal accidents between 1880 and 1969 was 1,446, while the greatest number in a single year was 55 in 1902. With the development of new and safer machines, closer supervision by both state and federal inspectors, and the passage of more stringent mine safety laws, both fatal and nonfatal accidents have greatly decreased.

VIII. MINING CAMPS OF THE PAST

During the years when coal mining was a thriving Iowa industry, mining camps dotted the landscape of central and southern Iowa. Bleak and dismal in their outward appearance, these short-lived communities stretched from Wapello and Mahaska counties in southeastern Iowa upward to Dallas and Boone counties in the central region of the state.

A company town, showing the miners' houses located adjacent to the headhouse of the mine.

Mining camps were not regarded as permanent settlements because of the uncertainty of the coal supply. When the coal had dwindled the mine was abandoned and the operation usually moved on to another site. The average life of a coal camp in Iowa in the early 1900s was about 8 years. Yet, during the life of the mine, housing had to be provided for the miners and their families. Throughout southern and central Iowa, names like Happy Hollow, Kirksville, Carbonada, Pekay, Lost Creek, and Buxton are a few of the almost forgotten and vanished settlements which hundreds of people once called home.

Most mining settlements were company towns, which meant that the mining companies built the houses, the schools, the community halls, and most of the stores. The houses were four- or five-room, one-story dwellings. Because of the mines' impermanence, most homes were without foundations and poorly finished, both inside and out. Often the structures were nestled so close together that there was little yard space for the children to play or for the family to raise a garden. Most camps did not have electricity, water works, or sewage systems, so sanitary facilities did not exist and the water system sometimes became contaminated.

Also located in the camp were the company store, a community hall, and usually a school. In some settlements, the community hall was utilized for educational purposes as well as social functions. The company store offered the miners everything they needed, but often at inflated prices. Many companies expected their employees to trade at the company store and it usually intensified the miners' belief that they were being exploited. Many miners found themselves in debt, year after year, and it led to a familiar expression that the miners "owed their soul to the company store." Running through the center of town was the indispensable railroad.

Education for the young people was strictly limited, as teachers, underpaid and inconvenienced by the primitive living conditions, were hard to retain. There was little opportunity for miners' children to pursue a high school education, and most boys—some as young as 12—

A view of Buxton, Iowa, in the early 20th century.

went to work in the mines as their fathers had done before them. The girls, once finished with grade school, were needed at home to help care for the many younger children and to help with the endless household chores.

Because of their temporary economic base, most mining communities were never incorporated. Without this process and the subsequent legal structure, there were no town officials to formulate and enforce laws. Many mining sites were notorious for the gambling, drinking, and fighting that took place.

Of all the mining communities in Iowa's history, however, the most colorful and unusual was Buxton. Founded in the early 1900s by the Chicago and North Western Railroad, Buxton's population grew rapidly, and at its peak, company officials could boast of 9,000 people.

An unusual feature of Buxton was its large black population. The Consolidated Coal Company had imported many black laborers from southern states to work the coal mines. Lacking any knowledge of coal mining, the blacks were paid $20 a week plus their board until they learned the trade. As additional mines were opened, more southern blacks moved northward to Buxton, and eventually the population of the community was about half black and

half white. During its prosperous period, Buxton also had many black professional men—doctors, lawyers, teachers, ministers, pharmacists, and businessmen.

The homes built in Buxton were described as "comfortable, frame houses" with five or six rooms, located on one-fourth acre lots. Three grade schools were maintained, and 10 years after its founding, Buxton opened a high school. The community continued to flourish, and during World War I Buxton miners were earning the extraordinary salary of $10 per day.

Like so many of the other mining camps, however, Buxton's days were numbered. Just two decades after its inception, the mines began to shut down and by 1927 the last mine—No. 19—was abandoned. With the collapse of the community's economic base, the other businesses began to close their doors. The miners' homes were eventually sold for $50 each, and today there is little trace of Buxton's exciting, important past.

When the mines around Buxton closed down, many blacks moved to Des Moines and found other employment. Many of the children and grandchildren of the original black Buxton miners continue to live in Des Moines, and they remember the community as a utopia for their people in the early 1900s. Equal wages and integrated, adequate housing made Buxton a good place to live.

IX. OTTUMWA'S COAL PALACE

Of all the features of Iowa's coal mining history, perhaps the most spectacular was the Ottumwa Coal Palace. Built in 1890 to advertise the coal resources of south central Iowa, the project was part of a statewide movement to advertise regional specialties. By the late 1800s much agricultural experimentation had taken place in the Hawkeye State, and farmers throughout the state had

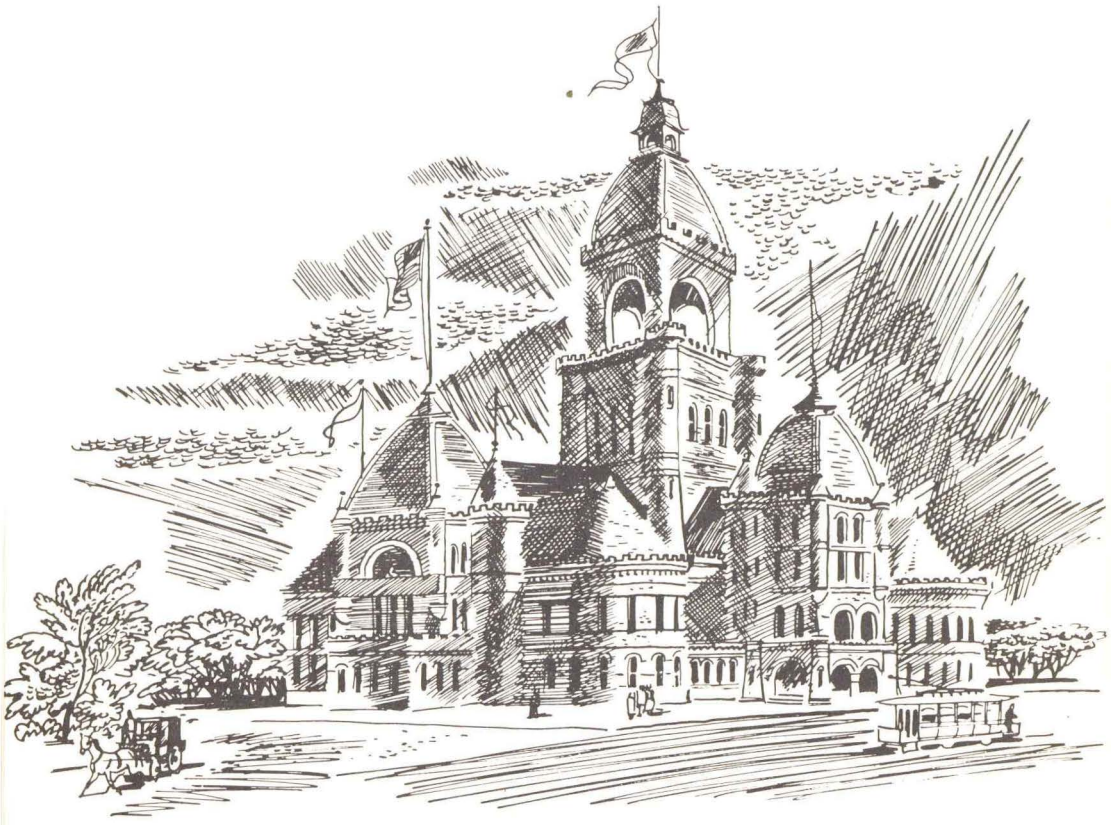


Fig. 9. Coal Palace at Ottumwa. (Courtesy of James C. Taylor)

learned which crops grew best in their particular localities. Local agrarians and business boosters, eager to tell the world about their specialties, concentrated on ways to advertise their region's products.

In 1887, the citizens of Sioux City hit upon a most novel way to advertise their specialty of corn when they decided to build a corn palace! Constructing a huge building, they decorated it entirely with corn and other grains. A week-long festival was held which, along with the palace itself, attracted hundreds of visitors to the city. Sioux Citians, jubilant over their success, held corn palace festivals again in 1888, 1889, 1890, and 1891. Other communities,

influenced by the success of Sioux City's venture, decided to put their region on the map; Creston citizens built a bluegrass palace, Forest City residents constructed a flax palace, and residents of another community even talked of building an onion palace!

Influenced by these novel but successful ventures, the citizens of several southern Iowa coal communities decided that they should hold an exposition that would advertise the coal resources of southern Iowa. The main promoter was Peter Ballingall, a Scotch immigrant who had come to Ottumwa in 1859 and had become a prominent business and civic leader.

The Coal Palace was erected in 1890 at a cost of approximately $30,000. Described by the local press as "a compromise between the Gothic and the Byzantine, the loftiness and the cathedral-like windows hinting at the former and bulbous turrets suggesting the latter," the structure was completely veneered with blocks of coal. It measured 230 feet long, 130 wide, and contained a central 200-foot tower surrounded by four large rectangular pillars, each resembling solid columns of coal.

The interior of the palace provided a bright, colorful contrast to the building's dark, somber exterior. Workmen had decorated the interior with wheat, cornstalks, sorghum, and cattails, and with these materials had produced colorful figures and displays. Decorating one wall was the portrait of a famous Indian leader, Chief Wapello, done in corn and bedecked with strings of red haw beads. A 30-foot waterfall adorned another portion of the interior. The palace even featured a reconstructed but fully functioning coal mine located beneath the lofty edifice.

A week-long celebration was held which featured political speeches and parades and of course highlighted the Coal Palace as the main attraction. The affair was deemed a huge success, and local officials loudly proclaimed that there should be another festival the following year. After the 1891 event, however, the practice was never revived. The Coal Palace had perhaps fulfilled its founders' initial purpose, but more significantly, the major promoter, Peter Ballingall, had died in 1891.

X. STUDENT ACTIVITIES

The following is a list of activities that you might find useful if you wish to develop further the material presented in the film and the guide.

1. To better present and explain different aspects of the coal mining process to your class, the illustrations could be made into transparencies. When projected it would then be easier to illustrate and discuss such subjects as the carbide lamp, the cross-section of a coal seam and the development of different methods of mining. Another way of illustrating the material would be to use an opaque projector and simply project the picture itself onto the screen.

2. You will note the map of Iowa which indicates the present coal mines and their type (figure 3). You could relate the opening of some mines to other historic events in the state so students could better understand the relationship between events. The dates and events listed below could also be presented in pictures and words on a time line. It might be desirable to incorporate the material on Iowa and Iowa coal mines with events in American history; these could also be included in a time line project. Students could be responsible for finding or sketching the pictures and writing the event summaries.

   1673 The first coal was discovered in the bordering area of Illinois. This was the year that Marquette and Joliet traveled down the Mississippi River and visited the region called Iowa. They were the first white men to visit Iowa.

   1788 Julien Dubuque received permission from the Fox Indians to work the lead mines near what is now Dubuque. This developed into an important industry in early-day Iowa.

   1840 The first Iowa coal mine was established at Farmington in Van Buren County in southeastern Iowa. White settlers began moving into Iowa in large numbers in 1833 when the Black Hawk Purchase was opened for settlement. By 1840, many pioneers had built homes and were farming land in the eastern one-third of Iowa. The Des Moines River runs through Van Buren County, so it was a natural spot for early settlement and mining development.

   1840 The federal government built Fort Atkinson to protect the Winnebago Indians from the Sioux and Sac and Fox Indians.

   1847 Dutch families established the town of Pella. They brought many of their old customs and traditions from the Netherlands.

   1857 Des Moines became the capital of Iowa.

   1864 Coal mines were developed around Des Moines to supply coal to railroads being built through central Iowa.

   1870 All four major railroads completed their lines across Iowa and reached the Missouri River. This created a huge demand for Iowa coal.

   1876 Whitebreast Coal and Mining Company organized near Lucas, the birthplace of John L. Lewis.

3. After watching the film, students might like to build their own coal mine. The following suggestions might be helpful:

   A. Soil, sand, and gravel could be used to duplicate the different strata that would be evident in the side view of a coal mine. See figures 2 and 5.

   B. Pencils could be used for props; popsicle sticks would make effective cribs, and small stones the packwall. A realistic mine face might be produced with modeling clay.

   C. Miners and cars could be fashioned from modeling clay and cardboard, or students might have small plastic figures that could be used.

4. An alternate method for constructing just the cross-section of a mine and one that could be done by each individual student would be the following: Taking a quart jar, use materials such as sawdust, dirt, sand and fine gravel and by alternating these materials, create the layers of rock and material that would reflect a cross-section of a coal seam and the type of layers found above and below it. (See figure 2.) This would provide the background for a discussion related to earth science as well as Iowa history.

5. Considering the information you have about the formation of coal, and knowing what physical and geographical conditions are necessary, are there any parts of the world where coal could form or may be forming at the present time? What elements would be necessary? How much time would it take to form coal beds approximately 5 feet thick?

6. Prepare a written description of anthracite coal mining. What are the main methods used, and how do they differ from the processes used in mining bituminous coal? Why is anthracite coal found in so few locations?

7. Plan a musical session around the songs written and sung by the bituminous coal miners. One very appropriate song is "Sixteen Ton," made famous by Tennessee Ernie Ford. The song refers to the hard, backbreaking work and the miners owing their souls to the company store. Besides singing, the students can think about the words and what they tell us about the miners' lives, their problems, and their attitudes toward their work. Also see Korson, *Coal Dust on the Fiddle,* listed in the bibliography.

8. Every county in Iowa has some form of mining. What minerals are located in your county, and what type of mining is now being done? Locate the sites and write a brief description of the mining processes. Perhaps one of the men working in the mine could be interviewed and tell about his world of work. This could be recorded on a cassette and then played for the entire class. Possibly students could take pictures of the mine and also share these with their classmates.

9. If the students want to know more about other types of mining, they could write to the following groups for materials: The Iowa Limestone Producers Association, P.O. Box 6, East Des Moines Station, Des Moines, Iowa 50309; U.S. Gypsum, Fort Dodge, Iowa; and the Iowa Development Commission, Jewett Bldg., Des Moines, Iowa. One or two students could present materials on limestone and gypsum mining to the class, and perhaps discussions could be framed around the similarities and contrasts of the different kinds of mining.

10. Students might like to assemble a display of coal mining tools and equipment. If these are not available, a committee of two or three students could make a poster showing pictures of a miner's bucket, helmet, and carbide lamp.

11. Several students could prepare pictures of coal-burning train locomotives. Other students might wish to prepare pictures of steamboats, steam engine tractors, or any other steam-powered device that utilized coal as a fuel. Perhaps one of the students might have a relative or friend who has a steam engine hobby and would be willing to speak to the class.

12. Students might enjoy assembling a display of minerals that relate to the mining activities in Iowa. Pieces of coal, gypsum, limestone, and gravel could be included, as well as materials like shale that are located close to coal deposits. These could be put out where the students could examine them and compare qualities such as size, color, texture, and weight. The display should stimulate discussion about uses of the different materials such as the use of gypsum in making wallboard and the utilization of limestone in cement.

13. For students particularly interested in the social aspects of early mining days, suggest that they look for information (through fictional works and general reference works) on the life of children who lived in mining camps and went to work in the mines at the age of 12. If this material is unavailable, an alternative assignment would be for the students to write a story about the life of 12-year-old boys or girls who lived in the early-day coal camps, based on their general knowledge of the subject and their viewing of the film. The students could compare these activities with their own present-day life style.

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Some of the following questions could serve to initiate discussions and research projects in junior and senior high school classes in social studies:

1. Some form of mining is going on in every county in Iowa. What direct economic effect does this have on operations like roadbuilding and the building trades that are being carried on in every county? What over-all economic benefits does this provide for the whole state?

2. In more recent years, what economic effects have the mining operations had on the state and its many activities? (Some considerations would be general employment, industrial development, road construction, and the relationship of mining industries to other industries.) What specific economic effects have there been in southern Iowa counties like Marion, Lucas, and Mahaska, for example?

3. What are the minerals used for? What subsequent finished products are produced as a result of Iowa's mining industry? Are Iowa's minerals used primarily in the state or are they exported? As raw materials or as finished products?

4. Today there is a controversy over environmental pollution, but at the same time it appears that we may have a major crisis in our fuel supply. With approximately 21 billion tons of coal resources beneath our state, what factors enter into further exploitation of our coal reserves consistent with our concern for preventing pollution? What work is being done to "clean up" Iowa coal? Whose responsibility should it be to carry on such development work?

5. Many small towns that were once thriving mining communities are today shrinking, economically depressed communities. What types of assistance, from what sources, could be brought to bear on this problem? What can be done to retrain miners and make use of their skills in other areas?

6. If we study the literature of our state we find many books and poems written about state topics: Hamlin Garland on prairie living, Herbert Quick on pioneer life, Meredith Willson on Mason (River) City, and MacKinlay Kantor on the Spirit Lake Massacre. One area which seems to have been neglected, however, is coal mining. Write your own short story or poem dealing with the miners' life style and world of work. Why do you think mining has been so neglected in the literature of Iowa?

7. A major health problem of coal miners has been black lung disease. What kind of disease is it, and what kind of therapy can be applied for it? What has been the role of the mine union in aiding or minimizing the effects of this disease? To what extent has the federal government exhibited concern about black lung?

XI. ANNOTATED BIBLIOGRAPHY AND RESOURCE MATERIALS

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Films and Recordings

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