RUFFNER RED ORE MINES
(Ruffner Mountain Nature Center)
(Sloss' Ruffner Mines)
(Ruffner Mines No. 1,2,3,4 and 5)
Birmingham Industrial District
N. of I 20 at the Oporto-Madrid exit
Birmingham
Jefferson County
Alabama

HAER No. AL-27

HAER
ALA
37-BIRM,
43-

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| Location: | Ruffner Red Ore Mines are located five miles east of downtown Birmingham immediately to the north of I-20 at the Opporto-Madrid exit. The site is bounded by Georgia Road on the south; Ruffner Road on the east; 86th Street/Valley Brook Road to the north; and the Birmingham neighborhoods of Gate City, East Lake, South East Lake and Brown Spring on the west. |
| Date of Construction: | ca. 1880 |
| Designer/Engineer: | Multiple |
| Builder/Fabricator: | Multiple |
| Present Owner: | City of Birmingham |
| Present Use: | Nature Center |
| Significance: | Ruffner Ore Mines were operated by the Sloss Furnace Company, later the Sloss-Sheffield Steel and Iron Company. These mines provided ore for the nearby Sloss Furnaces, designated as a National Historic Landmark. Operated intermittently from the 1880s to the 1950s, the Ruffner mines exhibit a wide variety of technology, tracing the evolution of mining practice in the Birmingham District. |
| Project Information: | This recording project is part of the Historic American Engineering Record (HAER), a long range program to document the engineering, industrial and transportation heritage of the United States. The Birmingham District Recording Project was cosponsored during the summer of 1992 by HAER and by the Birmingham Historical Society, Marjorie L. White, Director. |
| Project Historian: | J. Lewis Shannon, Jr. |

INTRODUCTION

The Ruffner Ore Mines are located along the northeastern portion of Red Mountain, known locally as Ruffner Mountain, between Morrow Gap and Red Gap. This section of Red Mountain is characterized by a continuous series of mining developments, but those known specifically as the Ruffner Mines begin at the unnamed gap presently marked by Roebuck Springs Road, and continue to the southeast roughly 1.75 miles. All mining development at Ruffner was carried out on the southeastern slope of the mountain.

Although the mines at Ruffner were identified by number, to the uninitiated this system seems almost arbitrary. While the numbers assigned to the mines imply that there were discreet divisions, many of the drift mine systems were interconnected. Also, the numbering system employed was in chronological order, which had no relationship to location. The most intensively developed mines at Ruffner, No.s 1, 2 and 3, as well as the Roebuck Slope, are clearly identified. Divisions among the other four designated Ruffner mines, which are contiguous with other early developments, are less clear.[1]

The Ruffner sites can be located on the Irondale Quadrangle of the U.S.G.S. 7.5 minute series. The easternmost of the major surface plants is the Ruffner No. 2 site, which is also the most recent and most extensive of the Ruffner sites. This mine is associated with the Roebuck slopes. The slopes were connected by tunnels and a trestle, and the No. 2 surface plant served both developments. The Roebuck Slope hoist is still situated along Roebuck Springs Road. These sites are located in Section 12 of Range 2 West, Township 17 South. Owned by the United Land Co., a subsidiary of U.S. Pipe and Foundry Co., (a division of the Jim Walter Corporation), this site is currently not accessible to the public.

The Ruffner Ore Mines were operated by the Sloss Furnace Company, later the Sloss-Sheffield Steel and Iron Company. These mines provided ore for the nearby Sloss Furnaces, the site of which has been designated as a National Historic Landmark. Operated intermittently from the 1880s to the 1950s, the Ruffner mines exhibit a wide variety of technology, tracing the evolution of mining practice in the Birmingham District. This area indicates the alteration of the landscape associated with the ore mining

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[1]For a more complete discussion of mine site locations, see Robert Yuill, "Iron Ore Mining on the Northeast Portion of Red Mountain, Birmingham Alabama", TMs, copy to be placed on file at the Birmingham Public Library, Dept. of Archives.

industry, as well as the scale at which such operations were carried out.

Although the Ruffner Mines area displays vestiges of the first phase of ore mining used in the district (surface development of the ore outcrop), Ruffner is the best extant example of the system of drifts and inclines used in the landscape. There are well over one hundred drift openings present, and the grades of the inclined planes that served the drifts are evident, as are various stone foundations, machine mounts, and retaining walls.

But perhaps the most impressive feature of this site is the scale of operation. Over a distance of several miles, every ravine along the southeast slope of the mountain is pierced with drift mines. Most openings were served by inclined planes, stretching hundreds of feet up the sides of the ravine and, with trestles, continuing into the next spur of the mountain to connect with another series of drifts.

The third phase of mining in the Birmingham District, the use of slope mines, is also evident at Ruffner. Slope mining, which represented a major increase in the level of technology as well as capitalization, was conducted at Ruffner No.s 1, 2, and 3. All of these sites retain a great deal of integrity, with hoist foundations, ore crusher foundations, and various mine openings remaining. The slope entrance at Ruffner No. 3 remains, as does the ore crusher itself. The site displaying the greatest degree of integrity is No. 2, which remained open until 1953.[2] This mine was repeatedly modernized and improved, and produced ore for decades after all other mining along this end of Red Mountain had ceased.

Ruffner No. 2 features an intact concrete mine portal. The ore crusher associated with the tipple, as well as the foundations of the tipple, the hoist house, the machine shop, office, and the conveyor system (used to handle the ore) also remain. At this site is the foundation of an ore benefication plant, which was constructed in the 1950s to concentrate local ores. This was the first ore concentration project in Alabama to use the heavy media separation process.[3]

A feature of the Ruffner Mines is their association with the

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[2]W.E. Hobson, "Report on Ruffner Property", 1958, TMs [carbon copy], United Land Co. files, U.S. Pipe and Foundry, Birmingham, AL.

[3]U.S. Pipe and Foundry Co., U.S. Pipe's Integrated Operations (Birmingham, AL: U.S. Pipe and Foundry Co., 1956), 2.

Sloss Furnaces. Throughout the industrial history of Birmingham, one of the key companies has been the Sloss-Sheffield Steel and Iron Co. Organized as the Sloss Furnace Co. in 1881, this company constructed the second blast furnace in the city of Birmingham, blown in at the current site of the Sloss Furnaces National Historic Landmark in 1882. Although the earliest sources of ore for the Sloss Furnaces are not well documented, they certainly included the Sloss Mines near Bessemer, AL. Furthermore, the Ruffner mines were producing ore by 1886.[4]

The Ruffner Mine sites are also linked to the transportation infrastructure by numerous rail spurs, the beds of which are still apparent. The mines were served at different times by two competing railroads, the Georgia Pacific Railroad and the Birmingham Mineral branch of the Louisville and Nashville Railroad, both of which were significant in the development of the Birmingham District. The importance of this linkage is illustrated by the selective nature of intensive, third phase development, which directly corresponds to rail accessibility.[5]

BACKGROUND

In the early development of the iron industry of Birmingham, it was essential to minimize production costs to gain a foothold in an already competitive market while financing massive capital investments in large scale industrial facilities. To keep ore production costs down, the initial phase of development consisted of surface mining the entire outcrop of ore along Red Mountain, a distance of some thirty miles.[6] In the course of this phase, it became obvious that the terrain along the northeastern half of the mountain provided a unique situation. The southeastern flank of the mountain was creased by a series of ravines that had eroded through to the iron ore seams. Since the original surface of the hillside was parallel to the rock strata, the sides of the ravines displayed the outcroppings of at least two ore seams for nearly their entire length. This allowed companies to excavate drift mines along the strike of the ore seams, a method

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[4]"A Reporter's Visit to a Very Remarkable Spot," Birmingham Age Herald, 6 October 1886, quoted in Yuill, "Iron Ore Mining," npn.

[5]For more information on these rail systems, see Mark M. Brown and Scott C. Brown, "The Industrial Railroads of the Birmingham District" (Washington, D.C.: HAER No. AL-11, 1992).

[6]Department of Commerce, Bureau of Mines, Bulletin 239, Iron Ore (Hematite) Mining Practice in the Birmingham District, AL., W.R. Crane, (Washington, D.C.: Government Printing Office, 1926), 4.

considerably more economical than the slope mining required elsewhere. The Sloss Furnace Company, seeking to take advantage of this situation, acquired land between Red Gap and Bald Eagle Gap, and began mining by 1886. These mines were first known as the Irondale or Upper Sloss Mines.[7]

To gain the full benefit offered by the terrain, company engineers designed gravity planes to connect the drifts at the surface. This system was remarkably simple, required very little initial investment, and was energy efficient.[8] Essentially, a gravity plane consisted of a carriage and a counterweight running on parallel tracks. The two sets of tracks traversed the side of a ravine, parallel to the ore outcrop. Drift mines, called entries, were located along this track at intervals of fifty to sixty feet. A carriage, constructed so that the deck is level when the wheels sit on the rails, travels on the track nearest the drift openings. The deck of the carriage can carry one or two mine cars on rails perpendicular to the direction of travel. These rails can be connected to those coming from any drift opening, using a short section of removable track.

The incline carriage is connected to a wire rope or cable, leading to a sheave at the top of the grade. After passing around the sheave, the cable leads to a counterweight traveling on the parallel track. In a single sheave system, the end of the cable is secured to the counterweight; in a double-sheave system, the counterweight is equipped with a second sheave, around which the cable passes. The cable is then led to the top of the counterweight track, where it is secured. The advantage of the double-sheave system is that it only requires half as much track distance for the counterweight, saving considerable grading and filling as well as rail. In either system the counterweight is balanced so that the carriage, when loaded with mine cars full of ore, descends to the track while raising the counterweight on the other track. When the carriage is loaded with empty ore cars, the energy in the raised weight is sufficient to lift the carriage to the drift openings. The entire system is controlled by a brake.

For this system to function economically, the bottom of the incline must be higher than the rail line serving the site. A

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[7]Geological Society of Alabama, Report on the Valley Regions of Alabama (Paleozoic Strata): Part II, on the Coosa Valley Region, Henry McCalley (Montgomery: Geological survey of Alabama, 1897), 368-72.

[8]At that time, energy efficiency was purely an economic consideration.

tramway is built from the foot of the incline to a tipple, which dumps the ore into rail cars below. The ore cars can be trammed by hand along this level section of track. Since all ore mining was done by contract, the company could operate these mines with a minimum of employees. Although it had gravity planes operating on both sides of a ravine, an 1892 description of the No. 2 mine claimed, "eight men are necessary to operate the plant, exclusive of contractors, including a ticket clerk, switchman, brakeman, plane-runner, and tippleman for each plane. In addition, there is a mine boss, a blacksmith, and a carpenter."[9]

Clearly, the cost of mining in this manner was low. Contractors were paid sixty cents per car, which was estimated to hold over a ton (payment by weight came much later, after scales had been installed at company mines). For this price, contractors were responsible for mining, loading, tramming, propping, and putting down the track (but not maintaining the track). A bonus of 2 1/2 cents per car was added for each 400 feet of tramming distance between the work face and the plane.[10]

Another duty of the miners was to separate the ore from the gouge, or rock. This was roof or floor rock that was not ore and therefore could not be shipped to the furnace. There was limited room inside the headings for this rock, so it was often carried outside and stacked in the nearest location, sometimes creating extensive stone walls.

Mining at the work face was conducted largely by hand, and was usually done by black miners. Contractors, who directed the work, were white. To advance the work face, first a miner would make a cut at the top of the seam using a pick to remove a thin layer of friable slate. Holes were drilled into the ore seam using either hand auger drills or hammers and bits. The miners would then break the ore out, either with wedges or by blasting. Finally, the loose ore was "mucked", or loaded into the ore cars to be trammed to the plane. Large pieces of ore were lifted into the car by hand; pieces too large to handle were sledged into manageable size. Loose ore was shoveled into the car, using square-ended shovels; each shovelful weighed about twenty pounds.[11]

One of the advantages of drift mining was the fact that the mines could be driven at an angle to slope slightly upward,

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[9]Ibid

[10]Ibid

[11]Ibid.; "A Reporter's Visit"; Crane, 93.

making the mines self-draining. This shallow pitch also assisted in the tramming of ore, since it "favored the load"; it was easier to tram empty cars up the grade than full ones. There were also break-throughs, called "upsets", made between adjacent entries every seventy-five feet, providing natural ventilation. This system therefore needed no pumps, fans, hoists, or compressors. In short, there was no need for any power equipment at the Ruffner Mines at this stage, and therefore no boilers were installed.

Initially, mining at Ruffner was conducted on the Irondale Seam, and only the "soft" or leached ore was taken. This ore, without the lime content of the normally "hard" ores of the district, contained a higher iron content. Moreover, since the local industry had been established on outcrop ore, this was the ore to which furnace operators were accustomed. Consequently, whenever hard ore was encountered, a heading was considered to be worked out. This practice limited the utility of drifts by limiting the ore available. In areas where the terrain allowed, the Irondale Seam and the Big Seam were worked out simultaneously, using parallel gravity planes.[12]

It was obvious to the mine operators that the life span of the system of drifts and gravity planes was finite. The third phase of mining was soon to follow. Slope mines were begun before the drifts were worked out, to avoid creating a period in which there was no production from the Ruffner mines. The commitment to slope mines was a major step in planning. Since a slope follows the ore seam underground, the ore must be hoisted up the slope to the surface, requiring a power hoist. To drain the mine, pumps were needed. The introduction of power equipment necessitated the installation of boilers. To justify this investment, the Sloss Company chose to develop slopes at the three most accessible, and therefore most easily expanded, Ruffner sites. The slope at Ruffner No. 1 was begun in 1903; slopes No. 2 and No. 3. were begun in 1908.[13]

The introduction of steam power at the mines quickly made radical changes in the mine operations. Once boilers were present, it was convenient to add a crusher to a tipple, to

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[12]Department of the Interior, Iron Ores, Fuels, and Fluxes of the Birmingham District Alabama, Ernest F. Burchard and Charles Butts, U.S. Geological Survey, Bulletin 400 (Washington: U.S. Geological Survey, 1910), 58-59.

[13]"Sloss Hard Ore Reserves: Development of Ruffner No. 2 Irondale Seam" (Report, United Land Co. files, 1930); Ores, Fuels, and Fluxes, 59.

prepare the ore for the furnace. Steam-powered compressors were installed to power drills; the new pneumatic jack hammers were more reliable than older models, and the air they used aided ventilation in the mines. Once compressors were in place, other pneumatic tools such as auxiliary hoists were installed. Ruffner No. 3 was equipped with an Allis-Chalmers No. 7 1/2 gyratory crusher. Equipment at No. 2 included a steam driven, single drum power hoist producing approximately 200 horsepower, a McCully No. 8 gyratory crusher, steam driven compressors, and four hand-fired, fire-tube boilers.[14]

[14]Semet-Solvay Engineering Corp., "Development Ruffner No. 2 Irondale Seams" (report, United Land Co. files: 1937), 1-3; "Sloss Hard Ore Reserves".