COAL

MONTANA'S PROSAIC TREASURE

by
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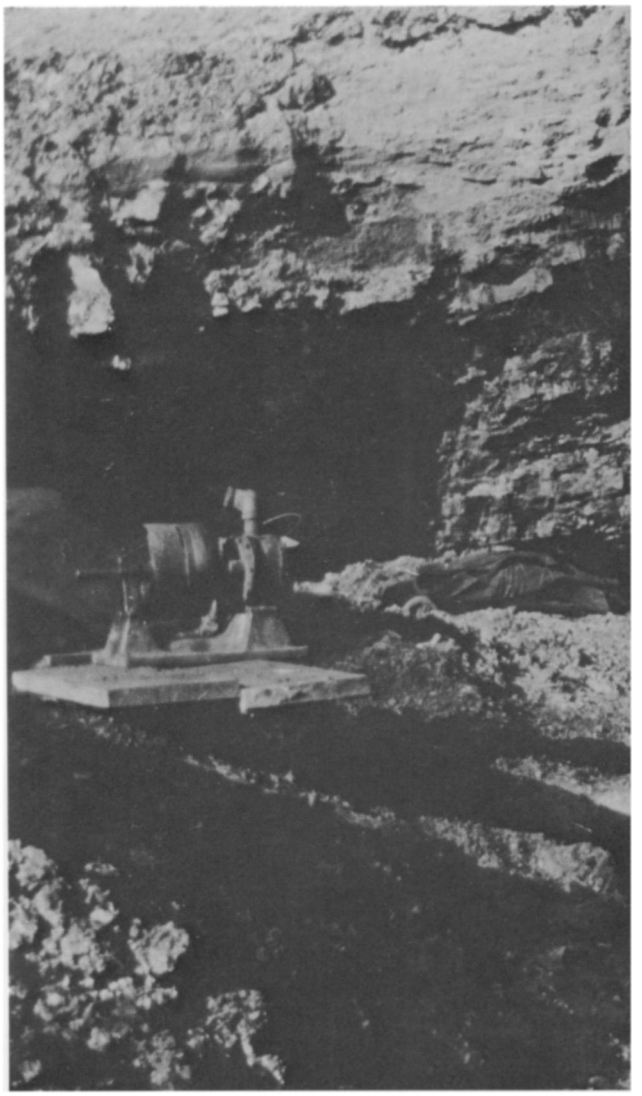


Amid the glamour of the gold rushes and the capers of the Copper Kings, a mundane mineral substance — coal — has plodded its way through the pages of Montana history. Dirty and prosaic, coal is largely ignored in discussions of Montana's mining past. Yet it is a fuel, and fuels were vital to the survival of settlers and for development of industries and transportation networks. In truth, coal qualifies as Montana's "black gold," not only for its contribution to her past, but for its potential as a major future source of energy. It qualifies as well as a source for an ecological confrontation, the results of which may not be fully assessed for decades to come.

Until recently, the history of coal mining in Montana was thought to be just that — history. Used in small amounts for domestic heating and power production by the early white settlers, it became the favored fuel as railroads began to spread their networks westward in the 1880's. Coal fueled

locomotive boilers, and, largely in the form of coke, began to supply the metal smelters being established at such towns as Butte, East Helena, Anaconda, Wickes, and Great Falls. Metal smelting came into its own once the railroads linked metal mines, smelters, and eastern markets. Thus the railroads were the key to the entire development.

Such towns as Roundup and Red Lodge owe their major growth to coal mining. Smaller communities, such as Cokedale, Storrs, Chestnut, Chimney Rock, Timberline, Belt, Stockett, Sand Coulee, Bearcreek, Washoe, Klein, Aldridge, Electric, and Colstrip developed as coal mining camps. Although some survive, others are all but deserted now. Their fallen timbers and abandoned trestles and tracks and "glory holes" have much the same aspect as the gold-mining ghost towns of Montana. But, like the product that gave them substance, they do not have the glamour of gold.

Growth, Decline, Rejuvenation

By 1960, about 180 million tons of coal had been produced in Montana, but annual output had declined to around 300,000 tons. Coal mining could have been labeled as a once-robust but dying industry. The chart published on the next page shows graphically the sharp decline in production following the peak of World War II as traditional markets were increasingly served by petroleum and natural gas. However, a second glance shows a startling rejuvenation of coal mining in the last few years. In 1971, one mine alone — at Colstrip — produced 5.1 million tons of coal, exceeding the entire statewide production for the previous peak year of 1944! Statewide output for 1972 runs off the graph. By 1975, over 20 million tons may be produced annually.

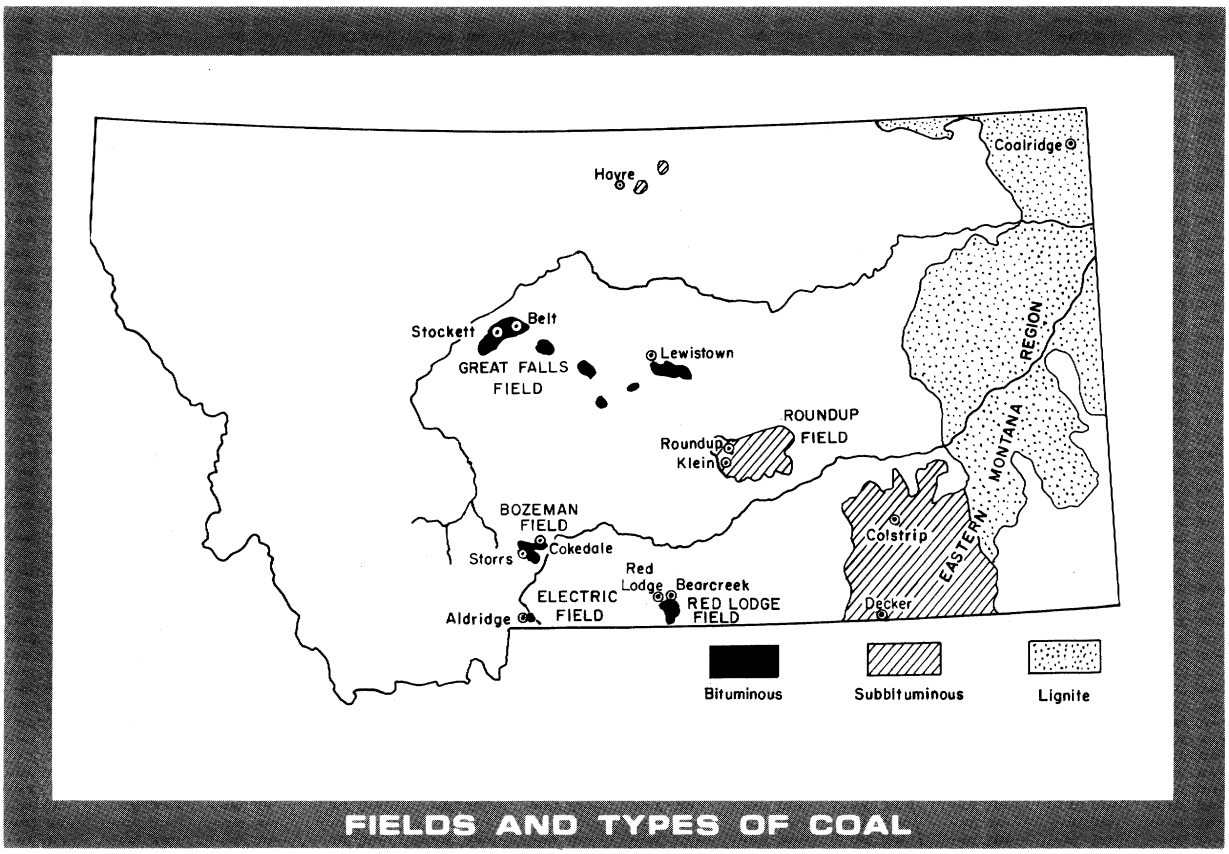
Thus, one might characterize Montana coal mining as a history of growth, maturity, stagnation, decline, vigorous rejuvenation, and now, ecological struggle.

A closer look at the graph on the opposite page shows that various individual mining communities or coal fields went through their own cycles. Production rose, peaked, and declined, in general, consecutively later in time in the Bozeman, Great Falls, Red Lodge, and Roundup fields. The coal towns in these districts likewise boomed, stagnated, and declined or were abandoned. Recent rejuvenation is due entirely to activities in the Eastern Montana region.

In a particular district, mining activity may have declined because of depletion of easily mined coal and discovery of better quality or more easily extractable coal elsewhere. For example, the Bozeman field faded in importance as the Red Lodge deposits were developed in the 1900's and 1910's; activities in the Red Lodge field, in turn, gave way to strip mining in the Colstrip area in the 1920's.

Overall, Montana coal production declined in the periods 1920-1940 and 1945-1960 because of (1) increased substitution of oil for coal as railroad locomotive fuel, first in oil-burning steam locomotives and later in diesel-electric engines; (2) increased substitution of natural gas and oil for coal in domestic heating and as industrial fuel, especially stimulated by the development of oil production and refining in Montana, and (3) changes which reduced coke requirements in metal smelting, and conversion of some smelters to gas fuel. Offsetting these factors has been the increased use of coal as fuel for steam-electric generating plants, but until recent years the extensive development of hydroelectric power in Montana kept the need for coal-fired plants to a minimum.

Employment in coal mining decreased even more sharply than tonnage output because of improved methods of production. Montana's underground mines produced in the range of 5 to 10 tons per man-shift; conversion to strip mining has raised this



FIELDS AND TYPES OF COAL

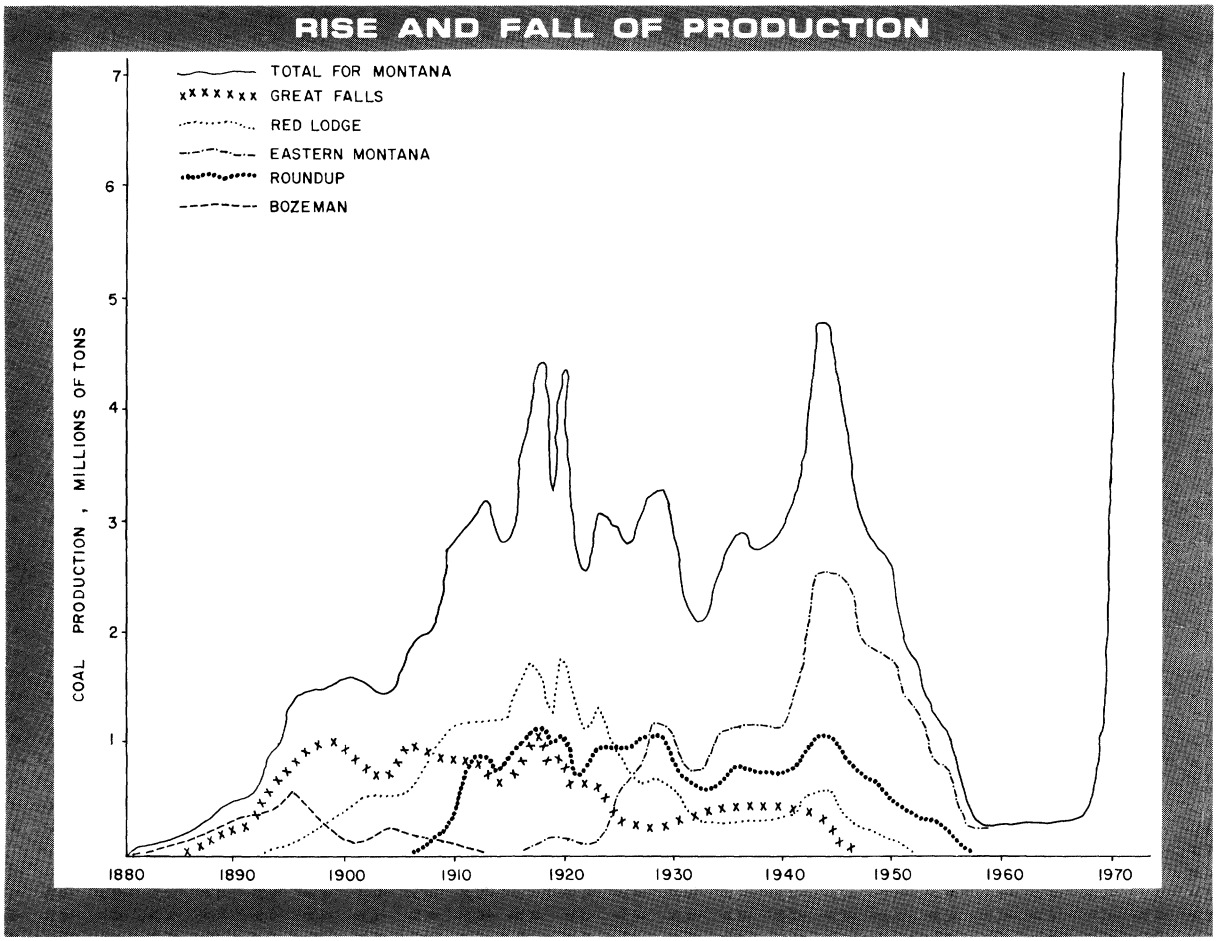


figure to 100 tons or better. For example, in 1972 the Western Energy Company mine at Colstrip employed 150 men to produce 5.5 million tons. Compare this to a peak year in the Red Lodge district, 1917, when 1800 miners produced about one-third of this tonnage. It is an understatement to say that coal mining towns have had rough times meeting changing conditions.

Historically, coal mining has shifted from Western to Eastern Montana, from underground to surface mining, from bituminous coal utilization to sub-bituminous and lignite, from locomotive and smelter fuel markets to thermal generation of electric power.

Geology of Montana Coal

The interrelationships between these factors can be better understood if one considers the geologic origin of coal. During geologic times, particularly about 60 million years ago, the climate in Montana was just right for the growth of luxuriant vegetation in vast swampy areas, largely coastal, perhaps comparable to Florida's Everglades of today. As the vegetation died, it was preserved from decay in the waters, and thick masses of partly decomposed plant matter accumulated. Periodic floods of water from encroaching seas or from rivers emptying into the swamps covered the peaty layers with mud and sand. Over a long time, the plant matter became buried so deeply that heat and pressure began driving off the more volatile constituents, compressed the remaining matter, and converted it gradually to increasingly higher ranks of coal through the stages of peat and lignite.

These processes were not uniform across Montana, because a vast crustal disturbance buckled up strata of rock and interlayered coal beds to form the Rocky Mountains. This deformation was minor in Eastern Montana but increased in intensity westward. The rank of coal was increasingly raised by the crustal heating, folding, fracturing, and squeezing, from lignite in the east and northeast through sub-bituminous to bituminous rank in Central to Western Montana. Higher ranks of coal mean higher heating value, or "BTU content," since deformation gradually drives off volatile matter and increases the carbon content.

The coal in Central to Western Montana thus would seem most desirable because of high heating value. However, the same crustal deformation folded and fractured this coal so that in many places seams dip steeply into the ground; from the outcroppings, overburden rapidly increases and becomes too thick for surface mining. Thus most Montana bituminous coal requires underground mining. The sub-bituminous and lignite further east, though

of lower heating value per pound, could be extracted by the much cheaper and safer surface mining technique because the strata lie horizontally and, in many places, near the surface.

In earlier days, labor costs were less crucial and giant mining machines were not yet in use; hence underground mining was economically feasible. This is not true today in much of Montana. Furthermore, former uses of coal, principally as locomotive and smelter fuel, strongly favored bituminous rank — in fact, only bituminous coal could be coked. Conversely, electric power generating plants can easily burn finely ground lignite or sub-bituminous. Overall cost per BTU unit of heat content is the overriding consideration. Lignite is economically burned in a power plant at Sidney, since it is strip mined and transported from nearby Savage.

Thus, understanding the trends of Montana's coal mining history requires knowledge of the interrelationships between geology, engineering, and economics. As electric power generation became the dominant use of coal, and as labor costs rose, the shift to easily mined, undeformed — though low rank — coal of Eastern Montana was only logical.

There is another geologic quirk, also critical, which characterizes Montana coal. The state's subbituminous and lignite coals contain relatively little sulfur, having a low amount of the iron sulfide mineral, pyrite. Recent trends point in the direction of protection of the environment, and this has resulted in greater restrictions on emission of sulfurous gases from power plant stacks. Thus, the rapid rise in Montana coal production in 1968-1973 was due to the increased demand for low-sulfur coal by midwestern electric utilities.

Although one can only speculate about the role of coal in Montana's future, it is possible to examine in some detail its significance to Montana's past and the resulting effect on mining communities. Such an examination forms the theme of the rest of this paper.

Lewis and Clark, in their journals, referred to "Straters of Coal" along the banks of the Missouri and Yellowstone Rivers. These occurred "in Several vaines of different hights and thickness," according to Clark's observations along the lower Yellowstone near Forsyth during his return trip downriver in 1806.

The next year, a little coal was taken to supply Manuel Lisa's trading post at the mouth of the Bighorn River. As river traffic increased in succeeding years, some coal-fueled steamboats plyed the Missouri. Most of the riverbank coal was of poor quality, however.

When the gold rushes of the 1860's brought hordes of prospectors to Montana, demand for coal for heating purposes suddenly increased. Coal was shipped into Fort Benton in increasing quantities. Small deposits were opened near Bannack, Argenta, and Virginia City to supply metal mining camps in these western areas.

The Bozeman Field

It was near Bozeman that Colonel James D. Chesnut developed Montana's first major coal operation. A confirmed optimist, Chesnut visualized a glowing future for Montana coal. His first mine was established near Bozeman Pass in the mountains east of town and supplied coal to the garrison at Fort Ellis beginning in the winter of 1867-1868. The coal, priced around $9.00 per ton delivered, met grudging acceptance at first by Bozemanites, most of whom continued to use wood. As wood supplies diminished, this attitude changed, and the Colonel's optimistic judgments began to be confirmed.

Meanwhile, railroads were edging westward. Railroad and federal government personnel conducted statewide surveys for coal supplies to fuel the steam locomotives. In 1882, the Northern Pacific Railroad built across Bozeman Pass and leased Chesnut's mine. Railroad requirements also stimulated mining in the nearby Timberline district. The camp of Timberline, perched on the divide near Bozeman Pass, was a spirited community complete with a town band. The band members donned smart white uniforms with gold braid and played for festive occasions around the state.

The coal from the Timberline mines found markets as far away as Moorhead, Minnesota. In 1886, new management instituted economies in the operations which included a pay cut for the men and higher prices at the store. Obviously, this did not please the miners, and as unrest developed, Pinkerton detectives in the guise of newly-hired miners infiltrated the ranks. The result was a strike which began in July, 1886, and lasted almost a year. Such a lengthy strike was unusual in those days, and it attracted national attention. Although feelings ran high, little violence resulted.

As the rail network expanded into Montana, metal miners designed smelters to roast their ores and permit shipment of high-grade metal to eastern markets. Smelters needed coal and coke for fuel. The Bozeman coal was bituminous and of coking quality, thus much better suited for metallurgical uses than the lignitic deposits located along the rail line near Miles City. Both Bozeman and Livingston, on opposite sides of the coal field, benefited from the expanded coal shipments to smelters in Western Montana.

Several small mining camps sprang up along Trail Creek and near Bozeman Pass: Chestnut, Storrs, Chimney Rock, Hoffman, Timberline, and Cokedale. These communities are now ghost towns with a few ranch buildings or deserted cabins and foundations. Storrs, built by the Anaconda Company, was a modern community with electric lights, water mains, 65 dwellings, a dance hall, and a baseball diamond. Today, only a few foundations remain.

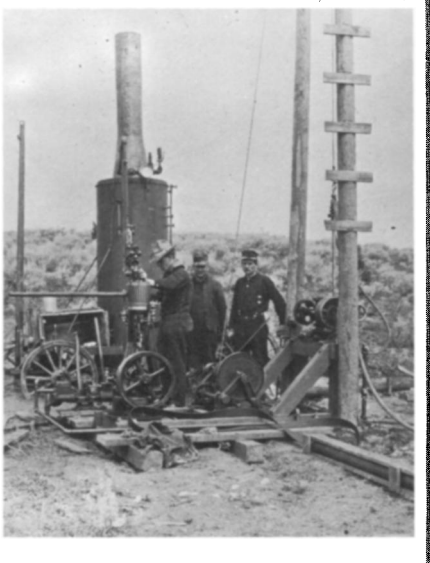
The coal boom peaked in the 1890's — 600,000 tons of coal worth $1.3 million were extracted in 1895. Coke was in great demand for smelters at Anaconda, Butte, and East Helena, and was supplied

ACTIVITY AND DECAY IN THE BOZEMAN FIELD

COKEDALE, MONTANA, 1890

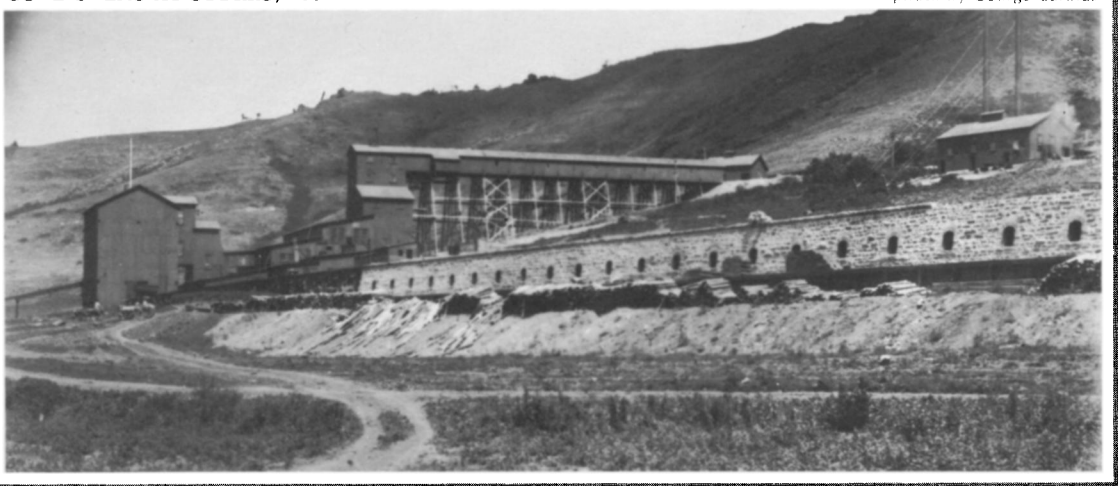
courtesy Bert Ruse

A few rotting timbers are all that remain of ALDRIDGE, a high mountain coal town which boasted some 800 residents when the elaborate bunker washing installation at left was in business, coal from the Foster Mine coming by aerial tram for processing. Coal in this area, close to the boundary of Yellowstone Park, was found in pockets, detected by the use (right) of diamond drill rigs.



COKE OVENS AT STORRS, 1902

photo by George Carolus



HOME DELIVERY AND THE GREAT FALLS FIELD

Al Lucke Collection

courtesy John Ross

Householders in Havre and Great Falls were served by wagon and truck coal deliveries, as seen in these two graphic photographs. Above, Neil Phillips drove his four-horse coal wagon in front of the H. Earl Clack store in 1912, while, at the right, the pioneer Graham & Ross fuel and feed firm in Great Falls used a motor truck, a team of horses standing ready for other uses in the left background.

STOCKETT, CASCADE COUNTY, MONTANA

Mont. Dept. of Agriculture

by 115 coke ovens at Cokedale. A smaller bank of ovens was constructed at Storrs.

Meanwhile, in the same geological formations, coal was discovered in the upper Yellowstone Valley north of Yellowstone National Park. The mining camp of Aldridge mushroomed, reaching an estimated population of 800, including many Austrians, Italians, and Welsh. The steep mountainside topography necessitated construction of an aerial tramway by which the coal descended and was fed into the maws of 125 coke ovens at Electric (originally called Horr) in the Yellowstone Valley. Nearly all the coal was coked and shipped to Butte and Anaconda.

After the turn of the century, both the Bozeman and Electric fields declined rapidly because (1) the best and most accessible coal was depleted; (2) improvements in copper smelting techniques reduced the coke requirements, and (3) technological developments favored coal mining further east in Montana and coal and coke shipments from high grade deposits in Wyoming and Utah.

By World War I, coal output in Gallatin and Park Counties had shrunk to a trickle, and it has been negligible since. But during their brief reign in the sun, these now largely forgotten fields produced about $10 million worth of coal and contributed significantly to Montana's early industrial development.

The Great Falls Field

Even as the Bozeman field expanded, coal mining sprang to life elsewhere in Montana. In 1877, John K. Castner, a transplanted Pennsylvanian who knew coal when he saw it, filed claims on bituminous coal-bearing lands at Belt. His mule teams hauled the coal to Fort Benton for steamboat and domestic consumption. Castner built several experimental coke ovens and exhibited his product. The Anaconda Company became interested and purchased lands from Castner. About the same time, coal prospects were located and developed at nearby Sand Coulee.

To take advantage of the area's abundant coal and water power, Jim Hill extended his St. Paul, Minneapolis, and Manitoba Railroad (later to become The Great Northern) to Paris Gibson's new town of Great Falls in 1887, laying rail all the way from Minot, North Dakota in one season. Coal mining for railroad use was stimulated, and production expanded even more rapidly after the opening of Anaconda's copper smelter and refinery at Great Falls in 1892. Coal also found domestic use in the city and for the manufacture of coal gas. In the 1890's, Belt boomed to a population of over 1,000, mostly employees of the Anaconda Company, and a hundred coke ovens were built. Because the benches of coking coal could not be economically separated from the non-coking coal, however, the ovens were shut down.

Nearby coal deposits fostered the growth of Stockett and Sand Coulee. By 1893, Cascade County led the state in coal output. But the boom did not last. After 1920, production dropped drastically as the furnaces of the Anaconda Reduction Works no longer needed coke or coal, since natural gas replaced coal gas for domestic uses, and oil-burning steam locomotives attained wide use on the Great Northern lines. Belt and Sand Coulee then "had only memories of the days when night was like day, the saloons were filled with miners relaxing after their hard day's work in the pits, and nobody looked ahead much farther than the next payday."[1]

The Great Falls coal-bearing region extends toward Lewistown, and some coal was mined near the latter community for locomotive fuel and domestic heating. Because of the lack of major industry there, however, output totaled only a fraction of that from the Belt-Stockett-Sand Coulee area. In the 1885-1955 period, the Great Falls-Lewistown region produced about 36 million tons of coal.

At Havre, small quantities of coal were dug and brought to town by wagon. Seams in this area are widespread but thin, and since the coal is below bituminous rank, it was used mainly for domestic purposes.

The Red Lodge Field

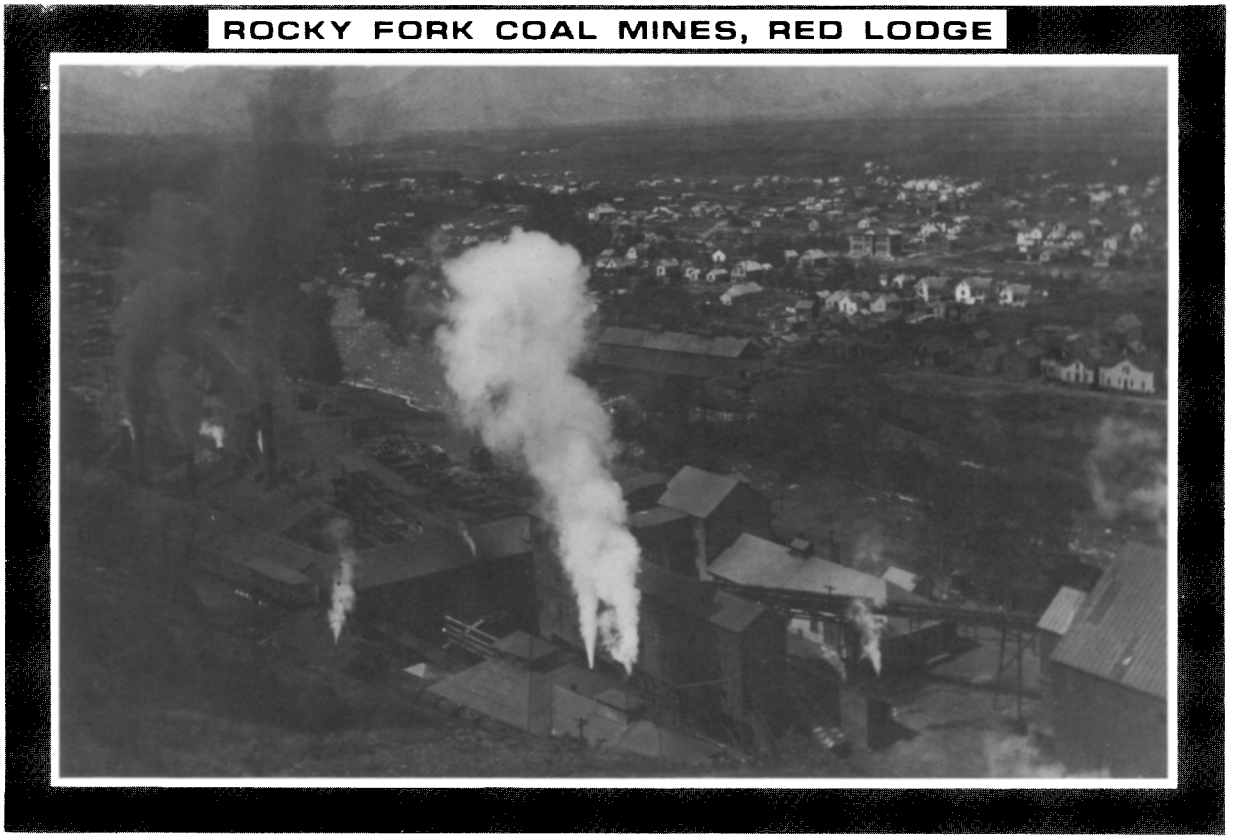
The coal mining scene began to shift markedly toward the Red Lodge area by the turn of the century. Although coal was taken in small amounts in the early 1880's, major activity awaited the extension of railroads into the area. Walter Cooper, Bozeman entrepreneur and founder of the town of Red Lodge, bought control of the coal fields at Rocky Fork in 1884, and proceeded to develop the extensive deposits. Completion of a Northern Pacific branch line into Red Lodge in 1889 was followed by a large influx of settlers and mine workers.

The Northwestern Improvement Company, a subsidiary of the Northern Pacific, commenced mining in 1898, gaining control of the Rocky Fork Coal Company. In twelve years the population of Red Lodge rose to 4,800. The mines supplied the Northern Pacific locomotives with boiler fuel, smelters at Butte and Anaconda, and a domestic trade in the Red Lodge - Billings area. Generally of higher quality and more easily extracted than the Bozeman-Trail Creek coal, the Red Lodge product found markets from Bismarck, North Dakota to the Idaho-Washington line.

Exploration for coal was directed along a trend of outcrop from Joliet to Bridger. Coalville, a company town, was built to serve a mine just west of Fromberg. It was later abandoned, reportedly because of transfer of coal company interests to better deposits in Wyoming.

Across the bench from Red Lodge, coal beds cropped out in the Bearcreek area and mines opened there in 1900. The coal had to be hauled about four miles over a very hilly road to Red Lodge, thus pricing it considerably above the Red Lodge product. In 1906 the Yellowstone Park Railroad completed a

[1] *Great Falls Tribune*, Diamond Jubilee issue, Nov. 11, 1959, p. 14.



line up the Clark's Fork valley from Bridger to the Bearcreek mines, allowing direct rail shipment. S. A. Hall, who built the line, hoped to extend it on to Cooke City, build a smelter at Belfry, and smelt the Cooke City metallic ores with Bearcreek coal. These grandiose plans, however, came to naught. The line was never extended to Cooke City.

The Bearcreek field reached its peak from 1917 to the early 1920's. Reportedly the Bearcreek-Washoe community was a typical "frontier days" mining camp, complete with knee-deep mud, gambling halls, saloons, and rough characters. The high hills between Red Lodge and Bearcreek prevented direct rail connection and gave the latter camp its own individual flavor.

In those days, Red Lodge had a large foreign-born population, including Finns, Welsh, Hungarians, Italians, Austrians, Slavs, Swedes, Norwegians, Russians, and others. During World War I, differences in national origin and political beliefs came to the fore. In 1917, a large rally of Finnish-born patriots resolved that "to the liberty-loving Finnish people, the teachings of autocracy, pro-Germanism, and I.W.W.'ism, and all other disloyal isms, are distasteful and must not blot our race with shame again."[2]

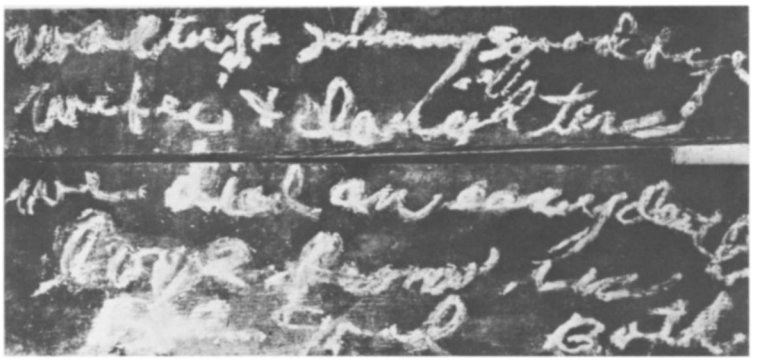
By the early 1920's, labor costs were rising, labor was restive as evidenced by a long strike in 1922, and the Northwestern Improvement Company decided to open a surface mine in Southeastern Montana south of Forsyth. Production began in 1924. Within a year the large shovels there were furnishing about three-fourths of the railroad's requirements, and coal from the company's Red Lodge operations was thrown onto the commercial market. The market evidently could not absorb all this coal, and in 1926 Red Lodge was jolted when the West Side Mine closed. Workers were absorbed by other mines, but six years later the East Side mine closed. Production declined through the 1930's as oil and gas increasingly replaced coal for many uses and as the remaining markets depended more heavily on surface mined coal. A revival of the industry during World War II was interrupted by a major mine tragedy.

The Mine Disasters

Actually Red Lodge had been the site of two earlier serious coal mine accidents. On June 5, 1906, fire broke out from spontaneous combustion in the Northwestern Improvement Company's East Side mine. The men attempted to fight it but were driven back by poisonous gases. Two days later, a crew went in, thinking that the fire was out. Noxious fumes were still present, however, and eight men, including two from a rescue party, died from the dread "white damp" with little forewarning.

[2] *Red Lodge Picket*, Dec. 21, 1917.

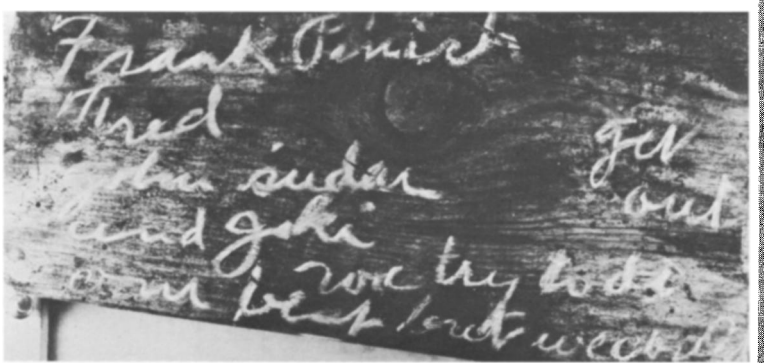
THE SMITH MINE DISASTER



"Good bye wife and daughters, we died an easy death," is part of this tortured message, written in chalk on the walls of the Smith Mine in which more than 70 miners died in an explosion in 1943.

UNDERGROUND IN THE SMITH MINE, WASHOE- BEARCREEK FIELD

Several miners trapped in the Smith Mine signed their names to messages to loved ones, scrawling a note which said, in part, "We try to do our best but we couldn't get out . . ."



Another fire broke out in the same mine on November 20, 1908, killing nine men. About 800 men were underground at the time. An underground fire had smoldered for years in walled-off adjacent workings, and it was first thought that this fire had broken through the barrier. It turned out, however, that the fire started from a miner's lamp.

The worst coal mine disaster in Montana history, however, took place during the World War II crush to maximize coal output. The No. 3 Smith Mine of the Montana Coal and Iron Company at Washoe had been known for years as a "gassy" mine. Gas underground had been reported almost daily for over a year prior to the tragedy. In those days, mine safety precautions were rather loose: open-flame miners' lamps were in use, and smoking underground was common.

About 9:30 A.M. on Saturday, February 27, 1943, a tremendous explosion shook the Smith mine. The first indication of tragedy was a phone call to the surface reporting a "tremendous wind" within the mine workings. Further attempts to contact the men underground were fruitless. Fearing disaster, rescue workers entered the mine and found smoke, fumes, and shattered equipment. Three men were found overcome but still alive and were rushed to the surface. They became the only survivors out of 77 men who had been in the mine that morning.

Rescue operations were aided by medical personnel and miners rushed from Billings, Roundup, Butte, Red Lodge and other communities. When the mine was finally ventilated and systematically combed, the dimensions of the tragedy became apparent. Thirty men had been killed instantly by a blast evidently touched off by a miner's open-flame lamp in a gassy portion of the workings. The rest of the men tried to escape from the deadly gas but were trapped in various parts of the mine. One group of bodies was found lying by a chalkboard on which were scrawled the following words: "It is five minutes past 11 o'clock Dear Agnes and children. I am sorry we had to go this way. God Bless you. Emil, with lots of kisses."[3]

Post-disaster investigations confirmed that gas had been detected almost daily in the mine, that smoking and open-flame lamps were permitted, that electric power lines were in places strung on wet timbers, and that rescue equipment was inadequate. The No. 3 Smith workings never reopened.

The Smith mine tragedy stimulated the formulation and enforcement of stricter safety regulations. After the war, coal mining declined rapidly. Most coal was now coming from Eastern Montana. Attempts were made to revive the Red Lodge economy, among them a proposal for a hydrogen plant for jet plane fuel. A char plant was built to utilize coal combustion products but closed two years later. In 1970, the last underground operation, the Brophy Mine, shut down and today Red Lodge depends heavily on tourism to support its economy.

[3] Report of the Governor's Committee Appointed to Investigate the Coal Mine Disaster at Bearcreek, Montana, 1943.

The Roundup Field

Like Red Lodge, the town of Roundup owes its principal growth to coal mining, in this case stimulated by proximity to the Milwaukee Road right-of-way. From the 1880's, coal was known to occur in the Bull Mountains. A small quantity was shipped to Anaconda at that time, but development was slow until the Chicago, Milwaukee, and St. Paul Railway built its Pacific Coast extension through the state in 1906-1908. The railroad needed coal, and the Bull Mountains contained the only significant deposit along the right-of-way between Iowa and west-central Washington. Anticipating the arrival of the railroad, the Republic Coal Company No. 1 mine opened in 1907. Workings extended under the Musselshell River; unfortunately the overlying river sediments "permitted the entrance of great quantities of water and rendered the plan unfeasible."[4] A more feasible plan was then adopted: enlargement of an air shaft on the other side of the river to be used as the main shaft. Once the railroad came through in 1908 and mining got underway in earnest, the tiny cattle community of Roundup boomed rapidly as a coal camp.

Geological surveys brought estimates of coal reserves in the Bull Mountains field to 9.5 billion tons. The Milwaukee used the coal for locomotive fuel and shipped quantities to Butte along its track. Major mines opened — the Roundup Coal Company No. 3 mine in 1908, and the Republic No. 2 mine in 1909. Around the latter operation grew the town of Klein. Another coal camp sprang to life along Carpenter Creek.

Coal occurs in a number of different seams in the district, but most are less than 10 feet thick. Seams are near-horizontal and, due to the rugged topography, commonly crop out along steep hillsides. Such deposits could be mined only by tunneling into the hill or by strip contouring along the hillside.

In the early days, mules furnished the motive power in the mines. Because the No. 2 mine at Klein had a vertical shaft, the mules were stabled underground. One mule, named Dinah Miner, was born and raised underground, never seeing daylight. Finally, when electric motors replaced mulepower, Dinah was brought to the surface — and found to be totally blind. The mules in the Divide Mine reportedly were smart enough to "not work during lunch hours or after quitting time."[5] These redoubtable beasts did have occasional problems. One mule reportedly fell in love — on company time — with a Shetland pony used to work in a neighboring mine. The pony later jilted the mule and kicked him to death.

In common with other districts, Roundup coal operations declined after the 1920's. The drop was more gradual, however, so that in recent decades Roundup has retained second place in production, exceeded only by the Eastern Montana region.

[4] L. H. Woolsey, R. W. Richards, and C. T. Lupton, "The Bull Mountain coal field, Montana," U.S. Geological Survey *Bull.* 647, 1917, p. 60.

[5] *Great Falls Tribune*, Nov. 16, 1969.

Roundup's population, too, has held in the 2,000-3,000 range since 1920. Decline of the industry in the 1950's was accentuated by the closing of the Republic No. 2 mine at Klein in 1956. The last major mine closed in 1963, and by 1969, only six small mines were in operation.

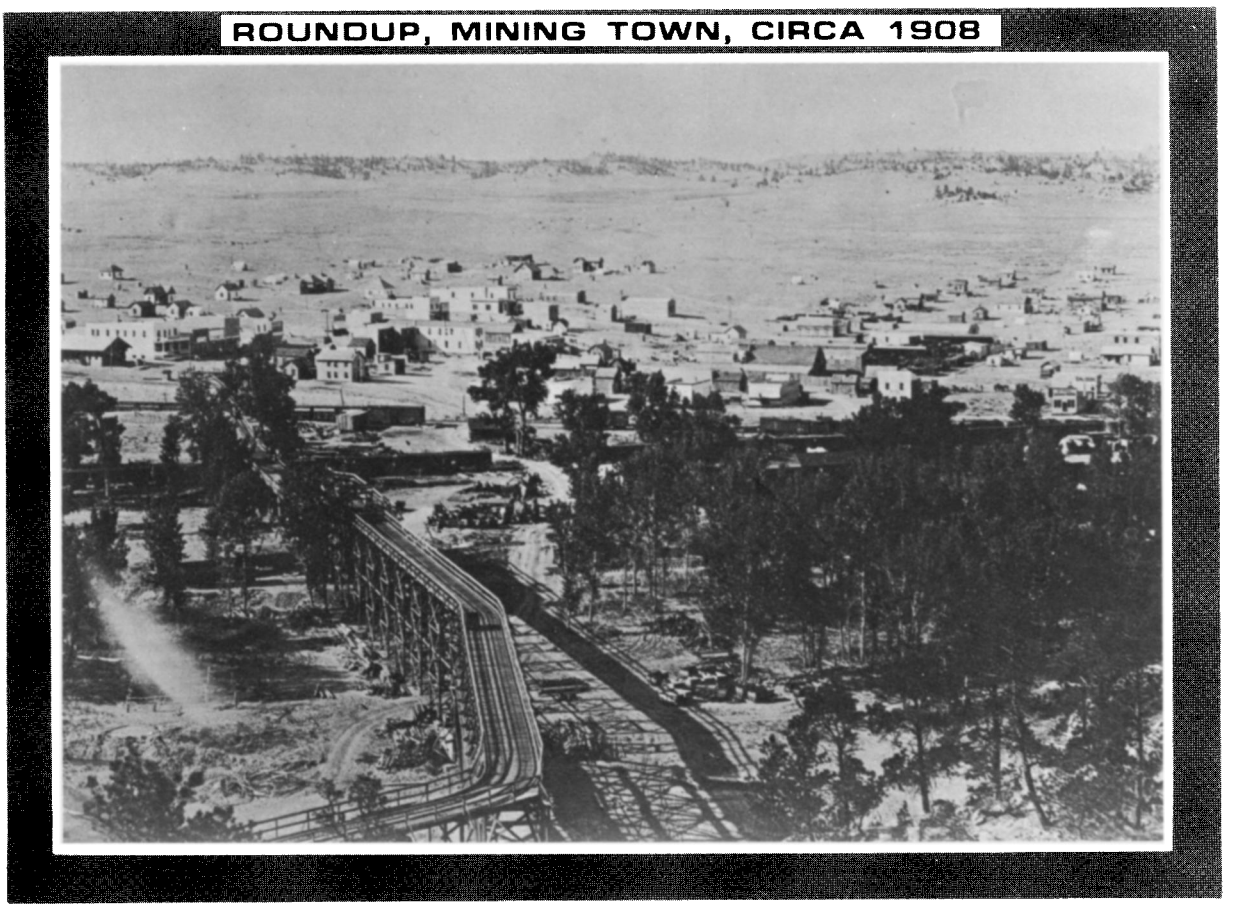
What can be done with an inactive coal mine? Why, grow mushrooms in it, of course! It all goes back to the 1950's, when Glen Johnson built a few trays and tried to grow batches of the succulent commodity in his small mine just west of Roundup. The mushrooms did just fine, but marketing was a problem, and Johnson went back to the drawing board. After various abortive attempts, a mushroom growing pilot project was launched in the spring of 1972. Trays of newly planted mushrooms were carried into the tunnels of a particularly cooperative mine, that of the Western Coal Company eight miles south of Roundup, whose even temperature and humidity were just right for this purpose. Reportedly, the mushrooms have grown well and are very palatable.

Large coal reserves still exist in the Bull Mountains. Recently, large coal companies have shown interest in these deposits. Since the seams run along steep hillsides, strip mining would have to be conducted along hill contours, posing difficult land reclamation problems.

Eastern Montana Coal

Of low heating value and distant from market, the non-coking lignitic and sub-bituminous coals of the eastern third of Montana were largely ignored in early decades of white settlement. Though the region contains thick, flat-lying coal seams in the Fort Union geological formation, coal was taken from only a few small wagon mines, such as those in the Coalridge area, and for a power plant at Miles City. However, U.S. Geological Survey reports documented the vast tonnage available.

In the early 1920's, the Northwestern Improvement Company began having difficulties in the Red Lodge field. The mines could not supply all the railroad's requirements, mining costs were rising, and labor was restive. Several serious strikes influenced the company to take a serious look at alternative coal sources. Large power shovels were coming onto the market, and this encouraged a search for coal which could be mined by surface stripping methods. About 30 miles south of Forsyth, the company delineated a large tonnage of strippable coal in the form of the 25-foot thick Rosebud seam. A cost analysis indicated that it could be mined for 65¢ per ton as compared to $2.75 to $3.00 at Red Lodge. The company therefore built a rail branch to


ROUNDUP, MINING TOWN, CIRCA 1908

STRIP MINING AT COLSTRIP, CIRCA 1920

courtesy
Mrs. J. Weaver

photo by Dean, Forsyth, Mont.

courtesy
Mrs. J. Weaver

BIBLIOGRAPHICAL ESSAY

Among the sources used for this article are various publications of the U.S. Geological Survey which discuss geology, mines, and mining history of the coal fields. These publications include: *Bulletin* 471, W. R. Calvert, "The Electric coal field, Park County, Montana," 1912, p. 406-422; *Bulletin* 356, C. A. Fisher, "Geology of the Great Falls coal field, Montana," 1909; *Bulletin* 341, E. G. Woodruff, "The Red Lodge coal field, Montana," 1909, p. 92-107; *Bulletin* 822-A, R. S. Knappen and G. F. Moulton, "Geology and mineral resources of parts of Carbon, Big Horn, Yellowstone, and Stillwater counties, Montana," 1931; *Bulletin* 647, L. H. Woolsey, R. W. Richards, and C. T. Lupton, "The Bull Mountain coal field, Montana," 1917; and *Professional Paper* 526-A, A. E. Roberts, "Geology and coal resources of the Livingston coal field, Gallatin and Park counties, Montana," 1966.Coal production data were taken from U.S. Bureau of Mines, *Minerals Yearbook,* volumes from 1880 to 1970. Future reserve and production estimates are based on studies of the Montana Bureau of Mines and Geology. Other significant articles consulted include: Rita McDonald and M. G. Burlingame, "Montana's First Commercial Coal Mine," *Pacific Northwest Quarterly,* v. 47, No. 1, 1956, p. 23-28; W. B. Evans and R. L. Peterson, "Decision at Colstrip," *Pacific Northwest Quarterly,* v. 61, No. 3, 1970, p. 129-136; Thomas Morgan, "History of coal mining in Montana," Proceedings of the First Montana Coal Resources Symposium, Montana Bureau of Mines and Geology Special Publication 36, 1966, p. 3-4; George Darrow, "The Bearcreek coal field," Billings Geological Society Guidebook, 5th Ann. Field Conf., 1954, p. 130-132; and Bill and Doris Whithorn, "A Photo History of Aldridge," Minneapolis, 1965. Newspaper files of the *Bozeman Chronicle, Great Falls Tribune, Billings Gazette, Carbon County News, Red Lodge Picket,* and *Roundup Record-Tribune* were also consulted. Drs. Merrill G. Burlingame and Michael P. Malone of Montana State University kindly reviewed the manuscript and contributed a number of suggestions which were incorporated into the final draft.

the deposits and constructed a town, Colstrip. Mining was contracted to Foley Brothers of St. Paul and commenced in August, 1924, using a newly designed electrified shovel and loading directly into railroad cars — the first completely electrified strip mine in the country.

With power shovel operation, productivity shot up to 50 tons per man-shift, over five times that at Red Lodge. Within a few years, the Colstrip operation outdistanced all others in the state. World War II needs could most easily and quickly be met by expansion of strip mining, and output reached 2.5 million tons in 1943, when 143 men were employed and the mine was producing over half the coal in the state.

Because of the cheapness of Colstrip coal, the Northern Pacific delayed dieselization until after most railroads had converted. Finally, in the late 1950's dieselization forced closure of the mine. By the early 1960's state output had declined drastically to some 300,000 tons. Almost no coal was being produced outside the Eastern Montana region. The only important operation at that time was a lignite strip mine operated by the Knife River Coal Mining Company at Savage, which had opened in August, 1958, to supply the new Montana-Dakota Utilities Company power plant at Sidney.

This operation was a straw in the wind, however, for in the late 1960's conditions changed drastically. Demand for coal rose rapidly as electric utilities rushed to meet the increased consumption of power. It appeared, too, that petroleum and gas supplies would get tight and that nuclear power would be slow to fill the gap.

In 1959, the Montana Power Company, through a subsidiary, Western Energy Company, obtained a long-term lease from the Northern Pacific on coal deposits and ownership on surface rights at Colstrip. The power company indicated that its future power needs were expected to come from coal-fired steam-electric generating plants. In 1968, the company began shipping coal to its 180 megawatt plant at Billings. In the same year, Peabody Coal Company contracted to provide a Minnesota utility with coal from a nearby location at Colstrip, and opened the Big Sky Mine. The economics of shipping coal for long distances in unit trains was proving feasible, and a coal leasing boom was underway. Decker Coal Company opened a surface mine on a 52-foot thick coal seam at Decker on the Wyoming line in 1972 to supply a Chicago utility with several million tons per year, and Westmoreland Resources, Inc., had laid plans to open a strip mine at Sarpy Creek in 1974 to supply other midwestern utilities.

Leasing of coal lands have continued apace, as have studies of environmental problems such as land reclamation, water disposal and replenishment, and potential air pollution from proposed mine-site power plants.

Construction of mine-site power plants to transmit electricity long distances, rather than shipping coal, is a trend currently underway elsewhere and is evidenced in Montana by construction at Colstrip of two 350-megawatt units jointly by Montana Power Company and Puget Sound Power & Light Company.

The coal is there in vast quantities — 20 to 30 billions tons of strippable reserves in Eastern Montana. The ultimate destiny of Montana coal — shipment out of the state, consumption in Montana electric generating plants, gasification plants, or liquid fuel conversion complexes, or letting it remain largely in the ground because of economic or environmental factors — is a question for today's Montanans to ponder and for future historians to interpret.

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