MINING TECHNOLOGY IN THE COALFIELDS OF NORTH-CENTRAL ALABAMA

WORKER SAFETY AND ENVIRONMENTAL HEALTH, 1825-1915

By

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A Senior Thesis presented to the faculty of the History Department at Princeton University in partial fulfillment of the requirements for the degree of Bachelor of Arts.

This thesis is dedicated to my fiancé, Charlie Scribner, who taught me that environmentalism is not just about protecting birds and trees.

Environmentalism is about protecting the human environment, so that we, as ecological beings, can live in harmony with our surroundings.

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INTRODUCTION

1.1 APRIL 8, 1911: BANNER MINE EXPLOSION

April 8th, 1911, began like any other day for the Alabama convicts working in the Banner Mine of the Pratt Consolidated Coal Company. The prison wardens awoke the prisoners at 5:30am from their overcrowded sleeping quarters.[1] The men, many of them suffering from dysentery, tuberculosis, and malnutrition, reluctantly entered the mine fifteen minutes later under the warden's threats of beatings and whippings.[2] The most able-bodied convicts, known as "first class" prisoners, faced ten hours of hard labor, during which they were expected to meet their daily coal quota of four tons or face corporal punishment. The weak and sickly miners, commonly referred to as "dead hands," cost the company half as much to lease and were thus required to produce only one ton of coal per day.[3] Roughly one hundred seventy convicts entered the mine on the morning of the 11th, "ushered like cattle from the prison to the mine shaft entrance;" however, only forty men would reemerge that day from the 1,700-foot chute that descended into the depths of the Banner mine—a mine managed by men with "impeccable credentials" and reportedly one of the safest mines in the Birmingham district.[4]

During the course of the previous night, while the convicts were sleeping, a tiny fissure in the mine cavity of side gallery number seven slowly filled the underground

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[1] Harrison, Shelby M. "A Cash-Nexus for Crime." *Survey*, Volume 27. January 6, 1912, 1555.
[2] Ward, David Robert and William Warren Rogers. *Convicts, Coal, and the Banner Mine Tragedy.* University of Alabama Press, Tuscaloosa, 1987, 6.
[3] Blackmon, Douglas A. "From Alabama's Past, Capitalism Teamed with Racism to Create Cruel Partnership." *Wall Street Journal.* July 16, 2001.
[4] Ward and Rogers. *Convicts, Coal, and the Banner Mine Tragedy*, 1987, 6.

chamber with methane gas, an odorless and colorless substance known among miners as "firedamp" for its tendency to ignite into deadly flames.[5] Methane, a hazardous by-product of this particular type of underground mining, was notoriously prevalent throughout the seams of north-central Alabama's Warrior coalfield. However, despite the elevated risks associated with underground mine operations, the Pratt coal owners ventured deeper into the Warrior field in order to exploit its valuable coal seams, known among coal connoisseurs as the "Cadillac of coals."[6] In consequence of their willingness to expose humans to deadly work hazards in the interest of profits, the coal owners, in effect, laid the foundation for the death trap that lay ahead for the 128 convicts who lost their lives on that fateful morning.

At 6:30am, shot-firer John Wright proceeded with his normal duties in side gallery number seven, unaware of the deadly and explosive gas that filled the air around him. Wright had the special task of firing shots, or blasts, in this particular entry of the mine. To maximize coal production, Pratt required its miners to blast away large chunks of coal from the face of the seam with explosives instead of the more archaic and less-efficient method of hand pick mining.[7] This practice, of course, amplified the dangers of working in a gaseous mine because it only took one spark to set fire to even a small quantity of methane. Many shot-firers had been scorched and injured by minor methane

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[5] Rosen, George. *The History of Miner's Diseases: A Medical and Social Interpretation.* Schuman's: New York, 1943, 143.
[6] Jackson, David. "The Human Cost of Coal Mining." First of Three Part. The *Chicago Tribune.* 22 September 2002.
[7] Interview with Reese Millet, Alabama Mining Engineer and Geologist. August 10, 2005. I first met Reese Millet through a mutual friend who provided me with his contact information and assured me that Mr. Millet could help me understand the technological foundation of coal mining in Alabama. Millet first moved to Alabama in 1947 and began working as a geologist and engineer for Alabama ByProducts Corporation. He served as the first coal mine surveyor for the company at a time when mining technology in Alabama was developing rapidly. With over sixty years of mining experience, Millet possesses extensive knowledge on the development of mining techniques in Alabama.

fires in the Banner mine, but when Wright drilled the hole in the coal face and fired the shot in left number seven on this particular morning, the colossal explosion that erupted blew him to pieces.[8]

Four other miners died instantly in the fire, and the explosion itself roared through the mine, filling the air with dust, knocking down roof supports, and blasting away the twenty foot ventilation fan designed to replenish the mine with fresh air.[9] For those miners who were not crushed to death under piles of fallen rocks and collapsed mine roofs, the ensuing rush of "blackdamp," a deadly mix of carbon dioxide and nitrogen, suffocated the other hundred miners trapped in the deepest chambers of the mine. Because the mine operators had sealed off all openings in the mine to prevent the convicts from escaping, the only means of egress was up the 1,700 foot inclined mine shaft. Consequently, no more than forty men managed to fend off the suffocating gas, dodge the fallen piles of rocks, and reach the safety of this single mine entrance. James Franklin, one of the few convicts to survive the blast, later relayed the harrowing experience to a *Birmingham News* reporter:

> The blackdamp came on us. I felt it. We renewed our efforts; we pushed on hard. Nicholson [another survivor] was about to give up when we succeeded in getting into a new course of air and then we struggled out. It was an awful experience, believe me, an awful experience. I didn't believe I was going to get out.[10]

For the most productive and sophisticated underground mine in north-central Alabama—the first of its kind to adopt electric lighting, electric haulage, and electric coal cutting—this deadly explosion reminded convict laborers and local citizens alike that the products

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[8] Ward and Rogers. *Convicts, Coal, and the Banner Mine Tragedy*, 1987, 7.
[9] Ward and Rogers. *Convicts, Coal, and the Banner Mine Tragedy*, 1987, 8.
[10] *Birmingham News*, April 8, 1911. As quoted in Ward and Rogers. *Convicts, Coal, and the Banner Mine Tragedy*, 1987, 8.

of mechanized mining did not come without the price of blood, sweat, and environmental hazards.

1.2 THE TECHNICS OF INDUSTRY

As evidenced by the wave of death and destruction that followed the Banner mine explosion, it is impossible to conduct an historical analysis of the coal mining industry, or any extraction-based industry for that matter, without considering external costs to both the workers and the environment in which they work. Recent mining disasters, such as the death of fourteen West Virginia miners in January 2006 and an equally devastating explosion in Brookwood, Alabama in 2001, further emphasize the need to acknowledge such costs in any historical discussion of industrial development. Moreover, because the growth of these industries was and remains technology-dependent—requiring the application of expensive equipment like coal cutters and haulage systems—the evolution of this technology provides a useful lens through which to view the changing relationship between industry and the human work environment.

Recently, a few Alabama scholars have produced a small body of work on the early industrial development in the Birmingham District, which attempts to elucidate this interrelationship between technological growth and the natural environment. For example, in his Ph.D. dissertation entitled "Raw Material Constraints and Technological Options in the Mines and Furnaces of the Birmingham District: 1876 – 1930," historian of technology Jack Bergstresser argues that the local proximity of the three main ingredients for pig iron—coal, iron ore, and limestone—combined with "the idiosyncrasies of the Birmingham District's raw materials" to facilitate a process of "vertical integration" amongst the large coal companies and further led to the creation of small "rationally organized mills."[11] W. David Lewis, another self-identified historian of technology from Auburn University, has similarly argued that "plantation-born aristocrats" successfully concentrated their efforts on the production of pig iron, rather than steel, because it was better suited to the unique physical and chemical properties of Birmingham's raw materials.[12] Of course, environmental variables alone did not influence Alabama's industrial coal operators and iron manufacturers to pursue these specific technological choices, which inevitably carried important implications for the new class of industrial miners required to labor in these highly mechanized, often dangerous, work environments. Indeed, as Arthur McEvoy, professor of law and environmental history at the University of Wisconsin explains: "Modern environmentalism has made it clear that complex social *and* ecological relations pervade the use of any technology."[13]

While these scholars provide a useful assessment at the dynamic relationship between technological decisions and natural environmental constraints, they both ignore, and at times dismiss the important role of the labor force and work relations to industrial development. They fail, for example, to mention how the need to control labor or the political resistance to corporate liability led mine owners to justify the use of specific, often hazardous, technologies. This observation thus calls for a new historical analysis of mining development in Alabama—one that places the life, work and influence of the coal

[11] Bergstresser, Jack Roland. "Raw Material Constraints and Technological Options in the Mines and Furnaces of the Birmingham District: 1876 – 1930." Ph.D. dissertation, Auburn University, 1993, 2.
[12] Lewis, W. David. *Sloss Furnaces and the Rise of the Birmingham District: An Industrial Epic.* University of Alabama Press: Tuscaloosa, 1994.
[13] McEvoy, Arthur. "Working Environments: An Ecological Approach to Industrial Health and Safety," *Technology and Culture*, vol. 36 (April 1995), 5. Italics added to emphasize the fact that social and ecological variables equally influence technological choices.

miners at the center of both environmental and technological discourse. Only then can one begin to shed light on the origins of modern applications of coal mining technologies and the human choices that lay behind such developments. Of course, it should be noted that technology, as the primary mediator between industry and the human environment, did not simply consist of mining tools, machines, and industrial equipment. Embedded in the manufacture of all these technological elements were the "wishes, habits, ideas, and goals" of society, the combination of which social commentator Lewis Mumford refers to as the "technics" of industry.[14]

In the coalfields of north-central Alabama at the turn of the twentieth century, the technics of the coal mining industry not only included the equipment employed in the mines, which increased the risk of deadly underground explosions like the one that occurred in the Banner mine in 1911, but it also included: the convict labor system that forced men to labor under such hazardous conditions; the production ideologies of the coal owners who placed profits over the safety of the miners; and finally the state government's unwillingness to regulate the use of dangerous equipment and machines in the mines. Following the Banner mine explosion, for example, a spokesman for labor criticized G. B. McCormack, president of the Pratt Company, for his use of electricity in a gaseous mine, a practice unregulated by the state's mine laws. Instead of recognizing the inherent connection between electricity and mine fires, however, McCormack attributed the cause of the explosion to individual error. "The only way I can account for

[14] Mumford, Lewis. *Technics and Civilization*, Harcourt, Brace and World, Inc: New York, 1934, 3.

the explosion," he explained to the press, "is that someone did something about the powder that caused it to explode."[15]

The law itself was equally ready to exonerate the company of any liability for the explosion. Just a few months earlier that year, the Alabama legislature had passed a resolution stating that miners could not enter a gaseous mine unless state inspectors had deemed the mine safe. [16] The clause, however, provided no relief for the overtaxed state inspection system; and with a growing number of coal mines opening throughout the district, state inspectors could, at best, assess the safety of a mine once every three months. Methane, on the other hand, could fill an entire section of an underground mine overnight, and miners had no way of ascertaining the safety of the mine on a day-by-day basis. With families to support and young mouths to feed, however, an industrial miner could not afford to wait three months to resume working, and most reluctantly entered the dangerous mines at their own risk. The law thus freed the mine operators from legal redress because it placed the burden of safety and responsibility upon the miner, who was expected to take his cues from an absent state inspection system. J. L. Clemo, spokesman for District 20 of the United Mine Workers in north-central Alabama, which held relatively little influence or power in the state compared to other areas of the country, condemned the legislation: "This [law] is not for the protection of the miners, but solely for the protection of the operators against any liability for the maiming and killing of those whom they send down into…the earth."[17] Indeed, this law enabled the mine

[15] *Birmingham Ledger*, April 10, 1911. As cited in Ward and Rogers. *Convicts, Coal, and the Banner Mine Tragedy*, 1987, 21.
[16] Ward and Rogers. *Convicts, Coal, and the Banner Mine Tragedy*, 1987, 69.
[17] *Birmingham Labor Advocate,* February 3, 1911. As quoted in Ward and Rogers. *Convicts, Coal, and the Banner Mine Tragedy*, 1987, 69.

owners to skirt safety devices, ignore perilous mine hazards, and focus instead on the development of productivity-enhancing machines.

Because mine operators based many of their technological decisions on the choices supplied by law, which effectively freed them of safety and environmental concerns, mining technology demands a much more comprehensive definition than simply the tools and equipment used to extract coal. Indeed, following the lead of Mumford and McEvoy, who perceive technology as something entangled within a nexus of social and political factors, this thesis will not define mining technology as extractive machinery alone. It will also include the aggregate of legal devices, political means, and industrial techniques that enabled the increase of coal production in the Warrior coal field between the years of 1871 and 1915. Between those years, Alabama's yearly coal production increased by over a thousand percent, from roughly 12,000 tons to 15,000,000 tons, leading one contemporary to label Alabama as "the most important mining State in the South."[18] However, over the course of those years, fatalities from mining accidents also managed to escalate. Between the years of 1908 and 1910 alone, accident-related deaths jumped from 4.55 per thousand miners to 10.80 per thousand, and in 1918, Alabama's death rate was nearly double that of the national average.[19] In light of this correlation between coal output and injury, this thesis thus explores the development of mechanical devices, as well as the related social, legal and political factors that enabled Alabama's industrial coal operators to increase coal production at the expense of both humans and their environment.

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[18] Milton, Fies. "Coal Seams of Alabama." *Coal Age.* Volume 26, October 1924; Crane, W. R. "The Pratt Coal Mines in Alabama." *The Engineering and Mining Journal.* Volume 79. January 26, 1905, 177.
[19] Fitch, John A. "Birmingham District: Labor Conservation." *Survey*. Volume 27. January 6, 1912, 1531; Flynt, Wayne. *Poor But Proud: Alabama's Poor White.* University of Alabama Press: Tuscaloosa, Alabama, 1989, 131.

1.3 THE NEW TECHNOLOGICAL ENVIRONMENT

Of course the question still remains: why did the Alabama legislature sanction the use of such technological systems that, without penalty, exposed humans and their surrounding environment to injury, contamination, and destruction? Mumford, in his book *Technics and Civilization*, offers a partial explanation of this conundrum. "Behind all the great material inventions of the last century and a half," he writes, "was not merely a long internal development of technics: there was also a change of mind."[20] Indeed, one hundred and fifty years ago, most coal miners in America were private entrepreneurs, loading coal by hand directly from the face of an outcrop onto wooden flatboats, where the only dangers lay ahead in the white rapids downstream. Their technology consisted of simple tools, which they themselves could wield and manipulate. Moreover, while preoccupied with thrift and expedience in their pursuit of optimal productivity, these workers still possessed the independence and control over the workplace, which allowed them to mitigate the various occupational hazards presented by nature. Furthermore, the small scale of production that these relatively autonomous miners pursued was less conducive to ecological hazards than the large-scale industrial mining that followed. From the immediate exposure to methane and other hazardous gases to the widespread contamination of air and water discussed later in this thesis, industrial coal mining damaged not only the health of miners, but also that of the surrounding environment.

As mine mechanization took hold towards the end of the nineteenth century, however, public officials, state legislators, and even society tended to view such costs as the inevitable and necessary consequences of industrialization. In the same way that the

[20] Mumford, Lewis. *Technics and Civilization*, 1934, 3.

earliest miners were expected to mitigate against the hazards presented by the natural environment, the new industrial class of miners were also expected to bear personal responsibility for workplace injuries incurred while laboring in the underground mines. Of course, whereas earlier miners could opt to back away with impunity from work that presented excessive dangers, industrial miners found themselves at the mercy of superintendents, prison wardens, and mine owners, who compelled them, either through force or threat of job loss, to continue working in the hazardous mine environments. Facing mine owners' single-minded pursuit of production, mine workers often became injured on the job; and when these workers tried to seek legal redress, they met with judges and officials who also supported the notion that workers labored at their own risk.

The "great change of mind," to which Mumford alludes, then, was reflected in the law and in society's tendency to view industrial architectures, embedded with their specific production ideologies and goals, as a natural extension of the environment in which the pre-industrial miners had long labored. In other words, in the same way that pre-industrial cultures viewed natural disasters, such as flooding or droughts, as unavoidable occurrences in which no single party bore responsibility, industrial societies similarly attributed underground mining accidents, such as explosions and rock falls, to natural and inevitable causes. While they may have grieved over the death of a miner or lamented the loss of a stream, most contemporaries were unable to connect hazardous work environments or industrial waste with the specific technological choices of the industrial miner owner. Rather, as McEvoy explains, late nineteenth century and early twentieth century individuals were more inclined to look upon technology as "linear, orderly, and bloodless," a view that only furthered distanced technological development from the forces of human agency.[21]

This defeatist view towards technology allowed industrial coal owners to make human and environmental injuries seem "natural," as an integral part of society's projected course of industrial development. Moreover, society's inability to perceive choice in technology also eliminated opportunities for technological alternatives that might have otherwise prevented such injuries. In 1913, for example, when Birmingham city commissioner James Weatherly proposed a stringent smoke ordinance intended to address the city's air pollution problem, industrial engineers managed to sway public opinion against the ordinance by arguing that pollution controls were impractical and that bituminous coal, when burned, was bound to produce smoke.[22] Mining engineers showed little resistance, however, when compelled by coal owners to devise technological solutions for specific mining problems. Alabama coals, for example, contain unusually high sulfur contents, which prevented their use in the production of iron until the introduction of the Robinson-Ramsay washer in the late nineteenth century. Prior to the invention of this device, Alabama coal owners attempted to remove coal impurities with the Robinson Washer, an English invention that tended to clog with sludge and break down when used with the excessively dirty Alabama coals.[23] Rather than admitting defeat, however, Erskine Ramsay, head engineer for the Tennessee Coal, Iron, and Railroad Company in Alabama, readapted the washer to suit the specific needs of Alabama coals, thus signifying a "major engineering benchmark in Alabama's

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[21] McEvoy, Arthur F, "Working Environments," 1995, S146.
[22] Stradling, David. Smokestacks and Progressives: Environmentalists, Engineers, and Air Quality in America, 1881-1951. The Johns Hopkins University Press: Baltimore, 1999, 130-136.
[23] Lewis, David W. *Sloss Furnaces*. 1994, 229.

industrial history."[24] Of course, this invention represented a major benchmark in Alabama's environmental history, as well, because the use of these washers released enormous quantities of sulfur, slate, and other coal impurities into the environment.

The promise of more lucrative mining operations motivated Alabama's industrial engineers, like Erskine Ramsay, to seek technological solutions to problems presented by the environment. However, when the use of these inventions created new environmental problems, such as air and water pollution, the same engineers could not be induced to address such problems through similar technological approaches, as human and environmental health was outside the scope of their industrial aims. As Mumford explains, "[Technics] exists as an element of human culture, and it promises well or ill as the social groups that exploit it promise well or ill."[25] At the turn of the twentieth century, Alabama's industrial operators owned the majority of capital and thus controlled the growth and development of the new technological environment. Moreover, their drive for thrift and expedience, which excluded unrelated concerns for human welfare and environmental quality, led them to exploit certain technologies in a manner that often promised ill for the industrial workers and their surrounding communities. These new mechanized mining operations—viewed by citizens, government officials, and politicians alike as part of an inevitable technological progression—consequently placed definitive limits on the quality of life of the individual miner by eroding his surrounding environment and significantly reducing his average life expectancy. In light of this, this thesis will also examine the way in which certain technological choices impaired the life and health of the mine worker in the coalfields of north-central Alabama.

[24] Ramsay, Erskine and Charles Bowron. "Coal Washing in Alabama." *Mines and Minerals.* Volume 25, September 1905; Lewis, David W. *Sloss Furnaces.* 1994, 229.

[25] Mumford, Lewis. *Technics and Civilization*, 1934, 6.

1.4 CONNECTIONS WITH THE WORK ENVIRONMENT

One way to assess the impact of industry's technological choices on the life of the individual miner is to trace his changing relationship with the environment as mine mechanization presented new challenges and work hazards. It should be noted that the word "environment," used throughout this thesis, does not merely refer to that part of nature inhabited by wildlife. Environment also includes that realm of nature inhabited by human beings and their artifacts, which they create in order to survive in nature. After all, as Edward Mumford explains in *Myth of the Machine: Technics and Human Development*, "there is nothing uniquely human in tool making."[26] Hive-bees, for example, modify the environment around them by constructing large wax domes that often weigh down the branch of a young sapling or disrupt the habitat of a nearby organism. Charles Darwin was so fascinated by what he called "the workmanship of the bee," that he devoted an entire section in *The Origin of Species* to the mathematical precision of the organism's hive-making instincts.[27] Birds are another animal whose nest-making instincts reflect the same propensity of humans to harness tools and alter surrounding environments to fit their needs. These versatile organisms will collect almost any material they find, from tree twigs to plastic wrap, to build elaborate nests in treetops and even tall buildings. Might we justly compare such innate craftsmanship to the earliest Alabama miners, who collected tree timbers to construct long flatboats for transporting coal, or the later industrial miners, who used the same timbers to prop the roofs of underground mine cavities?

[26] Mumford, Edward. *Myth of the Machine: Technics and Human Development*. New York: Harcourt, Brace & World, 1966, 5.
[27] Darwin, Charles. *The Origin of Species by Means of Natural Selection*. London: John Murray,1872, 222.

Historians and environmentalists alike often resist the idea that a human laborer can know and connect with nature through work, particularly in technologically altered environments like the underground coal mine. However, as environmental historian Richard White proposes:

> Coming to terms with modern work and machines involves both more complicated histories and an examination of how *all* work, and not just the work of loggers, farmers, fishers, and ranchers, intersects with nature. Technology, an artifact of our work, serves to mask these connections.[28]

Indeed, by analyzing the changing dynamic between the coal miner and his work environment, historians can better understand the ways in which the industrial coal owner's introduction of new mining technologies shaped the worker's connections with nature. Prior to industrial mine mechanization, for example, the earliest Alabama coal miners gained knowledge of nature through their attempts to extract coal from exposed outcrops, through their endeavors to transport coal over the shoals of the Black Warrior River, and finally through their efforts to supply food to all the men making the long river journey. Based on these unique experiences in nature, the earliest miners thus modified their work habits and adapted specific techniques to deal with the occupational challenges they encountered. These early miners harnessed the use of iron crowbars and simple cranes to extract coal from the face of an outcrop and lift it from the base of a riverbed; they constructed flatboats to withstand the dangerous shoals of the Black Warrior River; and they became skilled outdoorsmen and proficient hunters in order to survive the river journey and provide wild game for sustenance.

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[28] White, Richard. "'Are You an Environmentalist or Do You Work for a Living?': Work and Nature," in Cronon, William. *Uncommon Ground: Toward Reinventing Nature.* W. W. Norton & Company: New York, 1995, 182.

The invention of mechanized mining and steam locomotives did indeed displace these early mining economies by replacing crowbars with more efficient extraction machines and supplanting the obsolete practice of flatboat building with more convenient rail transportation. However, these new techniques and machinery did not displace the worker's ability to know and connect with his surrounding work environment. Like the earliest miners, the industrial miners still required basic biological needs in order to survive, such as air to breath, food to eat, water to drink, and a safe environment in which to work. Of course, the mine owner's hazardous construction of mechanized mines often compromised these needs by restricting air flows, by contaminating crops and water, and by creating dangerous work environments. Nevertheless, the individual miner still sought to mitigate against such hazards based on his experiences and knowledge of the underground mine environment. Carbon monoxide, for example, also known as "chokedamp," could seep into through cracks in the mine walls and suffocate a miner within seconds. Before the mid-twentieth introduction of better safety devices to test the air quality of underground mines, miners would often carry canaries with them into the mines because they learned from experiences with nature that the small bird would "choke" first, thus giving the miner enough time to get out of harm's way.[29]

Miners also realized quickly from their work in the industrial mines that underground cavities were highly unstable environments, likely to collapse at any given moment. For this reason, they learned to recognize signs of a weak roof, much in the same way that the earliest miners identified rocks and other dangers along the Black Warrior River. If an industrial miner spotted, for example, a roof pot, or petrified tree stump, embedded in the roof of the mine, he either avoided the area completely or

[29] Interview with Reese Millet, Alabama Mining Engineer and Geologist. August 10, 2005.

propped the unstable portion of the roof with a timber. As retired Alabama miner, Alfred Renshaw, later explained in an oral history conducted in 1979:

> "The pot is an old petrified tree stump-like, you know. They are very dangerous….You can hold them up if you timber right under the pot. But a lot of the time they paunch down below the surface of the top and it's quicker and cheaper to timber around them. Sometimes you can watch them and stay out of the way, but if you continue to work under a top that's not timbered right, a rock will get on you."[30]

Miners like Renshaw thus learned specific skills and acquired the necessary techniques to survive the dangerous underground work environments of the industrial mines. Of course, their awareness of these dangers did not always protect them from death and injury, as evidenced by the disastrous Banner mine explosion; and most miners and their families consequently accepted the possibility of death by modifying their attitudes and behaviors around it. Even as late as the 1930s, when mine safety had greatly improved, Alabama's industrial coal miners still accepted the possibility of death. Dr. E. L. McFee, an industry doctor employed at one of the mine camps, later recalled of the Alabama mining culture, "There was just a good deal of fatalism in the community…they [the miners] passed on to their children a kind of fatalistic living while you can and who knows what's gonna come."[31]

The fatalism of Alabama's coal mining communities illustrates an important point regarding the relationship of the industrial miner with his work environment near the turn of the twentieth century. While he gained knowledge of and connected with the mechanized work environments in much the same way that the earliest coal miner knew and connected with his immediate surroundings, the industrial miner confronted many

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[30] Alabama Coal Miners, Volume Six, Alfred J. Renshaw (Jefferson County), By Carl Elliot, Sr. and Susan Crittenden, Northwest Alabama Publishing Company: Jasper, Alabama, 1979, 49.
[31] Dr. E. L. McFee by Jim Nogalski, April 26, 1975. Oral History in Samford University Oral History Collection, Archives, Birmingham, Alabama, 5-6.

occupational hazards beyond his control, such as mine explosions and rock falls, which inevitably put his life at risk. This "maladjustment" to the new work environment, as McEvoy calls it, underscores the fact that while mining technologies may have changed over the course of the nineteenth century, presenting new dangers that devalued the life of the individual miner in the minds of the community and mine owner, the worker's susceptibility to physical injury remained constant throughout the period of technological change.[32] Moreover, in terms of injuries to the human body, industrial contamination of air and water, both within the mines and in the surrounding communities, compromised the health of the individual miner in the same manner that immediate mine hazards endangered his life. For this reason, the terms "environmental health" and "environmental injury," used frequently through this thesis, do not merely refer to the physical condition of plants and wildlife in north-central Alabama. Rather, these terms perpetuate the idea that the status of the physical environment serves as an indicator of human safety and health, both within the mechanized mine environment and in the surrounding community. Indeed, as environmental justice advocate Giovanna Di Chiro proposes, "The environment…is the place you work, the place you live, the place you play."[33]

Chapter 1 of this thesis will first explore the nature of pre-industrial mining in Alabama—the environment in which the miners labored, the challenges they confronted, and the technical solutions they sought. Chapter 2 will then turn to the period of mine mechanization in north-central Alabama and examine how the introduction of new mining technologies altered the human environment, thus changing the individual

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[32] McEvoy, Arthur F, "Working Environments," 1995, S149.
[33] Di Chiro, Giovanna. "Nature as Community." in Cronon, William. *Uncommon Ground: Toward Reinventing Nature*. W. W. Norton & Company: New York, 1995, 301.

miner's knowledge of and relationship with nature. Finally, because the "technics" of the Alabama mining industry included more than simply the mining machines themselves, Chapter 3 will look at the influence of government, politics, and society in shaping the technological decisions that inevitably altered the environments inhabited by the miner and his family.

CHAPTER 1: PRE-INDUSTRIAL MINING

2.1 INTRODUCTION

The replacement of independent coal mining activities with heavily financed and technologically elaborate industrial coal mines, while it occurred rapidly, did not simply transpire overnight. Instead, it gradually emerged from the intersection of two long-standing traditions in early Alabama coal mining—a preoccupation with cheap efficient coal production and a culture of unregulated free enterprise. Motivated by the promise of enormous coal profits and prospects for industrial growth, early town promoters and coal mine proprietors—Enoch Ensley and Henry DeBardeleben among them—seized the opportunity for technological development of the Alabama coal mines. With an eye towards economy and industrial efficiency, these early industrialists and engineers harnessed new technologies that were, in large part, simply outgrowths of the tools and techniques that predated them. Ironically, however, the early coal mine operators' shift towards greater mine mechanization created new divisions in the industrial workforce, which ultimately challenged the early traditions that helped advance industrialization in north-central Alabama in the first place.

Keith Dix, a social and labor historian who has written at length on the early mechanization of coal mining in West Virginia, notes that the early Appalachian pick miner exercised a considerable degree of control and autonomy in his work environment before the expansion of the coal market in the 1880s and 1890s—an observation that holds true for the 19th century development of coal mining in Alabama as well. Dix explains that "early coal mining was basically a craft job, with a skill level of its workers similar to that of iron-molders, glass-blowers, typographers and others who exercised a broad discretion in their work."[1] David Hanby, one of the earliest known coal miners in Alabama, and a pioneer blacksmith known as McGee, who established the first foundry in the Birmingham Region, were two pre-industrial entrepreneurs whose coal mining and iron-making enterprises—considered amateur by 1880 standards—fit the description of the "craft job," described by Dix.[2] What distinguished their early trades from the occupations of Alabama miners and industrial workers at the turn of the 20th century was the focus on individual craftsmanship and innovation, the right to ownership, and control over the workplace environment.

Until the 1880s, this self-sufficient nature of craft industry in Alabama was a universally-accepted right and part of a long-standing tradition of independent farmers who settled the region in the early 19th century. In fact, most of Alabama's first coal miners were farmers by trade, who dug coal during the wintertime to heat their furnaces or trade for necessary groceries and supplies at the local markets.[3] Even the early blacksmiths like McGee, who operated their own independent iron foundries, used coal power for the sole purpose of making iron plows, horseshoes, and other agricultural necessities.[4] In the strictest sense, the earliest white settlement in Jones Valley was a small community of self-governed farmers who conveniently lived within close proximity to vast coal, iron ore, and limestone reserves—the three major ingredients of pig iron. Had Thomas Jefferson been alive to observe this agricultural community on the

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[1] Dix, Keith. *Work Relations in the Coal Industry: The Hand-loading Era, 1880-1930*, Morgantown: Institute for Labor Studies, West Virginia University, 1977, 105.
[2] Ethel Armes, in *The Story of Coal and Iron in Alabama,* and B. E. Grace, in *Jefferson County and Birmingham, Alabama: Historical and Biographical, 1887*, both allude to the early foundry operations of McGee; however, neither Armes nor Grace provides a first name for this historical character, so I will simply refer to him as McGee throughout the thesis.
[3] Telle, Whitney R. "Digging 'Stone Coal': A Brief Account of Alabama's Early Coal Mining," *Alabama Heritage,* Summer, 2003, 37.
[4] Du Bose, *Jefferson County and Birmingham, Alabama: Historical and Biographical, 1887*, 63.

eve of the Civil War, he might have commented on the democratic nature of its settlers or invoked his well-known opinion that "[cultivators] are the most vigorous, the most independent, the most virtuous, and they are tied to their country and wedded to its liberty and interests by the most lasting bonds."[5] This vigor and independence, which Jefferson alludes to, characterized the pace of early craft industry and economy in north-central Alabama, particularly in the mineral districts where the institution of slavery had not penetrated society; however, with the advent of wide-scale industrialization and extensive mine mechanization, these worker ideologies became relics of the past. Miners and industrial workers were no longer tied to their land but to the new mining technologies that dictated the rate of coal production. Innovation, ownership, and control—once assumed rights of any Alabama craftsman or farmer—became the elite privileges of a new industrial class of engineers, coal proprietors, and business investors.

Of course, while mine mechanization introduced new, often dangerous, technologies into the work environment, a number of continuities existed between the pre-industrial and industrial mining periods. Amidst the changing mine environment, the individual miner maintained a unique relationship with his surrounding work conditions, constantly adopting new techniques and mechanisms to survive the challenges presented by nature, and later mine mechanization. Moreover, both the pre-industrial coal miner and the industrial coal operator selected specific mining techniques and mechanisms for the purpose of maximizing coal production, although the later industrial coal owners placed significantly less emphasis on safety. Given these continuities, an historical analysis of pre-industrial coal mining in Alabama provides an important precursor to a

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[5] Thomas Jefferson to John Jay, 23 August 1785. As quoted in Emmons, David and Stewart Udall. *The Forgotten Founders: Rethinking the History of the Old West.* Shearwater Books: September, 2002, 135.

discussion of mine mechanization because it not only underscores the mine worker's immediate connections to his surrounding environment; it also demonstrates the influence of early mining traditions on the successive mechanization of the coal mines.[6] As Robert Gordon and Patrick Malone explain in their study of mining development in western Pennsylvania, "The technological and social practices that endured in anthracite mining were largely established in the years between 1827 and 1834 by inexperienced adventurers whose aim was to obtain coal quickly and with the least trouble."[7] Indeed, the same pattern prevailed in Alabama; and while the pace of mine development may have varied at times over the course of the 19th century—escalating most rapidly during the final two decades—the industrial engineers of the 1880s and 1890s applied mining techniques with the same measure of thrift and responsiveness to the surrounding environment as the earliest pioneers.

2.2 A FLATBOAT CULTURE EMERGES

For nearly three hundred million years, massive coal and iron-ore deposits lay hidden beneath the Alabama soils until their discovery by white settlers during the early part of nineteenth century. Even then, these early colonizers held but a faint idea of the extent of these vast reserves. Named after its centerpiece, the Black Warrior River, the Warrior Field is the largest of the three coal beds found in the Birmingham District, spanning a length of seventy miles and a width of sixty five miles at its broadest point. Most heavily concentrated in Jefferson, Tuscaloosa, and Walker Counties, this particular

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6 I use the word "pre-industrial" to differentiate between the low-cost coal operations before 1850 and the highly mechanized underground operations of the turn of the century; however, the transformation did not occur rapidly overnight but instead took place along a fifty-year continuum of technological development.

7 Gordon, Robert and Patrick Malone. *The Texture of Industry: An Archaeological View of the Industrialization of North America*. Oxford: Oxford University Press, 1994, 260.

field covers an area of over 3,500 square miles.[8] Flanking the Warrior Field to the east is Red Mountain, a ridge of hills laden with several rich seams of red hematite iron ore, thus giving the mountain its name.[9] Finally, thick beds of limestone undercut the entire valley, providing the third and final ingredient necessary for the manufacture of iron.[10] This particular region of north-central Alabama is the only known place in the world where these three raw materials exist within such close proximity to one another, so it should come as no surprise that Birmingham industrialists later cited Jones Valley as the future iron capital of the South.[11] Of course, as W. David Lewis acutely notes in his epic study of iron-making in Alabama, "Natural resources have no value unless human knowledge makes it possible to exploit them."[12] For Alabama's earliest miners, this knowledge included techniques for flatboat construction as well as the navigational skills necessary to transport coal-loaded flatboats along the winding Black Warrior River to Mobile Bay.

Between the years of 1820 and 1830, William Jones recruited fellow farmers from Walker County, Alabama on a riverboat expedition to Mobile and became the first person to successfully navigate the dangerous shoals and rapids of the Black Warrior River—thus signifying an important turning point in the history of coal development in north-central Alabama.[13] As nineteenth century writer John Witherspoon Du Bose later recalled of the development of this early river economy, "Although Walker County was at first strictly an agricultural section and linked with the commercial work by a

[8] Lewis, W. David. *Sloss Furnaces.* 1994, 5.
[9] White, Marjorie Longenecker. *The Birmingham District: An Industrial History and Guide.* Birmingham Historical Society: Birmingham, 1981, 33.
[10] White, Marjorie Longenecker, *The Birmingham District: An Industrial History and Guide*. 1981, 34.
[11] Lewis, W. David, *Sloss Furnaces,* 1994, 1.
[12] Lewis, W. David, *Sloss Furnaces,* 1994, 9.
[13] Telle, Whitney R. "Digging Stone Coal." 2003, 35.

dangerous river, the people gave themselves at once to the daring business of flatboating products over the treacherous shoal of the Black Warrior to Tuscaloosa, Demopolis, and Mobile."[14] Indeed, as Du Bose suggests, the greatest obstacle impeding the early progress of coal mining development in northern Alabama was not the acquisition of the valuable mineral itself but the "treacherous shoals" that separated the coalfields from the burgeoning markets in Mobile. As a result of this specific environmental challenge, ambitious pioneers devoted their creative energies towards the development of effective riverboat transportation. Thus, while coke ovens and coal tipples may have characterized the late 19th century industrial landscape, the earliest settlers of northern Alabama associated coal mining with the development and construction of sturdy flatboats.

By the middle of the nineteenth century, flatboat construction was a relatively advanced skill in northern Alabama, requiring technical expertise as well as an intimate knowledge of the river systems of Alabama. The average size of each craft measured seventy-five feet long and twenty-five feet wide, and the average size of the keel alone was sixty feet by sixteen feet, according to the testimony of contemporary Joel C. Du Bose.[15] These enormous wooden structures, roughly three quarters the size of a modern basketball court, could carry up to seventy tons, or two thousand bushels, of coal per trip.[16] Bayliss Grace, a nineteenth century essayist who wrote extensively on the pre-industrial society of north-central Alabama, recollected her early memories of the flatboat economy:

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[14] Du Bose, John Witherspoon. *Jefferson County and Birmingham, Alabama: Historical and Biographical, 1887.* Caldwell Printing Works, Birmingham, Alabama, 1887, 50.
[15] Armes, Ethel. *The Story of Coal and Iron in Alabama.* Cambridge, Massachusetts: The University Press, 1910, 52.
[16] Telle, Whitney R. "Digging Stone Coal," 2003, 34.

> They constructed flat-bottomed boats out of the tall poplars that grew in the rich bottoms, and with several thousand bushels of coal on board would float them down to Mobile. The Squaw Shoals was the great obstacle, for here they always had to wait for a rise in the river, but with plenty of water they generally went over safely, though some boats were lost and one or two lives.[17]

With so many lives, materials, and goods at stake, river pilots had little room for error in the construction and navigation of their flatboats. Despite these limitations, however, the treacherous and often deadly rapids of the Black Warrior River failed to deter these ambitious entrepreneurs, and many men willingly risked their lives to trade coal at the profitable markets in Mobile.

Although these pre-industrial miners were constantly at the mercy of the river, they exercised a considerable degree of autonomy over their lifestyles and, most importantly, they controlled the pace and development of the technology that put lives at risk—the flatboat. Hence, because their livelihood depended directly upon the successful applications of their own technical skills, these early flatboat builders held a vested interest in securing the safety of their self-made crafts. “Carefully [selecting] timber for soundness and strength,” according to nineteenth century observer Mary Gordon Duffee, they took pains to ensure their flatboats could withstand the tortuous rapids of the river.[18] The flatboat builders then hauled these sturdy slabs of timber directly to the riverbank and laid them parallel to one another. Duffee continues her description of this diligent and painstaking process:

> [A] strong floor of rough-hewn boards called puncheons was laid between [the timbers] and securely fastened so as to resist all shocks of driftwood and projecting rocks. The floor was then caulked with melted tar to render it waterproof. A rude helm was constructed by placing a piece of grooved

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[17] Du Bose, Joel C., as quoted in Armes, Ethel. *The Story of Coal and Iron*, 1910, 48.
[18] Duffee, Mary Gordon, as quoted in Telle, Whitney, R. “Digging Stone Coal,” 34.

> timber at one end…Part of the boat was covered in order to protect the men who cooked their own provision and slept onboard.[19]

Duffee's detailed report of this technical process is diffused with precautionary words, such as "resist" and "waterproof" and "protect," suggesting that the overriding purpose of these crafts was to carry the men safely to port. Thus, while thrift and efficiency may have motivated pre-industrial coal production in Alabama, safety concerns determined the development of the primary techology that facilitated this profitable coal economy.

2.3 THE ERA OF 'IMAGINATIVE ARTISANS'

Another noticeable characteristic of this pre-industrial mining community was the variety of independently skilled artisans, or craftsmen, who contributed to different stages of the production process—a feature soon supplanted by the streamlined vertical integration adopted by the larger mining companies. Robert Gordon and Patrick Malone, in their study of industrial development in coal mining, reflect on the technical nature of these early mining communities:

> There were few socially constructed barriers to the range of skills that an individual could practice at work, and imaginative artisans could cross the conventional barriers between trades, enriching different technologies of each.[20]

Indeed, for the early industrial pioneers living on the edge of wilderness in the sparsely populated settlements of northern Alabama, innovation, imagination, and versatility were necessary tactics for survival. Tandy Walker, for example—a government blacksmith stationed at Fort St. Stephens, Alabama in 1801—required a range of skills in order to survive what was, at the time, the eastern-most settlement of the Mississippi Territory. In

[19] Duffee, as quoted in Telle, "Digging Stone Coal," 34.
[20] Gordon and Malone. *The Texture of Industry*. 1994, 222.

"The History of Methodism in Alabama," his nineteenth-century biographer Reverend Anson West describes the versatility of this craftsman's proficiencies: "[Walker] was by birth a Virginian, by nature and experience a backwoodsman, by trade a blacksmith, and by acquired knowledge of the Indian language a medium of communication between the English-speaking and the Indian-speaking people."[21] This resourcefulness and skillful flexibility similarly characterized the operations of early coal mining communities in Alabama.

To man the early flatboats, William Jones and other early coal entrepreneurs required sturdy independent men with a range of useful skills they could draw upon at any given moment to satisfy the strenuous and unforeseen demands of the long river journey. Each flatboat crew usually included an experienced, but by no means specialized, river pilot and between four and ten hands to man the boat. Also, in order to maximize the availability of skilled hands, historian Whitney R. Telle, in an article on early coal mining in Alabama, explains: "The boats traveled in small fleets so that other crew could assist if trouble arose."[22] All of these men were "expert with oars," according to 19th century observer Reverend F. M Grace; however, like William Jones, they also acquired a knack for hunting, familiarity with the surrounding woods, and everyday resourcefulness. Often, the greatest challenge the men confronted along the river trip was not the "the treacherous shoal of the Warrior," but acquiring adequate nutrition to refuel their bodies for the enormous physical strains required by the journey.[23] Every crew therefore included at least one skilled hunter and woodsmen who could be trusted to go ashore at nightfall, brave the rough country alone on foot, and catch up the following day,

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[21] West, Anson, as quoted in Armes, Ethel. *The Story of Coal and Iron*, 1910, 13.
[22] Telle, Whitney R. "Digging Stone Coal," 2003, 35.
[23] Du Bose, John W. *Jefferson County and Birmingham*, 1887, 54.

"laden with duck, turkey, and venison."[24] For these men, nature—the woods, the wildlife, and the river—defined their work environment, and there existed no clear division between the natural and artificial world. They thus responded to the demands of nature, or the work environment, by acquiring the skills necessary to survive in it. They all learned how to chart unknown territories, track foul and other wild game, and build sturdy flatboats to withstand the dangerous river rapids.

2.4 WORKING IN WILDERNESS

For an industry that mechanized rapidly and soon developed a notorious reputation for environmental degradation and hostile work conditions, the development of these early mining skills in Alabama reveals a surprisingly inextricable dependency upon, and at times subjection to, the whims of nature. Environmental historian Richard White—who has written extensively on the problematic modern dualisms of work and play, nature and non-nature—explains the origins of these early pioneers' connections to nature: "What most deeply engaged these first white men with nature was work…they did not gain knowledge of nature through play; they knew and connected with the world through work."[25] Indeed, the "bodily knowledge" and "physical experience"—as White calls it—that these pioneers gained from their engagement with nature was perhaps even more exaggerated amongst the early Alabama coal miners, who required specific mining methods in order to adapt to unique geological conditions like dangerous rivers and uneven coal seams.[26] Robert Gordon and Patrick Malone, who have written at length on

[24] Telle, Whitney R. "Digging Stone Coal," 2003, 35.
[25] White, Richard. "'Are You an Environmentalist or Do You Work for a Living?': Work and Nature," 1995, 177.
[26] White, Richard. "'Are You an Environmentalist or Do You Work for a Living?': Work and Nature," 179.

this unusual feature of the early coal mining industry across the United States, explain: "Coal-mining skills were unlike the skills acquired by nineteenth-century artisans in woodworking and metalworking, which were applicable to many different products made by numerous factories and could be applied wherever a new opportunity offered."[27] From the outset, coal mining development in Alabama reflected the contours and geological features of the natural landscape, a knowledge gained largely from immediate contact with the environment; and while coal proprietors and surveyors would later prescribe more systematic methods of coal exploration and exploitation, response to the environment remained the underlying feature driving the development of coal mining technology during the latter half of the nineteenth century.

An interest in the geological variations of different coal seams initially attracted eminent English geologist Sir Charles Lyell to the Warrior coal field in 1846, and his subsequent discovery of unusual geophysical characteristics accompanied by novel mining practices actually conflicted with the previous knowledge he had acquired of coal mining techniques in Europe—an event that underscores the variability and unsystematic nature of early coal mining in Alabama. For example, in his detailed impressions of the mining district, which reproduced in Ethel Armes' 1910 book *The Story of Coal and Iron in Alabama*, Lyell describes the geographical situation as "peculiarly interesting," and he goes on to note the unusual proximity of "rich beds of ironstone and limestone"—a feature later recognized as unique to northern Alabama alone.[28] Moreover, some of the mining methods employed by local farmers and entrepreneurs were so alien to Lyell that, upon hearing of them, he initially reacted with skepticism and disbelief. When local

[27] Gordon and Malone. *The Texture of Industry*. 1994, 261.
[28] Lyell, Charles, as quoted in Armes, Ethel. *The Story of Coal and Iron*. 1910, 63.

farmer David Boyd explained to the geologist that he and his neighbors lifted coal directly from the riverbed, Lyell quickly informed the farmer that such practices were "impossible, since coal, being soft and easily eroded, should not be found in the bottom of a river."[29] Farmer Boyd, trusting his bodily knowledge and physical experience over the textbook advice of a foreign geologist, responded: "I don't know how it is in the books, but I'll be hanged if it ain't that way in the river."[30] This insightful interaction between a well-versed English geologist and homespun Alabama farmer and coal miner demonstrates the extent to which the choice and development of early mining techniques depended directly upon a physical knowledge of the region's immediate environs.

2.5 THRIFT AND EXPEDIENCE

In addition to their direct connection to the local environment, another characteristic of these early mining communities was thrift and expedience—goals that continued to define the development of mining technology even when the means of production shifted from individual entrepreneurs to consolidated coal companies during the latter half of the nineteenth-century. Frugality and efficiency were sound guidance for an autonomous worker, but became dangerous motivation as increasing production scale compromised worker safety. In light thrift and expedience's continuity across the two mining periods, an historical glance at the production ideology of pre-industrial mining may help reveal the underlying root of the environmental problems and work hazards created by large scale coal operations, whose proprietors often placed production and profits over safety and health. As Gordon and Malone wisely note of the nineteenth-

[29] Telle, Whitney R. "Digging Stone Coal," 2003, 38.
[30] Boyd, as quoted in Telle, Whitney R. "Digging Stone Coal," 38.

century development of anthracite mining in Pennsylvania, "The mining practices and customs [that pre-industrial mine workers] established remained firmly in place for more than a hundred years and were the cause of many of the social and environmental costs of anthracite mining."[31] Indeed, the same could be said of the early mining communities in Alabama where, as nineteenth-century observer John Witherspoon Dubose recalls, "The people were sturdy, honest, industrious, and independent, and many of them restlessly striving for business conveniences."[32] Of these characteristics, those most related to efficient output—industriousness and convenience—notably prevailed as the region transitioned from a pre-industrial agricultural community to a booming industrial metropolis. This consequence was largely a result of the thrift and expedience of early mining techniques, which set the standard for later technological development and industrial expansion in north-central Alabama.

Of the pre-industrial mining techniques employed, David Hanby receives credit for the most sophisticated mining operations, which he performed himself along with a team of four to six men. This "novel process in the art of mining," as Alabama's first State geologist Michael Tuomey described it in 1848, required minimal technology and a lot of manpower and skill—a fact that led him to conclude that it was "one of the cheapest modes in practice."[33] Indeed, a complete list of the equipment used in this process included several wedge-shaped crowbars to pry the coal loose from its seam and a simple crane to hoist the eight hundred pound blocks of coal onto the flatboat. Docking the flatboat parallel with the edge of the coal outcrop, the men would first drive the long crowbars into the seam with large hammers, or mauls. Then, after successfully

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[31] Gordon and Malone. *The Texture of Industry*. 1994, 121.
[32] Du Bose, John W. *Jefferson County and Birmingham*, 1887, 54.
[33] Tuomey, Michael, as quoted in Armes, Ethel. *The Story of Coal and Iron*. 1910, 49.

dislodging a two-foot ledge of coal across the seam, two or three men would plunge headlong into the water after the blocks of coal and physically lift the masses onto the edge of the boat. Of course, the miners loosened some oversized blocks of coal that refused to budge with the exertion of mere human strength, so for these stubborn masses, the men would rig a simple crane to the flatboat and use a chain to hoist the large slabs onto the raft. The entire process was highly efficient and required almost no capital investment, apart from the price of labor; and even Tuomey, an accomplished Irish-born engineer with extensive knowledge on coal mining technology, was led to conclude: "Notwithstanding the primitive appearance of this method…I am inclined to think that in no other way could coal be raised at an expense so moderate."[34] With more than enough easily accessible coal outcrops to satisfy their limited demands, these early miners had no incentive to develop and implement expensive mining operations.

As demonstrated above, pre-industrial mining operations, like those of Hanby, exercised both thrift and expedience in order to guarantee profitable coal economies; however, what set them apart from later large-scale coal operations was the fact that natural limitations—rather than technological constraints—chiefly determined the convenience and productivity of their business undertakings. For example, most of these early pioneers were farmers by trade and considered mining only as a secondary source of income. They therefore turned to small-scale coal operations during the off-season when the land ceased to be productive, reaping greater profits by extracting coal from the exposed outcrops scattered across the countryside.[35]

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[34] Tuomey, Michael, as quoted in Armes, Ethel. *The Story of Coal and Iron*. 1910, 49.
[35] Flynt, Wayne. *Poor But Proud*, 1989, 116.

This abundance of readily available coal also meant that most farmer miners avoided costly underground operations that required both large capital investments and extensive labor organization—a fact that induced state geologist Tuomey to recommend "systematic modes" over "these unworkmanlike practices."[36] Of course, even Tuomey admitted "expensive operations [were] not necessary," since the environment naturally provided exposed ore beds and coal seams, "thick, and in every instance, situated on high ground."[37] In his *First Biennial Report on the Geology of Alabama*, Tuomey also noted that the organized underground labor, required by his recommended "systematic modes," was "inimical to the free hunter habits of our working population."[38] The geologist thus recognized that both the geological characteristics of the natural landscape and the natural habits of the working people controlled the pace and development of early coal mining operations throughout the region. For the members of these small agriculture-based communities, reaping immediate benefits from the natural work environment through skilled manual labor presented the most viable and attractive option for survival.

2.6 CONCLUSIONS

Michael Tuomey's frustration with "the free hunter habits" and "unworkmanlike" mining techniques of the early Alabama coal miners, which he viewed as an impediment to his own "systematic modes," signified the beginning of a shift from small-scale independently financed mining operations to large-scale corporate and government funded coal mines. When he first visited Hanby's coal operations in 1848, Tuomey,

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[36] Tuomey, Michael, as quoted in Armes, Ethel. *The Story of Coal and Iron*. 1910, 49.
[37] Tuomey, Michael, as quoted in Armes, Ethel. *The Story of Coal and Iron*. 1910, 49-50.
[38] Tuomey, Michael. *First Biennial Report on the Geology of Alabama.* Tuscaloosa, Alabama: M.D.J. Slade, 1850, 95-96.

representing the newly emerged class of industrial coal owners, engineers, and business investors, had recently been appointed state geologist by the Alabama legislature.[39] Prior to this time period, during the Jacksonian era, small farmers and "citizens of more moderate means," with an interest in preserving small-scale agricultural communities, largely controlled the state government and thus resisted steps towards large-scale industrialization.[40] However, with political pressure from the Broad River group, a wealthy class of planters with large holding interests in the mineral districts of the north-central Alabama, the state government made the momentous decision to allocate funding towards the industrial development of Jones Valley during the later 1840s and early 1950s.[41]

Their efforts proved fruitful because in 1850 Tuomey published a detailed report describing the location and size of ten individual coal beds, vast deposits of iron ore, and even greater quantities of limestone.[42] Eight years later, he served as a geological consultant to the railroad engineer M. Childe by recommending an alternative route for the state funded North and South Railroad. Prior to his proposal, railroad engineers had sited the line between Tuscaloosa and Elyton, thus completely circumventing Jones Valley and the massive Warrior coal field. However, in an a short letter to the state railroad engineers, to which he attached his 1849 geological map depicting the location of valuable coal reserves, Tuomey made the following alternative recommendation:

> We have carefully prepared this Map to illustrate our argument in opposition to the present contemplated line of the location of the North East and South West Alabama Rail Road…by which the Warrior Coal

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[39] Armes, Ethel. *The Story of Coal and Iron*. 1910, 49.
[40] Lewis, W. David, *Sloss Furnaces,* 1994, 15.
[41] Lewis, W. David, *Sloss Furnaces*, 1994, 15-17.
[42] Tuomey, Michael. *First Biennial Report on the Geology of Alabama.* Tuscaloosa, Alabama: M.D.J. Slade, 1850

> fields are avoided. We contend that the route ought to be more direct, and that it should pass immediately through the immense valuable Coal deposits North of the present line.[43]

While Tuomey admitted that his proposed route would require additional funding from the state legislature because the country in the Warrior coal field was "broken and ragged," the Broad River group supported his suggestion because they intended to develop an industrial city in Jones Valley, later to be known as Birmingham.[44] Continued pressure from this influential political group eventually succeeded in changing the original path of the line, and in 1871, the state completed the 295-mile railroad, which began at the southern Tennessee border, cut directly through the Warrior coal field in Jones Valley, and ran all the way to a junction near Mobile.[45]

The Alabama state legislature, by financing Tuomey's coal prospecting expeditions and the subsequent construction of the North and South railroad, played a key role in the emergence of industrial coal mine operations in the Birmingham District. As Lewis explains in *Sloss Furnaces: The Rise of the Birmingham District*, "The growth of Alabama's railroads contributed greatly to the state's emergence as an important producer of coal and iron, both heavy, bulky commodities requiring rail transport for fast, effective distribution."[46] Indeed, the construction of this railroad opened new markets for coal and iron by unlocking the valuable mineral reserves of Jones Valley that were previously only accessible by river. With new demands for coal and iron, the Broad River associates and other wealthy shareholders now had far more to gain by investing in

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[43] Letter from Michael Tuomey. *Independent Monitor Office*. Tuscaloosa, Alabama, January 18, 1858. Letter attached to Tuomey, Michael "Geological Map of Alabama." Published by Ackerman's Lithography: New York, 1849. W. S. Hoole Special Collections Library. University of Alabama.
[44] Letter from Michael Tuomey. *Independent Monitor Office*. Tuscaloosa, Alabama, January 18, 1858. W. S. Hoole Special Collections Library. University of Alabama; Lewis, W. David, *Sloss Furnaces*, 1994, 50.
[45] Lewis, W. David, *Sloss Furnaces*, 1994, 50.
[46] Lewis, W. David, *Sloss Furnaces*, 1994, 50.

the industrial development of the Warrior coal field. Moreover, because the state's expedient introduction of the efficient railway replaced the obsolete practice of flatboat building, which once characterized the technological focus of pre-industrial mining communities, the new industrial class of coal operators could exercise thrift in consolidating its capital in the research and development of extractive mining machines and equipment.

CHAPTER 2: MECHANIZATION OF THE MINES

"The machine does not isolate man from the great problems of nature
but plunges him more deeply into them."
~ Antoine de Saint-Exupéry, *Wind, Sand, and Stars*, 1939

3.1 INTRODUCTION

During the pre-industrial mining period in Alabama, the development of safe flatboats for coal transportation constituted the main focus of technological innovation, and most miners relied upon the versatility of their personal skills and crafts in order to execute profitable coal operations. Moreover, they gained most of this knowledge and skills from direct contact with the natural environment, which for them also represented their only known work environment. For this reason, thrift and expedience in early coal mining followed from the limitations presented by nature as well as the varying abilities of the workers themselves.

When and why did Alabama miners decide to forgo the advantages presented by their natural surroundings and personal autonomy, and seek expensive technological solutions to enhance coal productivity, at the expense of health and safety? In 1889, retired Pennsylvania miner Homer Green attempted to explain a similar phenomena among anthracite coal mining in his home state. According to Homer, small scale mining operations along open outcrops initially dotted the landscape, "…but when it became necessary, as it soon did, to penetrate more deeply into the earth for the article of trade, then the cost of shafting, tunneling, and mining in general usually exceeded the resources of the individual operator, and either he succumbed to financial distress, or disposed of his mining interests to men or firms with more money."[1]

Homer's explanation of resource limitations as a cause for technological innovation and corporate financing has a great deal of historical evidence in favor of it, not only in Pennsylvania but also in Alabama. In 1859, English-born geologist Joseph Squire moved to north-central Alabama and took note of the exhausted mines that characterized the landscape. He described the abandoned openings in the Montevallo seams as "a picture of desolation," and even ventured his opinion that the coal miners would welcome technological applications to resurrect their stagnant mine operations.[2] "The miners," he wrote, "seemed to be building their hopes on the hoisting steam engine and boilers coming from Pennsylvania as a means of lessening the labor and increasing the facilities for mining and getting out coal."[3]

Of course, an astute historian must keep in mind that Squire addressed his comments as a trained geologist with a personal financial stake in large-scale coal operations, which would require his scientific expertise. Whether new mining technology appeared to Alabama miners as a means of redeeming the coal trade or displacing their previous small-scale operations is a matter of interpretation. In fact, despite the picture of abandonment and desolation that Squire observed, certain evidence suggests that some miners responded negatively to the new mining methods introduced. In 1859, Squire leased the east side of the Irish pit entrance in the Montevallo seam from a local mine owner, and with the capital backing of Alexander Anderson and John Whitehead, he improved the haulage system and subsequently reduced overall mining

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[1] Green, Homer. *Coal and the Coal Mines*. Houghton, Mifflin and Company: Boston, 1889, 69.
[2] Squire, Joseph, as quoted in Armes, Ethel. *The Story of Coal and Iron*, 1910, 154.
[3] Squire, Joseph, as quoted in Armes, Ethel. *The Story of Coal and Iron*, 1910, 154.

costs by seventy-five percent. The mine superintendent, however, viewed such improvements as a threat because, as Squire recalls, "[The owner] began to put obstacles in our way, for he evidently looked upon our low cost coal as an evidence against his method of mining."[4] Squire identifies his superior "low cost coal" as the primary source of friction between his technological innovations and what he viewed as the more primitive methods of the small-scale mining operations. However, when considering the additional costs to human health and safety posed by these new technological applications, the idea of thrift and expedience in coal mining takes on a new meaning.

Indeed, evidence suggests that the source of hostility between independent miners and financed industrialists may have been attributed to the increased risks and hazards, rather than the "low cost coal," that emerged from these technologically modified work environments. Earliest accounts of underground mining operations in north-central Alabama certainly present a grim portrait of these subterranean work conditions, where coal operators often ignored mining hazards due to the use of dispensable slave labor. During the Civil War, for example, W. H. Thompson of Bibb County received a contract from the Confederate government to produce coal from the Upper Thomson mine. After being driven from his plantation home by the Union army, he commenced underground mining operations using his plantation slaves as laborers. Frank Fitch, a local Bibb County resident, later furnished an account of this new work environment inhabited by the slaves. With an air of nostalgia and, at times, despair, Fitch recalled:

> It was a severe life [and] all the comforts in health and in sickness of the good old plantation homes became but memories. Nothing was offered to alleviate the deprivations and suffering incident to the sudden, death-dealing change.[5]

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[4] Squire, Joseph, as quoted in Armes, Ethel. *The Story of Coal and Iron*, 1910, 155.
[5] Squire, Joseph, as quoted in Armes, Ethel. *The Story of Coal and Iron*, 1910, 151.

Moreover, with the mine full of water and no efforts made to install a pump, Thomson forced his slaves to work in miserable wet conditions, which only exacerbated the rate of death and incidence of disease.[6] Where once flatboats and human skill characterized the early coal economy, graveyards and hazardous work environments became the new hallmark of underground mining operations.

While industrialism brought many changes in the organization of labor and the use of human skills, a great deal of the problems it created emerged out of the previous mining traditions outlined in Chapter One. Like the early miners who drew upon the variety of their human skills to meet the demands presented by the natural work environment, capitalists and engineers similarly responded to nature through the application of various technologies, such as mine pumps, haulage equipment, and ventilation systems. Moreover, as the application of these new technologies "utterly transformed the ecology of colonized areas," as McEvoy suggests, they presented novel environmental challenges that subsequently created unexplored physical experiences and necessitated new industrial solutions.[7] In other words, technological applications literally became extensions of the natural environment, and like the early miners who gained their knowledge and skills from nature, industrialists developed similar connections to this technologically modified natural environment. Finally, and most importantly, the need for thrift and expedience continued to drive the technological decision-making of capitalists and engineers, the only difference being that, with miners now excluded from this process, concerns for health and safety took a backseat to productivity and financial gain.

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[6] Fitch, Frank, as quoted in Armes, Ethel. *The Story of Coal and Iron*, 1910, 151.
[7] McEvoy, Arthur. "Working Environments," 1995, S152.

Given the many similarities between early mining practices and later nineteenth century industrial coal operations, this chapter will explore the continuities that existed between these two mining eras. Moreover, it will further examine how these traditions encouraged the use of new technologies that supplanted the skills of workers, created new work environments entirely different from the ones inhabited by pre-industrial miners, and slowly shifted the dangerous side-effects of production upon the workers and the environment.

3.2 THE ERA OF TECHNOLOGICAL SOLUTIONS

In the same way that the imaginative artisans of the pre-industrial era relied upon their various humans skills to execute early mining operations, capitalists and engineers of the late nineteenth century similarly sought technological solutions to meet the demands of large scale coal operations. Moreover, whether it was human techniques or machine techniques, both instances, as McEvoy argues, depended upon "demography, local resource endowments, and other contingencies."[8] For the early Alabama miners, such contingencies included easily accessible coal outcrops, high waters, and navigational skills. They relied upon simple technologies like iron crowbars, cranes, and wooden flatboats, but the overwhelming majority of their success depended upon the availability of coal and the versatility of human skill. Naturally, the later industrialists also depended upon local resource endowments, such as the presence of vast underground coal deposits; however, their mining operations were more contingent upon the availability of technology, rather than human skill, in order to reach these deposits.

[8] McEvoy, Arthur. "Working Environments," 1995, S153.

In August of 1892, Colonel Alfred M. Shook, vice-president of the Tennessee Coal Iron & Railroad Company (TCI), estimated the vast wealth of mineral endowments located in the Birmingham District. Addressing the company's stockholders, who would ultimately finance the exploitation of these coal reserves, Shook wrote:

> Measures of the Warrior coalfield comprise 7810 square miles, over 3,000 feet thick with about five seams of coal…Estimating, however, that the workable area of this coal is only five hundred square miles and seventy-five feet in thickness, we would have a block of coal seventy-five miles longs by fifty miles wide and ten feet thick, or say, 37,500,000,000 tons, enough to last about 10,275 years, at the rate of 10,000 tons per day.[9]

Of course, while Shook makes the distinction between 'workable' and 'unworkable' seams, he excludes mention of the characteristics that actually qualify this distinction—namely, the ability of modern technology to expose the seams hidden beneath hundreds of feet of dirt and stone. Despite this omission, however, there exists evidence that he did indeed recognize the fact that the availability of modern mining technology greatly enhanced the value of underground coal seams. In an 1887 address before the Tennessee Historical Society, Shook explained why the company managed to acquire so much mineral wealth at so little a cost during the 1850s, noting, "The lands at this time had, in fact, absolutely no value. Men would not buy them even at twelve and one half cents per acre."[10] On the other hand, the newly formed Tennessee mining company, possessing the tools necessary to exploit the land, recognized an opportune business investment and elected to concentrate its mining activities in north-central Alabama. Shook's acknowledgement of the rising value of mineral wealth facilitated by the application of

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[9] Shook, "Iron and Steel in the South," September 10, 1897. File 386.4.26. A. M. Shook Files. Birmingham Public Library Archives.
[10] Shook, Alfred M., as quoted in Armes, Ethel. *The Story of Coal and Iron*, 1910, 364.

new technology thus became central to the rhetoric of industrial coal mining promotion during the latter half of the nineteenth century.

Alabama industrialists and civilians alike came to recognize technology as the new promise of wealth during this time period. In 1886, Colonel Enoch Ensley, president of TCI, made public his plans for a new town he intended to build in the heart of the Birmingham mineral district: "I intend to fill this valley, from the foot of the chert ridge yonder to the Pratt Railroad, with manufacturing plants. I'm going to build four big blast furnaces and a steel plant."[11] Indeed, between the years of 1885 and 1893, thirty-one new blast furnaces sprung up throughout the region, increasing iron production by nearly four hundred percent; and the regional population subsequently increased to 88,501 persons, with over 21,000 of these individuals employed in nearby furnaces, rolling mills, foundries and mines.[12] Of course, unlike the early miners who flocked to the region to bear their strength and utilize their human skill according to the challenges they faced in the natural work environment, these later industrial workers encountered an entirely new work environment, modified by technology and no longer dependent upon individual innovation and specific human skills.

The year 1876 marked an important year in the history of coal mining, both in Alabama and across the United States. In that fateful year, an Alabama engineer sunk the first deep shaft mine in the Birmingham District, and an American engineer by the name of George Henry Corliss presented to a crowd of onlookers at the Philadelphia Centennial the grand Corliss steam engine, whose fires would be used to power even deeper shaft

[11] Enoch Ensley, as quoted in Armes, Ethel. *The Story of Coal and Iron*, 1910, 395.
[12] Fuller, Justin. "Boom Towns and Blast Furnaces: Town Promotion in Alabama, 1885-1893." *The Alabama Review.* Volume 24, Issue 1. January, 1976, 38. White, *An Industrial History and Guide,* 1980, 48.

mines across the country. The sinking of this mine and the introduction of Corliss' powerful piece of machinery both signified an ongoing shift in the mining industry from dependency on human skill to dependency mechanical skill—a change that carried important implications for worker autonomy. As Keith Dix explains, "the miner's freedom and privileges as an independent craftsman were most restricted in the deeper mines…as coal output shifted to shaft and slope mines, it became increasingly difficult for the mine worker to leave the mine at will."[13]

3.2 PRISONS UNDERGROUND

The earliest mines in Alabama were drift mines, driven horizontally into a hillside along exposed coal seams in the face of a ledge or cliff. Drift mining, according to one nineteenth-century observer, was the most "favored mode of entry" because the men could enter and exit the tunnel at will, without relying upon expensive haulage equipment and lifts to transport them.[14] Moreover, because the floors of the drift mine were driven at a horizontal or slightly upward grade, the miners could use wheelbarrows or gravity to bring the coal out of the mine.[15] The upward angle of the tunnel also acted as a natural drain for any unwanted water encountered in the mines.[16] Miners required so little technology to extract coal from these types of mines that Henry DeBardeleben, who later founded the Pratt Coal and Coke Company, once offered the following description of an Alabama drift mine to a crowd of potential investors: "I know a coal mine, gentlemen,

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[13] Dix, Keith. *Work Relations in the Coal Industry,* 1977, 4.
[14] Green, Homer. *Coal and the Coal Mines*, 1889, 80.
[15] Interview with Reese Millet, Alabama Mining Engineer and Geologist. August 10, 2005.
[16] Green, Homer. *Coal and the Coal Mines*, 1889, 81.

where nature herself has driven the main entry for clean a hundred miles."[17] Of course, DeBardeleben's estimate of "a hundred miles" was somewhat exaggerated, but he was quite right in his suggestion that "nature" greatly facilitated the process of coal extraction in this particular drift mine.

As miners exhausted the naturally accessible coal reserves in drift mines, DeBardeleben and other industrial mine owners concentrated their technological investments in slope and shaft mines, which as Dix explains, greatly decreased the freedom of the mine worker. Slope mines, unlike drift mines, tunneled downwards into the dip of a coal seam at an angle of twenty degrees or more. They therefore required haulage equipment and pumping apparatus in order to transport men, haul cars of coal, and expel water from the mine.[18] Oftentimes, the degree of incline in a slope mine was not so extreme that it prevented men from escaping by foot in the event of an explosion or cave-in; however, once a miner entered a shaft mine, he was completely dependent upon a vertical lift in order to exit the mine.

A mine shaft is a vertical passageway, often hundreds of feet in depth, which is used to access underground coal reserves that are otherwise buried beneath layers and layers of earth. TCI's Shaft Number One at the Pratt Mines, for example, descended vertically 230 feet into Pratt seam. For the Alabama miners who worked in this mine, a lift, powered by a coal-fired winding engine at the surface of the shaft, provided the only means of transport in and out of the mine.[19] Moreover, once in the underground shaft mine, these miners endured some of the most inhospitable and bleak work conditions due

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[17] DeBardeleben, Henry, as quoted in Armes, Ethel. *The Story of Coal and Iron*, 1910, 343.
[18] Green, Homer. *Coal and the Coal Mines*, 1889, 84.
[19] Fuller, Justin. "History of the Tennessee, Coal, Iron, and Railroad Company, 1852-1907." Ph.D. dissertation. University of North Carolina at Chapel Hill, 1966, 191.

to the tendency of these mines to fill up with water, methane, coal dust, and other injurious substances.[20] The following portrait of a late-nineteenth century Pennsylvania shaft mine offers a glimpse of the mine conditions under which these Alabama miners labored:

> "Bare, brawny arms become visible and are withdrawn, men's voices sound strange, there is a constant rumbling of cars, a regular clicking sound as the carriage stops and starts, incessant shouting by the boys; somewhere the sound of falling water…Everything is black and dingy; there is no color relief to outline the form of any object.[21]

Alabama miners would have been imprisoned by similar circumstances in the late nineteenth century industrial shaft mines, which not only grew in number but also in size, with underground workings often spanning the width of a mile in some of the more technologically developed mines. Of course, the miner not only faced physical entrapment in the mines, but the application of new technology in these deep mines also devalued his strength and skills as an individual worker.

3.4 "AN ATHLETE OF STEEL AND IRON"

In 1876, a crowd of onlookers gathered together at the Philadelphia Centennial to witness the unveiling of the Corliss steam engine, a powerful piece of machinery that would revolutionize the process of underground coal mining. Upon its reception, the engine itself sat in the central transept of the hall, connected to over thirteen acres of machinery that would soon whirl into action upon firing of the engine's gigantic boilers. As Dee Brown later noted in *The Year of the Century, 1876*, "The Corliss engine [was] destined to be the favorite attraction of the Exhibition…a prime example of the giantism

[20] Interview with Reese Millet, Alabama Mining Engineer and Geologist. August 10, 2005.
[21] Green, Homer. *Coal and the Coal Mines*, 1889, 128-130.

that nineteenth-century Americans admired in their mechanical marvels."[22] Contemporary observer and newspaper reporter William Dean Howells, for example, referred to the machine in the *Atlantic Monthly* as "an athlete of steel and iron," thus symbolizing the new nineteenth century standards of strength and skill.[23] Among the "mechanical marvels" performed by this "athlete" before its enthusiastic crowd were spinning, printing, sewing, lithography, and other useful services required by the general public.[24] However, the unseen uses of this new machine included pumping mine water and moving heavy cars full of coal; by 1882, John T. Hardie and William Tynes had founded the profitable Hardie-Tynes Manufacturing Company in East Birmingham, which "was particularly well known for building Corliss steam engines."[25] Of course, the customers that kept their company in business were not the shoemakers and cloth makers appealed to at the Philadelphia Centennial but the industrialists and engineers with an interest in large-scale mining operations.

Alabama industrialists and engineers required the use of the Corliss engine's steam power in the mines because as they plunged deeper into the earth, it became increasingly difficult to keep the mine tunnels dry and haul loads of coal with mere human strength alone. In an 1895 report on TCI's Whitwell mines in southeastern Tennessee, Alabama-based engineer Erskine Ramsay explained this growing difficulty with respect to mine water accumulation: "As the mines become more extensive, the amount of water generated naturally increases, and it is very likely that it will then be

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[22] Brown, Dee. *The Year of the Century: 1876.* Charles Scribner's Sons: New York, 1966, 129.
[23] Howells, William Dean, "A Sennight of the Centennial." *Atlantic Monthly*, Vol. 38, 1876, 96.
[24] Brown, Dee. *Year of the Century*, 1966, 129.
[25] Lewis, W. David, *Sloss Furnaces*, 1994, 282.

found advisable to pipe this water down."[26] Ten years later, W. R. Crane produced a similar assessment in an article on "The Pratt Coal Mines in Alabama," which appeared in the January issue of the *Engineering and Mining Journal.* Referring to the need to implement electric haulage in the Pratt Mines, Crane explained, "The miners object to pushing cars up grades higher than five percent, and occasionally the grade of the heading [in the Pratt Mines] exceeds that allowable for ordinary methods."[27] Ramsay and Crane's observations demonstrate an important characteristic of industrial mining that distinguishes it from the early small-scale coal operations in northern Alabama. Where pre-industrial coal miners would have looked upon excessive water accumulation or steep headings as a reason to curtail mining operations, late nineteenth-century mining engineers viewed such situations as challenges, rather than limitations, requiring technology to overcome.

Of course, this observation is not meant to suggest that early Alabama miners did not also seek new methods and innovative techniques as a means of maximizing coal outputs. As demonstrated in Chapter One, David Hanby, William Jones, and other pre-industrial miners harnessed the use of flatboats and crowbars in order to extract the valuable mineral from outcrops and transport it by river to the coal markets in Mobile. While their overall goal was to increase coal profits, however, their choice and use of technology largely depended upon their own human limitations and willingness to expose their bodies to peril and risk. Because they controlled the environment in which they labored, these early miners could decide whether the profits earned by the application of new technologies outweighed the human and environmental costs incurred by their use.

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[26] Report on Whitwell Mines for TCI, 1895. Erskine Ramsay Papers. File 1.1.9. Birmingham Public Library Archives.
[27] Crane, W. R. "The Pratt Coal Mines," 1905, 179.

Industrial coal operators, on the other hand, did not function under the same rationale because the human and environmental risks of new technologies had little bearing over their own lifestyles and well-being. For them, natural and human limitations merely represented obstacles that stood in the way of coal profits, and machines like the Corliss steam engine provided the solution to overcoming these natural barriers, even at the expense of human skill and worker welfare. As McEvoy explains, “Machinery, in this view, is the means by which owners and representatives of capital take control over the workplace away from those who do the work.”[28] Indeed, if technology determined the conditions of the work environment and Alabama coal operators controlled the pace and development of that technology, then McEvoy’s view of machinery is quite accurate. Between the years of 1888 and 1905, Alabama engineers introduced a number of technological innovations that not only responded to specific geological limitations but also redefined the work environment of the individual miner.

3.5 FULL STEAM AHEAD

At the height of their productivity, the coal mines in Alabama actually employed more mechanical power per ton of coal produced than any other mining region in America. Former Alabama mining engineer Reese Millet estimates that during this time period, roughly ten percent of the coal extracted from the mines was used to power all of the mining machinery.[29] This phenomenon was largely due to the unusual ‘challenges’ and geological features of the Alabama mineral reserves, such as dirty coal and faulty

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[28] McEvoy, “Working Environments,” 1995, S160.
[29] Interview with Reese Millet, Alabama Mining Engineer and Geologist. August 10, 2005.

seams.[30] The coal, for example, contained high levels of sulfur and needed to be burned and purified in coking ovens before it could be used to make iron. The coal seams themselves were ridden with faults, or rifts, that also required unique technological adjustments. Unlike the continuous coal seams in the well-endowed mineral districts of Pennsylvania and West Virginia, where mine owners could operate long and more productive mine headings, Alabama mining engineers had to work with shorter headings due to the breaks in the coal seams along Jones Valley.[31]

Owing to these natural challenges, TCI's Pratt Mines in northern Alabama underwent a series of technological modifications under the supervision of Erskine Ramsay between the years of 1888 and 1905, eventually leading to their national recognition among engineers in *The Engineering and Mining Journal.* Praising TCI's Slope Number Three mine as "one of the largest and best equipped mines in the district," Crane wrote of the Pratt Mines in 1905: "That the conditions warrant such extensive equipment speaks well for the future of coal-mining."[32] Such conditions included the uneven and faulty coal seams; and in 1888, "on account of the irregular and steep grades," Ramsay found necessary the use of an endless rope haulage system in the Pratt Mines.[33] This particular haulage system, as Ramsay later described it, was the "first of its kind" and could perform the work of 30 mules and 30 men combined.[34]

The most common form of haulage used in mines across America during the 1880s was the tail rope system, but Ramsay chose the endless rope haulage system to

[30] Bergstresser, Jack Roland. "Raw Material Constraints," 1993, 99; "Auburn and Industry." May 20, 1929. Erskine Ramsay Papers. File 1.2.21. Birmingham Public Library Archives.
[31] Bergstresser, Jack Roland. "Raw Material Constraints," 1993, 72.
[32] Crane, W. R. "The Pratt Coal Mines," 1905, 180.
[33] Ramsey, Erskine. "The Pratt Mines and Coke Plant." *The Colliery Engineer.* Volume 8, January 1888.
[34] Ramsay to G.B. McCormack, General Manager, on Pratt Division, February 13, 1896. Erskine Ramsay Papers. File 1.1.1D. Birmingham Public Library Archives.

account for the short mine headings in the Alabama mines. The more prevalent tail rope system, which was better suited for longer mine headings in the unbroken coal seams of the North, consisted of a steam-powered hoist attached to two ends of cable—one which hauled loaded cars to the surface of the mine and the other that returned the cars to the bottom of the slope.[35] Because these headings were long and continuous, one tail rope system could be installed to move the coal cars up and down the length of the mine. However, because TCI's Pratt Mines consisted of several short headings branching off from the main heading, the same system would require a series of intermediate tail rope haulage tracks. This system would not only amount to considerable costs; it would also be highly inefficient because coal operators would have to stop the main haulage line every time a trip of cars was ready to be loaded onto the track from one of the many short headings.

The endless rope haulage system, on the other hand, used a long wire rope that extended 4,000 feet into the mine and move continuously at a slow speed. Rather than attaching the cars to a track, the miners could position the loaded cars beneath the wire, "where they were snagged by an overhead latching device and pulled to the surface."[36], which hauled the car to the surface. Ramsay describes the benefits of the system in an engineering article published in *Mines and Minerals*:

> The great beauty about this plan of hauling coal as compared with the ordinary endless rope, or the more prevalent tail rope system, in both of which the cars are hauled in trips, is that no matter how long the haulage is, the capacity to deliver coal at the tipple is in no manner reduced. The coal will be delivered at the tipple just as fast as it is attached to the rope at various stations; but, of course, the longer the rope is, with a given distance between the cars, the greater will be the total number of cars

[35] Bergstresser, Jack Roland. "Raw Material Constraints," 1993, 58.
[36] Bergstresser, Jack Roland. "Raw Material Constraints," 1993, 58.

> attached to the rope at any one time, and therefore more powerful machinery will be required.[37]

This cheap and efficient method of hauling coal thus proved appropriate for the specific geological conditions presented by the Alabama coal seams. Although, as Ramsay suggests, the system required additional investments in more powerful engines and machinery, its promise to deliver a constant supply of coal outweighed the costs of additional technological investments.

Crane and other industrial mining engineers found Ramsay's endless rope haulage system appealing, not only for its ability to haul coal and adjust to unusual geological conditions, but also for its capacity to supplant and exceed the work of human laborers. In his 1905 article on the Pratt Mines, Crane stated quite bluntly that electric haulage was "preferable to mule haulage," because a mule could only carry a maximum of five cars whereas an electric motor could make a trip of twenty cars.[38] However, a factor that Crane failed to mention, but which certainly played an important role in the adoption of this technology, was that electric haulage also increased coal owner's control over the rate of coal production. Previously, the freedom of the mule-driver to leave the mines "caused delays and uncertainties in production that were beyond the mine owner's power to regulate," explains Dix.[39] However, with mechanized haulage, miners could no longer haul coal at their own pace but were instead subject to the constant rattle of an approaching coal car. This advantage was particularly true of Ramsay's endless rope

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[37] Ramsey, Erskine. "New Endless-Rope Haulage Plant." *Mines and Minerals.* Volume 24, December 1903.
[38] Crane, W. R. "The Pratt Coal Mines," 1905, 178.
[39] Dix, Keith, *What's a Coal Miner to Do? The Mechanization of Coal Mining.* University of Pittsburgh Press: Pittsburgh, Pennsylvania, 1988, 82.

haulage system because it reduced worker control over the workplace and eliminated the need for skilled mule-drivers.

Of course, the use of these new haulage systems in the Pratt Mines required additional steam and equipment, especially as the mine tunnels penetrated even deeper into the earth; in 1896, Ramsay instituted a number of expensive modifications in Pratt Shaft Number One and Pratt Slope Number Two to meet these challenges. He first installed a more powerful steam engine at the surface of the mines in the boiler room to power the 5,000-foot haulage line in Slope Number Two.[40] He then replaced the sixteen-pound tee iron rail in Shaft Number One with sturdier thirty-pound rails and extended the length of the haulage from 5,000 feet to 6,000 feet.[41] This extension subsequently brought a flood of water into the mine, necessitating the installation of a McArdle pump shaft with a depth of over 230 feet in Shaft Number One and another pumping shaft of depth 210 feet in Slope Number Two.[42] Finally, to channel the large quantities of water pouring forth from the entrances of these two mines, Ramsay added a twelve-inch cast iron and an eight-inch wrought iron discharge line to deal with the excessive flow.[43]

A significant point to note of these later mine additions—the upgraded boiler house, the extended rope haulage, and the extensive pumping apparatus—is that they no longer responded to naturally-created environmental challenges, like a flood or thunderstorm, but to challenges arising from technological exploitation of the mines. Thus, while mining engineers across the United States may have encountered similar

[40] Ramsay to G.B. McCormack, General Manager, on Pratt Division, February 13, 1896. Erskine Ramsay Papers. File 1.1.1D. Birmingham Public Library Archives.
[41] Ramsay to G.B. McCormack, General Manager, on Pratt Division, February 13, 1896. Erskine Ramsay Papers. File 1.1.1D. Birmingham Public Library Archives.
[42] Ramsay to G.B. McCormack, General Manager, on Pratt Division, February 13, 1896. Erskine Ramsay Papers. File 1.1.1D. Birmingham Public Library Archives.
[43] Ramsay to G.B. McCormack, General Manager, on Pratt Division, February 13, 1896. Erskine Ramsay Papers. File 1.1.1D. Birmingham Public Library Archives.

problems through mine exploration, for which a common set of solutions were often proposed, the fact remains that these problems did not arise naturally but through human intervention. In other words, both the miners and engineers were working in and dealing with technologically modified work environments, which had replaced the natural work environments common to pre-industrial miners. William Cronon, in his book *Nature's Metropolis,* uses the terms "first nature" and "second nature" to distinguish between these two types of environments.[44] Applying Cronon's theoretical construct to coal mining, "first nature" refers the original untainted nature in which the pre-industrial miners worked and operated, while "second nature" defines the new artificial environments created by the mechanical development of these industrial coal mines. Each environment warranted a different set of responses and technological solutions, which ultimately defined the coal miner's relationship with his surroundings.

3.6 THE SUBTERRANEAN WILDERNESS

Despite their newly modified work environments, the industrial engineers and miners maintained a relationship to their physical workplace similar to that of the pre-industrial miners. Like the early miners, the late nineteenth-century engineers sought opportunities to increase productivity, and the industrial miners similarly identified with and adjusted to the conditions of their work environment. While technology may have supplanted the use of human skill, and underground mine sumps may have replaced free-flowing creeks and streams, it is important to recognize that the act of mediating the relationship between humans and the environment remained consistent through this

[44] Cronon, William. *Nature's Metropolis: Chicago and the Great West.* W. W. Norton & Company: New York, 1992.

period of extensive mine mechanization. These industrial workers did indeed occupy mechanized subterranean tunnels rather than natural riverbeds and streams. However, as biological beings, they still required the basic services supplied by nature, such as an adequate oxygen supply and proper nutrition. Moreover, because these miners obtained their livelihood by working in these environments, they connected with and gained knowledge from the conditions that sprung forth from these modified workplaces.

In 1889, Pennsylvania miner Homer Green furnished a detailed report of work conditions experienced by miners in a deep shaft mine, the environment of which constituted the extent of their daily interaction with nature. In describing the general aesthetics of the mine, he wrote, "You can see through the murky atmosphere the rough walls of solid coal about you, the flat, black, moist roof overhead, the mine car tracks at your feet."[45] Moreover, instead of the birds chirping or the sound of water flowing over creek stones, the normal acoustics of the mine included the "constant rumbling of [coal] cars, [the] regular clicking sound as the carriage stops and starts, incessant shouting by the boys, [and] somewhere the sound of falling water."[46] Such conditions described by Green would have similarly applied to the Alabama mines during this time period and perhaps taken a more miserable tone given the relative lack of laws regulating mining conditions throughout the state. Moreover, in consequence of these grim and often dangerous work conditions, the miners who endured them developed a unique set of habits and attitudes that reflected the nature of their work environment.

Because underground mining operations required the use of explosives and the miners faced the ever-present threat of methane and carbon monoxide and other gas

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[45] Green, Homer. *Coal and the Coal Mines,* 1889, 128.
[46] Green, Homer. *Coal and the Coal Mines,* 1889, 129.

build-ups, the workers were constantly on guard against any possible mine threats and hazards. Moreover, unlike the pre-industrial miners who could mitigate against dangerous river rapids by building stronger boats and navigating during opportune seasons of the year, the dangers presented by underground mines were largely beyond the control of the industrial coal miner. Methane, for example, also known as "firedamp" for its tendency to ignite, was prevalent throughout the Warrior coal field, often seeping into underground mining cavities through tiny fissures in the mine tunnels. This odorless colorless gas could escape detection easily and build up slowly in a particular section of the mine; when this happened, it took but one small spark to set the entire mine in flames. Consequently, firedamp was often the cause of many mining explosions in the Alabama coal fields.[47] Carbon monoxide, on the other hand, also known as "whitedamp," usually only attacked individual miners. This non-flammable but deadly gas could creep up slowly on a miner and kill him before he even recognized that his life was in danger.[48] Finally, "chokedamp," a deadly combination of carbon dioxide and nitrogen, could also take a miner by surprise in the coal mines. Early 17th century English miners used protect themselves against chokedamp through a practice known as "beating out the gas." As George Rosen explains this practice *A History of Miners' Disease*, "a miner simply swung his jacket to and fro for the purpose of creating a current of air."[49] However, in the deep shaft mines of Alabama, such primitive ventilation techniques were ineffective. The miners thus faced constant perils beyond their control, and their daily tasks of exploding coal from the face of the seam often further increased the risk of mining explosions and accidents.

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[47] Lewis, W. David. *Sloss Furnaces*, 1994, 7.
[48] Interview with Reese Millet, Alabama Mining Engineer and Geologist. August 10, 2005.
[49] Rosen, George. *The History of Miner's Diseases: A Medical and Social Interpretation*. 1943, 143.

Unlike David Hanby and other pre-industrial miners who removed coal directly from exposed outcrops with the use of crowbars, these later industrial workers had to descend to depths of two-hundred or more feet, undercut a seam of coal with the use of a hand pick, and use dynamite to blow the coal down from the top of the seam. Alfred J. Renshaw, an Alabama miner who began working for Pratt Consolidated Coal Company at age twelve in 1908, described the method of lighting a squib, or short fuse, to explode the coal down:

> Miners had a needle that you pushed into a hole in the coal with your drill. You pulled the needle out of the coal and put a squib in it. Then you took off because it would shoot pretty quick.[50]

Miners knew from experience that the use of explosives could generate a number of hazards, such as accidental roof falls and explosions in the event gas build-up, so their constant exposure to such dangerous activities meant that they knew how to detect and get out of harm's way fast, as Renshaw suggests. However, quick reflexes did not always protect the miners from impending dangers, and as Renshaw explains, "A rock falls on nearly every coal miner, sooner or later."[51] Renshaw himself incurred a serious injury from a roof collapse while working in an underground mine, which, as he describes it, "crippled me up for a couple of months."[52] Because such injuries were often inevitable,

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[50] Alabama Coal Miners, Volume Six, Alfred J. Renshaw (Jefferson County), By Carl Elliot, Sr. and Susan Crittenden, Northwest Alabama Publishing Company: Jasper, Alabama, 1979. Birmingham Public Library Archives. This particular source is one of a series of volumes available at the Birmingham Public Library. Each volume in this ten volume series includes the oral history of one Alabama coal miner. Carl Elliot, Sr. and Susan Crittenden conducted each oral history in an interview format during the late 1970s.

[51] Alabama Coal Miners, Volume Six, Alfred J. Renshaw (Jefferson County), By Carl Elliot, Sr. and Susan Crittenden, Northwest Alabama Publishing Company: Jasper, Alabama, 1979. Birmingham Public Library Archives.

[52] Alabama Coal Miners, Volume Six, Alfred J. Renshaw (Jefferson County), By Carl Elliot, Sr. and Susan Crittenden, Northwest Alabama Publishing Company: Jasper, Alabama, 1979. Birmingham Public Library Archives.

miners often tried to devise indicators and methods other than intuition and reflex to avoid mining hazards.

Ironically, until the mid-twentieth century introduction of methane detectors and state-of-the-art roof supports, miners often relied upon the use of animals to detect mine threats—a dependency that underscores the miner's relationship with nature. For example, miners looked towards movement or excitement amongst the mine rats as an indication that a roof was about to fall or cave inwards. Renshaw explains the rationale for this reliance upon these seemingly useless and unsightly animals:

> Rats are supposed to have a very keen hearing for any movement in the earth. When a "squeeze" starts in the mine top, they're supposed to be able to hear it before the human ear can pick it up.[53]

Indeed, Renshaw was not the only Alabama miner to recognize the utility of these mine rats. Bennie Amerson, another miner mentioned in Wayne Flynt's book *Poor But Proud*, also noted that when the rats "went a moving," so did he.[54] Additionally, miners also relied upon the use of canaries to detect areas of the mine that lacked sufficient oxygen. White damp, which attached to red blood cells and blocked oxygen uptake, was often most feared amongst the miners because the gas acted upon their bodies quickly and usually resulted in death. However, because a canary was smaller and more susceptible to carbon monoxide poisoning, the bird would suffer symptoms early enough to provide the miner with an adequate warning and enough time to reach safety in a nearby mine tunnel.[55] Thus, mine rats and canaries became indispensable natural companions to the

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[53] Alabama Coal Miners, Volume Six, Alfred J. Renshaw (Jefferson County), By Carl Elliot, Sr. and Susan Crittenden, Northwest Alabama Publishing Company: Jasper, Alabama, 1979. Birmingham Public Library Archives.

[54] Flynt, Wayne. *Poor But Proud,* 1989. 133.

[55] Interview with Reese Millet, Alabama Mining Engineer and Geologist. August 10, 2005.

underground miners who faced the constant threat of rock falls from coal explosions and the risk of carbon monoxide poisoning from poorly ventilated areas of the mine.

The subject of mine ventilation provides another interesting lens through which to view the Alabama miner's connection to nature because, while he inhabited a hostile underground work environment, he still required a sufficient flow of oxygen in order to carry out his work in the mine. Writing in 1889, Pennsylvania miner Homer Green explained this natural dependency of the miner:

> Man is an air-breathing animal. So soon as his supply of air is cut off he dies. In proportion as that supply is lessened or vitiated, his physical and mental energies fail. One of the first requirements, therefore, in all mining operations is that the ventilation shall be good…[56]

Because these underground tunnels had a natural tendency to fill up with methane and other deadly gases, technology often provided the only means of providing sufficient ventilation in the mines. Hence, the development of proper ventilation methods served as an extension of nature and its elements, to which the body of the worker was inextricably bound.

Of course, industrial engineers as well as miners held a stake in the establishment of proper ventilation systems in the mines; otherwise, the buildup of methane or carbon monoxide could lead to explosions, death, and extensive property damage—all of which hindered the productivity of the mines. In 1894, when the Pratt Mines were undergoing expensive modifications and technological renovations in order to expand mining operations, Ramsay notified George B. McCormack, TCI's financial manager, of the need to invest in new ventilation apparatus. Ramsay wrote to McCormack:

> The extension of the mines, make applicable the same remarks in connection with the cost of maintaining adequate ventilation, as it is not an

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[56] Green, Homer. *Coal and the Coal Mines*. 1889, 147.

> easy matter to carry sufficient currents of air into the mines long distances and back again without the leakage amounting to considerable between the inlet and outlet.[57]

Ramsay's comment not only demonstrates the increasing circulation difficulties posed by mine extension; it also shows that mine ventilation was a subject of concern for the mine operators and engineers. However, it should be noted that ventilation most often fell lowest on the list of technological priorities because it did not guarantee increased coal production, and it only marginally benefited the coal owners by securing against mine explosions. Often, the benefits of protecting property in the event of an explosion did not outweigh the costs of installing expensive ventilation systems, and coal owners required either legal or social coercion in order to safeguard the mines.

In 1896, Ramsay wrote again to McCormack requesting funds to bring the ventilation system of Slope Number Three of the Cahaba Mines into compliance with the state law. As he explained to the financial manager:

> The fan on the right side of the slope was found to be incapable of furnishing a sufficient supply of air for the workmen employed in the mines, and in order to increase this so as to meet the requirements of State Law, another fan has been erected over the air-course on the left side of the Slope.[58]

Of course, free miners worked the Cahaba Mines in Blocton, Alabama, so TCI received added pressure from the organized workforce to provide proper ventilation. However, with a shortage of mine inspectors to enforce regulations, mine operators often neglected proper ventilation in the mines worked by convicts, who held no organized power. As

[57] Ramsay to G. B. McCormack, Asst. General Manager, Birmingham Alabama, Pratt City, Alabama December 26, 1894. File 1.1.8. Birmingham Public Library Archives.
[58] Ramsay to G.B. McCormack, General Manager, on Pratt Division, February 13, 1896. Erskine Ramsay Papers. File 1.1.1D. Birmingham Public Library Archives.

late as 1895, for example, TCI's convict mine in Whitwell still used an outdated and dangerous method of air circulation known as furnace ventilation.[59]

Furnace ventilation, illegal in the state of Pennsylvania by this time, employed the use of a furnace at the base of the mine shaft to suck air through its underground passages and out the entrance of the mine. Usually, an air shaft sunk some distance from the entrance, depending on the expanse of the mine, supplied the return air for the underground tunnels. Of course, as the mines grew larger, it became more and more difficult to circulate air through furnace ventilation alone, and the risk of leaks and deadly gas build-ups subsequently increased. As Green explained in 1889, "Furnace ventilation in mines in which explosive gases are generated is dangerous at best, and is now prohibited [in Pennsylvania] by the act of 1885."[60] However, this added danger failed to deter some Alabama mine operators from using this cheap and easy method of ventilation, and in 1891, an explosion occurred in Pratt Shaft Number One, killing nine convicts and one free man.[61] John B. Hooper, one of the few Alabama Mine Inspectors who consistently sided with worker safety, publicly condemned the company: "[The] Tennessee Coal and Iron Company were well aware that this was a gaseous mine, as in the past two years two men have been killed and a number I don't know how many burned."[62] Hooper later criticized the company publicly for its faulty ventilation system, noting that, "a steam jet, while it may be an aid to ventilation, is not sufficient force and not considered reliable."[63]

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[59] Report on Whitwell Mines for TCI, 1895. Erskine Ramsay Papers. File 1.1.9. Birmingham Public Library Archives.
[60] Green, Homer. *Coal and the Coal Mines,* 1889, 151.
[61] Hooper, John de B. "The Pratt Mines Explosion Report." *The Alabama Sentinel.* June 13, 1891.
[62] Hooper, John de B. "The Pratt Mines Explosion Report." *The Alabama Sentinel.* June 13, 1891.
[63] Hooper, John de B. "Shaft No. 1 Pratt Mines." *The Alabama Sentinel.* September 5, 1891.

Hooper was not the only nineteenth century observer to comment on the inadequate ventilation systems in the Alabama mines; the miners themselves often offered their own opinions and observations as well. Following the 1891 Pratt Mine Explosion, the Knights of Labor, an organized labor group founded 1869, published a series of articles in the *Alabama Sentinel* condemning the lack of safety in the mines. In a combined attack on both the convict labor system and poor work conditions that accompanied it, one article provided a series of alarming impressions from convicts working in the mines of Tennessee. Wood Diggs, a prisoner sentenced to five years labor in the mines for robbery, recalled the nearly suffocating conditions of the Briceville mines. "The air is bad," he said. "[It] hurts me in the head…have headache, *bad* cramps the other day."[64] Of course the physical suffering experienced by Diggs from lack of adequate oxygen supply was not limited to the Tennessee mines alone. Alabama miner Alfred Renshaw also recalled nearly suffocating conditions in the Mountaintop Mine of the Pratt Consolidated Coal Company, where he worked from 1908 to 1911. Renshaw later furnished the details of this poor ventilation system in an interview conducted in 1979. "[The mine] had big stacks—tall stacks—on top of the ground with a large fire underneath," he explained. "That [fire] pulled some air through Mountaintop Mine, but barely enough to get by with."[65]

These testimonies of Diggs and Renshaw illustrate an important point regarding the connection between industrial coal miners and their underground work environments during the latter half of the nineteenth century in northern Alabama. While technology

[64] "Convicts in Mines: Horrors of the Lease System of the State of Tennessee." *The Alabama Sentinel.* October 10, 1891.

[65] Alabama Coal Miners, Volume Six, Alfred J. Renshaw (Jefferson County), By Carl Elliot, Sr. and Susan Crittenden, Northwest Alabama Publishing Company: Jasper, Alabama, 1979. Birmingham Public Library Archives.

may have drastically altered the workplace, and at times created perilous situations, the miners still depended upon the basic elements provided by nature, such as oxygen. Moreover, the mines were often so deep and extensive that technological systems offered the only means of achieving these basic elements; and, like the pre-industrial miners who depended upon safe flatboats for transport over the treacherous shoals of the Black Warrior River, these later miners also required adequate ventilation systems to withstand the otherwise suffocating conditions of the deep shaft mines. Another similarity between these industrial miners and their early counterparts was that their work with nature transmitted a specific bodily knowledge and physical experience of their familiar environment. David Hanby, William Jones, and other early pioneers, for example, acquired from their work a knowledge of the ebb and flow of local waterways, a familiarity with the woods, and an eye for easily accessible coal outcrops. Alfred Renshaw, Wood Diggs, and Homer Green, on the other hand, learned from observing animals in the mines that a mine rat could detect a "squeeze" in the mine roof long before the human ear could sense danger and that a dead canary meant a miner faced imminent death from suffocation if he failed to exit the tunnel quickly.

Of course, while the pioneer and industrial miners responded to and connected with nature in similar ways, through their immersion in the work environment, the terms that dictated their relationship with nature were very different. The early miners owned and controlled the development of technology that guaranteed their safety, as demonstrated by their careful construction of flatboats. However, the industrial miners were at the mercy of the mine owners and engineers who controlled the conditions of the work environment and the development of safe ventilation systems. This relationship is evidenced by the fact that Renshaw, Diggs, and other Alabama miners experienced near suffocating conditions while working in the shaft mines as a result of inadequate air circulation. Because the industrial coal operators placed production over the health and safety of the miners, the installment of safe ventilation systems often fell lowest on the list of industrial priorities. As Alabama mining engineer Reese Millet explains of the development of mining technology, "Safety was always one of the outermost concerns."[66]

3.7 THE NEW COSTS OF THRIFT AND EXPEDIENCE

The consequences of death and injury within the mine, and pollution and waste outside the mine, largely resulted from the emphasis on thrift and expedience, which originated in pre-industrial mining and remained a prerogative throughout the process of mine development. However, as previously noted, a major point of difference between these two mining periods was that the industrial miners no longer determined the development of technology. As Arthur McEvoy explains, "[Machinery], in this view, is the means by which owners and representatives of capital take control over the workplace away from those who do the work."[67] Indeed, the social and political transfer of the means of production from the miners to the industrial mine owners meant that human welfare and environmental safety, which once provided limits to the productivity and feasibility of pre-industrial mining operations, became antithetical to the industrial aims of thrift and expedience. Writing on the human and environmental effects of mine mechanization in the anthracite regions of Pennsylvania, McEvoy explains that within

[66] Interview with Reese Millet, Alabama Mining Engineer and Geologist. August 10, 2005.
[67] McEvoy, "Working Environments," 1995, S160.

this shift in priorities, "Death and injury from mine accidents, social strife in mining communities, and environmental degradation from mine wastes were the new costs of wealth created by the digging of anthracite."[68] This section examines the nature and attitudes of the industrial mine owners who created such wealth at the expense of the workers and the environment during the industrial mining period in Alabama.

The industrial coal owners' adoption of mechanized and later electrical haulage in the Alabama mines provides an insightful technological progression for historical analysis because it simultaneously increased the productivity of the mines while further endangering the health and safety of the miners. This corollary sprang from the fact that human-driven mule haulage became too slow and inefficient as the mines expanded, resulting in costly coal car stoppages and delays. In January of 1896, the mine boss for Pratt Slope Number Three explained to TCI engineer Ramsay that the primary factor hindering the production of coal was the lack of efficient mine haulage:

> The mine has a yearly output of 186,084 tons, but it would take 8,091 railroad cars to haul this coal…it would make a train 46 miles long. In a year, we were stopped 177-1/3 hours, on account of having no empty railroad cars, or being blocked with loaded ones. This item alone cost $1,212.30 in day wages.[69]

In 1893, Assistant General Manager Shook had expressed similar concerns to TCI Vice President N. Baxter, noting, "The greatest obstacle to increasing output is the present expensive system of mule haulage."[70] In the interest of savings and expedience, Shook

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[68] McEvoy, "Working Environments," 1995, S171.
[69] S. J. Routledge to Ramsay, Report of Mines bosses for Slope 3, January 1, 1896. Erskine Ramsay Papers. File 1.1.8. Birmingham Public Library Archives.
[70] "Report of Assistant General Manager to Mr. N. Baxter Jr., Vice President, January 31, 1893, Tennessee Divisions." File 382.2.10. A. M. Shook Files. Birmingham Public Library Archives.

recommended the adoption of a more efficient haulage system, such as “rope haulage or electrical haulage.”[71]

Responding to these requests and concerns by the company managers who provided his salary, engineer Ramsay thus invented the endless rope haulage system, which according to his 1903 article in *Mines and Minerals*, managed to increase the output of the Pratt Mines from 700 tons to 1,000 tons of coal per day.[72] “The great beauty of this plan of hauling coal,” he wrote, “is that no matter how long the haulage is, the capacity to deliver coal at the tipple is in no manner reduced.”[73] The primary focus of Ramsay’s description is the efficiency and productivity of his endless rope haulage system, which constituted the main concern among coal owners and mine operators. However, Ramsay fails to mention the effect of mechanized haulage on the life and safety of the mine workers, who suffered increased risks and dangers due to the introduction of this new technology.

With 3,000 pound pit cars emerging from the smoke and steam of the dark mines at a minimum rate of six miles per hour, unsuspecting car collisions constituted the greatest source of injury and death in the mines after rock falls and roof collapses.[74] In 1895, for example, a Blocton coal miner met a gruesome death after colliding head-on with an oncoming coal car. The *Blocton Journal* provided the following detailed description of this horrific event: “The hole the size of a man’s fist was knocked in the

[71] “Report of Assistant General Manager to Mr. N. Baxter Jr., Vice President, January 31, 1893, Tennessee Divisions.” File 382.2.10. A. M. Shook Files. Birmingham Public Library Archives.
[72] Ramsey, Erskine. “New Endless-Rope Haulage Plant.” *Mines and Minerals.* Volume 24, December 1903.
[73] Ramsey, Erskine. “New Endless-Rope Haulage Plant.” *Mines and Minerals.* Volume 24, December 1903.
[74] Crane, W. R. “The Pratt Coal Mines,” 1905, 180.

side of his face and head, scattering his brains in every direction."[75] The risk of injuries like these only increased with the later substitution of mechanical haulage with electrical haulage, which harnessed the power of electric currents rather than steam.

In 1903, when Don H. Bacon took over management of the Pratt Mines for TCI, he replaced Ramsay's endless rope haulage system with an electric tail rope system, which immediately resulted in a number of worker injuries and deaths. Observing this wake of human destruction, one newspaper labeled the Bacon's new system as "positively dangerous."[76] With this development, TCI's miners not only faced the risk of death by coal car collision; they now worried about death by electrocution as well because this new system required them to work alongside power cables carrying 300 volt currents to all the machinery in the mines.[77] The Alabama mine operators neglected to insulate the exposed power cables in the mines because, as labor historian Mark Aldrich explains, it was too expensive.[78] Of course, in the interest of profits and efficiency, this electric tail rope system presented a number of advantages that, for the mine owners, justified its hazardous use at the expense of human safety. In an article published in the journal *Mines and Minerals* a year prior to the installation of this new equipment in the Pratt Mines, G. E. Lynch explained the many advantages of electric power in the mines, which, as he noted, were "all economical."[79] Among the economic rewards of this system included a greater power economy, the extended life of mining equipment due to

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[75] *Blocton Journal*, January 10, 1895, as quoted in, Adams, Charles Edward. *Blocton: The History of an Alabama Coal Mining Town.* Cahaba Trace Commission: Brierfield, Alabama, 2001, 29.
[76] *Engineering and Mining Journal.* Volume 76. September 12, 1903, 409. As referenced in Fuller, Justin. "History of the Tennessee, Coal, Iron, and Railroad Company, 1852-1907." Ph.D. dissertation. University of North Carolina at Chapel Hill, 1966, 138.
[77] Lynch, G. E. "Power for Coal Mining Machinery." *Mines and Minerals.* Volume 25, June 1905.
[78] Aldrich, Mark. *Safety First: Technology, Labor and Business in the Building of American Work Safety, 1870-1939*, Johns Hopkins University Press: Baltimore, 1997, 165.
[79] Lynch, G. E. "Power for Coal Mining Machinery." *Mines and Minerals.* Volume 25, June 1905.

reduced wear and tear, and the need for smaller machines. The disadvantages, on the other hand, were "mainly work hazards," such as the possibility of explosions from sparks in the machines and injury to the workers from accidental contact with the line.[80] Given the industrial coal operators' decision to emphasize economic benefits over safety concerns and considering the fact that Bacon elected to install the more dangerous electric haulage system when he assumed responsibility for the Pratt Mines, it appears that the industrial coal operator's aim for thrift and expedience during the period of extensive mine mechanization in Alabama not only took precedence over but also excluded concerns for human safety and welfare.

In terms of environmental costs, the Alabama coal owners and operators made several technological decisions during the industrial mining period that favored profits at the expense of environmental health. In fact, some of TCI's operations grew so extensive, requiring enormous amounts of power to run, that the mines ceased to be profitable without the adoption of environmentally damaging technologies. In 1888, for example, when the cost of operating all the machinery employed in the Pratt Mines nearly exceeded the profits generated by the mines, engineer Ramsay decided to alleviate this expense by erecting a battery of coke ovens at the entrance to Shaft Mine Number One. As he explained his decision in a letter to Colonel Charles P. Ball, Superintendent of the Pratt Mines Division:

> Sometime ago the expense of raising steam had assumed such proportions [in] the mines in Shaft No. 1 as to render its reduction almost a necessity in order that the mine might be operated at a profit. [For] operating the hoisting-engines, wire rope haulages, pumps, air compressors, coal

[80] Lynch, G. E. "Power for Coal Mining Machinery." *Mines and Minerals.* Volume 25, June 1905.

> washing machinery, etc, work was begun on a plant of 25 ovens which were made to deliver their heat and gases to 4 boilers located nearby.[81]

Because Alabama coal contained high levels of sulfur, it needed to be coked before it could be used to make iron. Ramsay discovered that by erecting by-product coke ovens near the entrance of the mines, he could both accomplish this task and use the waste heat generated by the ovens to supplement the steam needed to power the mines. The erection of this coke oven plant was so successful, resulting in an overall reduction in monthly expenses by $1500, that Ramsay recommended the construction of a similar battery of coke ovens at Slope Number Two in 1894. The total cost of the ovens and steam plant would require a large capital investment of $12,500, but as he explained to McCormack, "This expenditure would effect a saving of about $5,000 per year."[82] However, while the plant might have paid for itself over the course of three short years, according to Ramsay's estimates, these savings did not cover the costs air and water degradation resulting from the plant's use.

Like electric haulage systems, the advantages of using coke ovens to power the mines were largely economical while the drawbacks mainly consisted of safety and environmental repercussions. The process of coking coal first consisted of heating the coal in enclosed chambers for long periods of time to drive off volatile compounds, such as hydrocarbons, fumes, and ash. These "injurious gases," observed one Pennsylvania state botanist writing at the turn of the century, "killed and stunted trees and crops within the locale of the ovens and often left a layer of coal dust, ash, and particles on the

[81] Ramsay to Col. Charles P. Ball, Superintendent of Pratt Mines Division, February 28, 1888, Erskine Ramsay Papers. File 1.1.7. Birmingham Public Library Archives.
[82] Ramsay to G. B. McCormack, Asst. General Manager, Birmingham Alabama, Pratt City, Alabama December 26, 1894. File 1.1.8. Birmingham Public Library Archives.

surrounding fields."[83] Moreover, due to the high sulfur content of Alabama coals, which according to W. A. Buckout, "give rise to disproportionately large amounts of injurious gases," environmental damage from coke oven air pollution was particularly acute near the mine camps in Alabama.[84] Exemplifying the damage inflicted by these unhealthy environments, tuberculosis, an illness commonly associated with air pollution, was the number one cause of death among individuals living in Birmingham's smoky slums. While air pollution alone did not cause the illness, the presence of volatiles, fumes, and ash in the air predisposed individuals to infection by the virus—a fact widely recognized among scientists and doctors as early as 1918.[85] In 1916 alone, the illness killed 356 people, giving the city the second highest tuberculosis death rate after Denver, Colorado.[86]

Extensive air pollution from coke ovens only covered approximately half of the environmental damage created by the process of coking coal. Once all the volatile matter had been driven off, there still remained a substantial quantity of by-product coal waste, containing heavy concentrations of ammonia, cyanide, and other harmful chemicals. According to environmental historian Joel Tarr, most of this waste found its way into nearby streams and rivers; and in 1923, it is estimated that by-product coke plants across

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[83] W. A. Buckout, "The Effect of Smoke and Gas Upon Vegetation," *Annual Report of the Pennsylvania State Department of Agriculture.* Harrisburg, Pennsylvania, 1900. 19. As cited in Tarr, Joel A. "Searching for a 'Sink' for an Industrial Waste: Iron-Making Fuels and the Environment." *Environment History Review: Special Issue on Technology, Pollution, and the Environment.* Volume 18, Number 1, Spring 1994.
[84] Ramsay, Erskine and Charles Bowron. "Coal Washing in Alabama." *Mines and Minerals.* Volume 25, September 1905. W. A. Buckout, "The Effect of Smoke and Gas Upon Vegetation," *Annual Report of the Pennsylvania State Department of Agriculture.* Harrisburg, Pennsylvania, 1900. 19.
[85] Krauss, Allen K. "Smoke and Pulmonary Tuberculosis," 29 *Bulletin of Johns Hopkins Hospital*, Number 327, May 1918, 106-109.
[86] Harris, Carl V. *Political Power in Birmingham, 1871 – 1921.* The University of Tennessee Press, Knoxville: 1977, 160.

America discharged a total of 38,000,000 tons of coal waste into various water bodies.[87] The water pollution created by TCI's mining operations grew to such an extent that in 1924, an Alabama farmer failed a lawsuit against the company for dumping "human excrement, coal washing, coal ashes, cinders, and poisoned foul matters" into a nearby creek that ran through his property. According to the testimony of plaintiff A. Wilhite, "[The] trees have been dying gradually along [the creek] I will say for four or five years, and when the stream overflows now it leaves traces of that tar and grease over the ground."[88] Moreover, TCI's negligent contamination of the creek not only caused extensive environmental damage to the water ecology and the farmer's property, it also made his family "sick, tortured, and tormented."[89] However, because farmer Wilhite could provide no definitive evidence or scientific proof of his family's ills and sufferings, the court ruled in favor the defendant, thus granting TCI the authority to continue sullying the environment.

3.8 CONCLUSIONS

These accounts of the human and environmental harms created by the irresponsible use of certain mining technologies, such as hazardous electrical equipment and environmentally contaminating coke ovens, illustrate the new costs of thrift and expedience that accompanied the expansion and development of industrial mining operations during the latter half of the nineteenth century. However, while such

[87] Tarr, Joel A. "Searching for a 'Sink' for an Industrial Waste: Iron-Making Fuels and the Environment." *Environment History Review: Special Issue on Technology, Pollution, and the Environment.* Volume 18, Number 1, Spring 1994, 12.

[88] Tennessee Coal, Iron & RR Co. v. Wilhite. 100 So. 135 (Alabama, 1924). Westlaw Campus. Though never formally published, the decisions of this particular court case were cited in a number of subsequent civil disputes over environmental pollution from industrial activities in Alabama. This case, and others like it, are available through the online database, Westlaw Campus.

[89] Tennessee Coal, Iron & RR Co. v. Wilhite. 100 So. 135 (Alabama, 1924). Westlaw Campus.

technologies made these new underground operations possible, it was more than just technology that contributed to the incidence of death and disease characterizing these new large-scale mining operations. Indeed, it would be a mistake to place the blame for this transformation on technology alone because the earliest miners harnessed technical applications and equipment, such as flatboats, crowbars, and cranes, to improve coal productivity. Rather, the deficient application of new technology, such as the exclusion of safety apparatus and pollution controls; the government and corporate financing that backed such faulty applications; and finally, the social and legal systems that condoned the use of slave labor and later convict labor in the dangerous mines, all played a role in the creation of hazardous work environments. As Arthur McEvoy explains in "Working Environments: An Ecological Approach to Industrial Health and Safety," the aggregate of technology, politics, and economics working as a system "utterly transformed the ecology of colonized areas and just as utterly displaced the economies of the prior inhabitants."[90] The next chapter examines how certain social, legal, and political factors influenced and even encouraged the application of harmful mining technologies.

[90] McEvoy, "Working Environments," 1995, S152. By the term "colonized," McEvoy is referring the areas of land inhabited by people, in this case the pre-industrial miners, before the advent of industrialization and extensive mine mechanization.

CHAPTER 3: SOCIAL, LEGAL, AND POLITICAL FACTORS OF MINING PROBLEMS

4.1 INTRODUCTION

While the installation of the Corliss steam engine, electrical haulage systems, and other sophisticated mining machines in the Alabama coal mines drastically altered the miner's relationship to the workplace by posing significant health and environmental hazards, historians should be wary of attributing the cause of these problems to technology exclusively. This perspective, commonly referred to as technological determinism, errs in viewing technology as the prime engine of social and environmental change by ignoring the equally powerful influence of social, legal and political attitudes that both shape the production of technology and control the organization of the workforce. As Arthur McEvoy explains:

> Every technology nests in a dynamic system that includes the worker's body, the social conditions under which production takes place, and the ideologies that both springs from and mediates the interaction between biology and production.[1]

Indeed, in order to execute profitable mining operations, Alabama coal owners not only depended upon the use of mining machinery, they also relied upon three central conditions: the steady supply of convict labor from the state penitentiary, the absence of employer liability for mining injuries, and the generally accepted attitude that environmental pollution constituted a necessary cost of industrial growth. This chapter thus considers the influence of these three important variables on the application of technology in the Alabama mines and the structure of the mining workforce. It also examines the kinds of human and environmental injury that resulted from such industrial

[1] McEvoy, "Working Environments," 1995, S165.

applications near the turn of the twentieth century. State support for the convict lease system, for example,

4.2 PRISONS ABOVEGROUND

If 1876 marked the year of the Corliss steam engine and the first deep shaft mine in Alabama, then 1866 signaled the beginning of the convict lease system and a long history of human oppression in the Alabama mines. That year, the state legislature passed a law allowing for the concentration of state convicts in the mining districts of north-central Alabama, thus supplying the crucial labor force needed to operate the expanding coal mines. The 1866 Act regarding convict labor explicitly stated, "[Convicts] shall be employed or hired in the county convicted, unless in the opinion of the county it requires that they be hired outside the county."[2] The second clause of this act proved extremely useful to the coal mining industry because it gave policy-makers and county officials the discretion of transporting convicts from the agriculture districts of the South to the mining districts of the North—a decision that reaped enormous profits for both the State and the coal owners. As historians Robert David Ward and William Warren Rogers explain in their book *Convicts, Coal, and the Banner Mine Tragedy*, "[The] history of the convict leasing system in Alabama was tied directly to industrial expansion in the state's north-central mineral counties."[3]

So close did labor issues cut to the employer's prerogative in the coal mines that by 1901, the convict lease system had grown into the most profitable lease system in the nation. Under Sydeman B. Trapp, president of the Board of Convict Inspectors in 1901,

[2] *Acts,* 1882-1883. (Montgomery: Brown), 1883, p. 134, as quoted in Ward, Robert David and William Warren Rogers. *Convicts, Coal, and the Banner Mine Tragedy*, 36.
[3] Ward, Robert David and William Warren Rogers. *Convicts, Coal, and the Banner Mine Tragedy*, 1987, 30.

the State earned a total of $188,533.30 during that year by working the prisoners in the mines and selling the coal they produced back to the companies at considerable profits. This system represented considerable savings for the company as well because TCI and Sloss Iron and Steel received five-year contracts on convict labor at substantially lower prices than they had in previous years.[4] Moreover, in addition to savings on the price of convict labor, the use of convicts in the mines also succeeded in substantially lowering the wages of free miners. In 1866, the first 105 miners for TCI were free native whites and northern European immigrants earning an average of 90 cents per ton of coal mined. However, over the course of the next thirty-five years, the average wage paid to free miners dropped by over fifty percent with the introduction of convict labor, from 90 cents to 37 cents per ton of coal mined.[5]

Support for the convict labor system in Alabama stemmed from two mutually reinforcing needs that united the interests of both the State and the coal mining companies. The first was the need for money in the State treasury and the second was the need for a reliable labor force in the coal mines. Attempts to banish the system in 1895 actually failed miserably because the state lacked the funds to house the prisoners in places other than the company-owned jailhouses. As Ward and Rogers explain, "To remove them [from the mines] meant prisons to put them in; prisons meant money, and the state treasury was empty."[6] The coal owners also showed little support for the banishment of the profitable lease system, which gave them critical control over the labor force in the

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[4] Ward, Robert David and William Warren Rogers. *Convicts, Coal, and the Banner Mine Tragedy*, 1987, 43.
[5] Fuller, Justin. "History of the Tennessee, Coal, Iron, and Railroad Company, 1852-1907." Ph.D. dissertation. University of North Carolina at Chapel Hill, 1966, 312.
[6] Ward, Robert David and William Warren Rogers. *Convicts, Coal, and the Banner Mine Tragedy*, 1987, 41.

mines. Only a year earlier, for example, TCI had opened Pratt Slope No. 7 during the 1894 labor strike. However, rather than opting to negotiate with the striking miners over demands for higher wages and better safety, the owners elected instead to work the mines "entirely with convicts," according to a report by Erskine Ramsay.[7]

Working the mines with convicts gave TCI and other large coal companies critical control over the human workforce, whose labor they depended upon in order to operate their mines. In the same way that mine ventilation and coal haulage created specific engineering challenges for the coal owners, human labor represented yet another obstacle requiring discipline and technological management. As TCI president George Gordon Crawford explained in 1911, "The chief inducement for the hiring of convicts was the certainty of a supply of coal for our manufacturing operations in the contingency of labor troubles."[8] Indeed, labor issues constituted a significant point of interest among coal operators, especially during the last decade of the nineteenth century as engineers pushed deeper into the mines, exposing workers to increasingly dangerous mine hazards like gas leaks and rocks falls. The work conditions in some of the industrial mines were so severe that one observer, writing in 1891, doubted whether it was even appropriate for animals to enter the underground mines. As he explained in a newspaper editorial, "It is a wonder human beings can exist therein [the mine]; and in passing through some of the entries a person has to pass through so much mud, slush, and stagnant water that any man with a proper regard for his cattle would hesitate to keep them in such filthy quarters."[9] Many Alabama miners shared similar sentiments, either criticizing the safety of the mines or

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[7] Ramsay to G.B. McCormack, General Manager, on Pratt Division, February 13, 1896. Erskine Ramsay Papers. File 1.1.1D. Birmingham Public Library Archives.
[8] Crawford, George Gordon, quoted in Harris, *Political Power in Birmingham,* 203-204.
[9] "Convicts in Mines: Horrors of the Lease System of the State of Tennessee." *The Alabama Sentinel.* October 3, 1891.

demanding higher wages to compensate for the new risks they endured. Of course, in the interest of thrift and expedience, the coal owners generally tended to ignore their complaints, and in 1894, 8,000 Alabama miners went on strike against the major coal companies when they significantly reduced the miners' wages.[10]

Control over this newly discontented workforce became a major topic of concern for the coal owners, whose production demands depended upon the steady supply of labor. In a letter to McCormack during the 1894 strike, Shook reflected upon the source of these labor problems. As he explained to his superior:

> The settlement of our labor questions is progressing very slowly. There are two reasons for this; one, the excessive hot weather, which causes men to stop work and creates a vacuum for what idle labor there is in the district to temporarily supply their places, and the other, and more important, reason is the large number of new enterprises that are starting up in this district…The result naturally is that the coke oven men and other classes of labor are loath to accept any reductions at our Pratt Mines ovens.[11]

As demonstrated in Shook's letter, labor demands stood in the way of company profits, and free miners equally resented mine owners' attempts to maximize profits at the expense of worker income and well being. As a consequence of this inherent conflict between capital and labor in the Alabama coal mines, the large coal operators sought legal and technological management of the workforce through their support of the convict labor system and the construction of mine prisons.

If haulage tracks and ventilation fans represented the technological response to mine extension, then the presence of prisons at the entrance of company-owned coal mines represented a similar response to labor problems. In fact, company engineers

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[10] Ward, David Robert and William Warren Rogers. *Labor Revolt in Alabama: The Great Strike of 1894.* University of Alabama Press: Tuscaloosa, 1965, 59.
[11] Shook to James T. Woodward, Esq., Chairman of Hanover Nation Bank, New York City, June 22, 1897. A. M. Shook Files. File 386.2.1. Birmingham Public Library Archives.

devoted equal energies to ensure that the structure of these prisons adequately transformed its prisoners into efficient and obedient "revenue-producers."[12] In an 1888 article on the Coalburg mines of the Sloss Iron and Steel Company, which appeared in the February issue of *The Colliery Engineer*, the author praised the company's technological management of the mine, noting that "the capacity of the present force of miners [was] 800 tons of coal per day."[13] The author's choice of language in describing the productivity of this mine is particularly telling because he refers to the "capacity" of its miners, half of which were convicts, in the same way that one might refer to the "capacity" of a machine. Indeed, the author goes on to describe the company's new prison stockade as a machine itself, organizing the prisoners and directing them towards the specific task of mining and producing coal. He provides the following portrait of the jailhouse: "The prison stockade connects directly with the mines, so that no guards are needed to accompany them [the prisoners] back and forth."[14] According to the author's description, the prison stockade literally existed as an extension of the mine and its other technological components, with the criminals providing the necessary labor force to keep the mines in operation.

By 1905, the convict-operated mines actually began to take the shape of underground prison cells, or dungeons, with no opportunity for escape in the event of a fire or roof collapse. W. R. Crane, writing on TCI's Pratt Coal Mines in the *Engineering and Mining Journal*, explained the prison-like nature of the company's convict mines: "In mines employing convict labor, all exits from the mine must be provided with barred

[12] Harrison, Shelby M. "A Cash-Nexus for Crime." *Survey*, Volume 27. January 6, 1912, 1550.
[13] "Coalburg, Alabama Coal Mines of the Sloss Iron and Steel Company." *The Colliery Engineer.* Volume 8, February 1888.
[14] "Coalburg, Alabama Coal Mines of the Sloss Iron and Steel Company." *The Colliery Engineer,* 1888.

doors, which are closely guarded."[15] Moreover, not only did the mines themselves resemble cavernous dungeons, but the work conditions forced upon the prisoners in these enclosed spaces presented significant health hazards and risks. In an 1891 news article protesting the use of convicts in one of TCI's Tennessee mines, the author condemned the legal arrangements that confined the prisoners to such life-threatening work conditions:

> Any man who will work in this room, with the air so bad and close and such dangerous top hanging over him, thinks but little of his life or does so because he is compelled to through fear of rules and regulations, such as the convict rests under.[16]

A series of reproachful comments and articles regarding the convict labor system in Tennessee eventually contributed to its demise in 1896, but TCI continued to employ convicts in its Alabama coal mines well into the twentieth century.

The mines in Alabama presented similarly hazardous work conditions, and in 1911, a death-dealing explosion rocked the Banner Coal Mine of the Pratt Consolidated Coal Company, taking the lives of 128 convict miners.[17] A news article criticizing the poor management of the convicts later alluded to the source of the disaster: "The cause of the explosion is easy to locate in the mind of any man who understands how the convicts are handled."[18] Although the Banner mine presented many "natural" risks and hazards, commonly associated with underground mining, the author recognized that the mine owners' legal oppression of the workforce equally contributed to the incidence of death and disease in the mine camps because the coal operators could skirt safety measures and abuse prisoners with little fear of penalty. Indeed, while many prisoners lost their lives

[15] Crane, W. R. "The Pratt Coal Mines." 1905, 180.
[16] "Convicts in Mines: Horrors of the Lease System of the State of Tennessee." *The Alabama Sentinel.* October 3, 1891.
[17] Ward, Robert David and William Warren Rogers. *Convicts, Coal, and the Banner Mine Tragedy*, 1987.
[18] Langston, *Jasper Walker County News.* April 11, 1911. As quoted in Ward, Robert David and William Warren Rogers. *Convicts, Coal, and the Banner Mine Tragedy*. 1987, 50.

in this particular tragedy, neglect and mistreatment of the convicts in the mine camps resulted in many more deaths during the sixty-year duration of the convict lease system.

In the *Second Biennial Report of the Alabama Board of Inspectors of Convicts*, Dr. R. Jones reported to the Governor of Alabama that poor sanitation and disease, rather than mining accidents and injuries, constituted the number one cause of death among the convicts laboring in the company-owned mine camps. As he explained in his report, "…the real cause [of death] was outside the mines, and was dependent upon the general atmosphere and local unsanitary conditions."[19] Between the years of 1886 and 1888, for example, roughly twelve percent of the 601 convicts sentenced to work in the Pratt Mines died of typhoid fever, pneumonia, or tuberculosis.[20] Despite these staggering statistics, however, policy-makers and law enforcers showed little efforts to remedy the situation; and as late as 1912, reports on the convict prison conditions showed little improvement over Dr. Jones' 1888 assessment. For an article entitled "A Cash-Nexus for Crime," Shelby M. Harrison conducted a survey of these prison camps in 1912 and arrived at the grim conclusion that the convict prison resembled nothing less than a "tuberculosis camp."[21] According to Harrison, the mine owners housed their convicts in prisons that were "unsanitary, overcrowded, crawling with vermin, dark, poorly ventilated, and without facilities for bathing or exercise."[22] Indeed the construction and management of these disease-ridden prisons exposed the mine workers to equal if not greater human health risks and hazards than the actual coal mines.

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[19] "Second Biennial Report of the Alabama Board of Inspectors of Convicts: From October 1, 1886 to September 30, 1888." Montgomery, Alabama: W. D. Brown & Company, State Printers, 1888, 209.
[20] "Second Biennial Report of the Alabama Board of Inspectors of Convicts," 1886-1888, 203.
[21] Harrison, Shelby M. "A Cash-Nexus for Crime." 1912, 1541.
[22] Harrison, Shelby M. "A Cash-Nexus for Crime." 1912, 1555.

If historians view technology as the devices, means, and techniques for manufacturing and producing finished goods and products, then the convict prisons represented an integral technical component of the Alabama coal mines. By constructing these large prisons at the entrance of the mines and barring off escape routes in the coal mines themselves, company engineers ensured the constant availability of a coal-producing workforce for their "manufacturing operations," as TCI President Crawford later indicated.[23] Moreover, the prison wardens' use of such disciplinary techniques as the threat of whipping or solitary confinement without food or water proved a sound methodology for meeting daily coal quotas. Men, and even women, who failed to produce their daily amounts of coal, faced such corporal punishment as whipping, which according to Harrison, usually consisted of "fifteen lashes over a back covered with but one garment."[24] Of course, while the company convicts labored under this constant threat of whipping, unsanitary living conditions and the spread of disease constituted the number one cause of death—both attributable to the neglectful management of the convict prisons. For this reason, the death rates in these prisons, which far exceeded those in the community at large, stemmed from the use of this particular technical component—itself a product of the politically supported convict lease system.

The fact that Alabama's convict lease system influenced the coal operators' applications of mining technology, resulting in many work-related hazards, demonstrates an important point in the history of coal mining development, or any technology for that matter. While Alabama engineers may have looked upon natural variables, such as the presence of excessive mine water or steep inclines, as a stimulus for the technological

[23] Crawford, George Gordon, quoted in Harris, *Political Power in Birmingham,* 203-204.
[24] Harrison, Shelby M. "A Cash-Nexus for Crime." 1912, 1542.

change, legal and political decisions, such as the support of the convict lease system, ultimately paved the way for such technological changes. Without the availability of cheap convict labor in the mines, it is likely that coal operators would not have been able to afford the capital investments necessary for technological development of the mines. Moreover, the construction of unsanitary prison camps and the neglectful management of convicts in the mines by far outweighed the risks and health hazards associated with the actual use of mining technology, as evidenced by the disproportional death rates among convicts and free miners. Indeed, one could even argue that, in the history of technology, the social, legal, and political underpinnings of technological development hold the greatest influence over the lives of the workers associated with the use of that technology. As Arthur McEvoy proposes, "A more subtle, pervasive threat to workers may stem from the social organization of the workplace, which is a product not only of the labor requirements of particular technologies but of the legal arrangements under which employers hire and control their workers."[25] In light of McEvoy's proposal, the next section looks at the influence of employer liability, or lack thereof, in the development and use of hazardous technologies in the Alabama coal mines.

4.3 MINERS BEWARE: FALLING ROCKS AND MOVING CARS

The previous chapter examined how the industrial coal owner's extensive mechanization of the mines transformed the miner's work environment and created a number of new occupational hazards, like falling rocks and moving coal cars. However, the law was equally complicit in the creation of these dangerous underground environments because local Alabama judges often declined to hold the coal owners

[25] McEvoy, Arthur. "Working Environments," 1995, S154.

responsible for the deaths and injuries that resulted from these new work hazards. Rather, they subscribed to a legal doctrine known as "contributory negligence," which stated that an injured miner's failure to exercise due care contributed to his own accident or death. The courts thus assumed that the industrial miner, like the pre-industrial miner before him, agreed to the risks associated with his job, even of those risks were beyond his immediate control. Moreover, by promoting this idea of individual responsibility, rather than corporate responsibility, the judges not only condoned the use of hazardous technology; they also provided little incentive for coal owners to implement mine safety devices, like steel roof supports and safety rails alongside coal haulage tracks. By looking at some of these accident-related court cases and the decisions of the Alabama judges, this section will attempt to highlight the explicit legal assumptions about whether the coal owners should be held liable for the dangerous work environments they created and defended.

In March of 1884, an Alabama miner, identified simply as "Jones," descended into a deep shaft mine of the Woodward Iron Company to assume his daily charge of the switch controlling the movement of descending and ascending coal cars.[26] These iron-clad pit cars, with the capacity to haul anywhere from 2,800 to 3,000 pounds of coal, moved up and down the shaft by means of an iron rope attached to a stationary steam engine above ground.[27] The same engine also supplied a descending shaft pipe with hot steam for the purpose of draining collected water out of the mine. However, upon assuming his station at the second "lift," or stopping point, along the shaft, Jones found this water pipe clogged with mud and spewing a fog of hot steam from a fissure in one of

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[26] Woodward Iron Company v. Jones, 1885 WL 426 (Alabama, 1885), Westlaw Campus.
[27] Crane, W. R. "The Pratt Coal Mines." 1905, 177-180.

its joints. Only the day before, Jones had reported to his superintendent Harrison that the joint was "out of repair," but finding that Harrison had neglected to fix the defective pipe, Jones set out to unclog the pipe himself so that he could proceed with his daily duties of moving coal cars up and down the shaft.[28]

Leaving the switch in charge of his assistant and passing along to him the superintendent's instructions that "a descending empty car was not to be stopped by turning the switch, unless there was, at the time and place, a loaded car to be drawn to the surface," Jones proceeded to fix the water pump. However, while repairing the defective machinery, a descending coal car, masked by the noise and steam from the pipe, delivered a forceful blow to Jones, badly injuring and bruising the unsuspecting miner. Unable to work in his newly debilitated state, Jones proceeded to bring a lawsuit against the Woodward Iron Company for "injuries caused by defective machinery." However, much to his chagrin, the court found the plaintiff guilty of contributory negligence since he knew the empty coal car was liable to descend and thus assumed the risks associated with his injury. According to the court's rationale:

> [Jones'] orders were not to stop a descending car, unless there was a loaded one ready to be carried back, [but] he certainly would have felt authorized to disregard such order and stop the car, if the work at the sump was so pressing that it could not be delayed until the car passed below. Viewed in any light, the plaintiff was guilty of negligence, which contributed proximately to the injury.[29]

Implicit in this argument are the assumptions that Jones willingly assumed the risk of injury and that he further held the authority to avert such risks by ignoring his supervisor's orders not to halt descending coal cars. However, a closer examination of

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[28] Woodward Iron Company v. Jones, 1885 WL 426 (Alabama, 1885), Westlaw Campus.
[29] Woodward Iron Company v. Jones, 1885 WL 426 (Alabama, 1885), Westlaw Campus.

this case reveals that the court overlooked several key facts governing the dynamics of the workplace environment, which ultimately contributed to the injury of plaintiff Jones.

The judge wrongfully assumed that Jones had the liberty and discretion to stop descending coal cars; had this been the case, however, the miner undoubtedly would have taken such precautions to ensure his safety. Instead, given his supervisor's explicit orders not to stop any descending cars, Jones likely elected to forgo such precautions for fear of losing his job or facing the reprimands of his supervisor if he chose otherwise. The judge also erred in assuming that Jones willfully took the responsibility of repairing the defective water pump himself. In fact, Jones had no choice but to repair the equipment because the broken pipe prevented him from carrying out his normal duties in the mine. Because the mine superintendent had failed to address the problem the day before, Jones arrived the following morning to find the mine filled with hot steam, spewing forth from a joint in the defective water pump. This fog of hot steam drastically impaired the visibility of the mine, and Jones could not see two feet in front of him to direct the descending and ascending coal cars up and down the mine shaft. As previously mentioned, failure to complete these assigned duties meant punishment and possibly unemployment, so Jones reluctantly attempted to fix the broken equipment against his better judgment.

Given these delicate circumstances, Jones thus faced the decision of either forgoing his employment or risking his own health and safety. McEvoy explains the nature of this longstanding conflict between safety and job security:

> Workers given the choice of producing faster or facing the wrath of their superiors have always circumvented safety devices and procedures and thus, in the eyes of employers, the law, and the general public, brought their injuries on themselves. Work accidents, then, are often the result of

> employer decision to intensify production and reduce investment in safety thus increasing the danger to workers. Complicit in these decisions, of course, is the legal system that entitles employers to make such decisions.[30]

Indeed, by demanding the constant flow of descending coal cars and failing to repair the defective mine machinery obstructing Jones' task, the supervisor effectively sentenced the miner to the injury incurred. Moreover, the court, in failing to recognize the impossible circumstances under which Jones labored, essentially condoned Harrison's decision to place production over the safety of the mine employees.

In many ways, the superintendent himself was a victim of the system, subject to the production demands of the coal owners for whom he worked. As Shelby M. Harrison later wrote in his scathing report of the convict labor system in Alabama: "…in this mine work, obedience is not merely a matter of pure discipline; it is snarled up with economic motives which, even where free labor is concerned, produce your 'drivers' and 'sweaters' among foremen and petty superintendents."[31] Because these "petty superintendents" answered to the financial interests of their superiors and not the safety concerns of their subordinates, they sought to satisfy the production demands of the mine owners at all costs, even at the expense of miner safety.

In an 1888 letter to the superintendent of TCI's Pratt Mine Division, for example, Erskine Ramsay instructed Colonel P. Ball to continue "robbing pillars" of coal from the abandoned rooms in Shaft Number One. This notoriously dangerous but financially favorable practice required miners to blast away columns of coal supporting the heavy slate roofs of these deserted rooms. The workers faced many risks in executing this task. As one nineteenth century contemporary warned his fellow miners, "The workmen must

[30] McEvoy, "Working Environments," 1995, S161.
[31] Harrison, Shelby M. "A Cash-Nexus for Crime." *Survey*, Volume 27. January 6, 1912, 1542.

be constantly on the alert, watchful for every sign of danger, but at the best some will be injured, some will perhaps be killed, by the falling masses from the roof."[32] Nevertheless, despite the explicit dangers associated with this practice, Ramsay ordered Ball to proceed with the hazardous task of removing pillars of coal. He wrote to the superintendent:

> As to stopping the [robbing of pillars], it is totally uncalled for, because if these entries should fall in, it would be a matter of no consequence to the Company, but on the other hand, by keeping them working they get 100 tons of coal daily, and every ton of this coal got is just that much saved.[33]

With so many degrees of managerial separation between the "economic motives" of the mining companies and the safety interests of its miners, the collapse of the entries in Shaft Number One and the resulting injury of a few miners were indeed "matters of no consequence" to the mine owners or Colonel Ball's own job security. As labor historian Mark Aldrich explains, "From management's point of view…it was cheaper and more efficient to kill a worker and replace him than to try to guard his safety."[34] Of course, court decisions absolving the mine companies from employer liability greatly facilitated this attitude, thus contributing to the lack of safety precautions in the Alabama coal mines.

While engaged in robbing pillars of coal for the Lookout Fuel Company in DeKalb County, Alabama during the summer of 1914, D. W. Phillips, a miner with twelve years of mining experience, incurred serious injuries when a large slab of slate fell on him and crushed his body against the floor of the mine. Like Jones, the injured miner

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[32] Green, Homer. *Coal and the Coal Mines*. Houghton, Mifflin and Company: Boston, 1889, 134.
[33] Ramsay to Col. Charles P. Ball, Superintendent of Pratt Mines Division, February 28, 1888, Erskine Ramsay Papers. File 1.1.7. Birmingham Public Library Archives.
[34] Aldrich, Mark. *Safety First: Technology, Labor, and Business in the Building of American Work Safety, 1870-1939*. 1997, 49.

sought compensation for the damages suffered, arguing that the defendant company failed to "properly and sufficiently prop the roof to prevent said stone from falling."[35] Only hours before robbing the pillars of coal, Phillips had reported the defective roof to his mine superintendent, who then assured the miner that "he would fix the roof and make it all right."[36] However, upon returning to the room, Phillips discovered that the superintendent had failed to provide any additional timbers to support the roof, thus leaving him to the mercy of the loose slate. Like most mining injuries brought before court, the judge ruled in favor of the defendant on the principle of contributory negligence, arguing that Phillips contributed to his own injuries by consciously assuming the risks associated with laboring beneath a defective roof.[37]

Indeed, such was the case with most accidents that occurred in the Alabama coal mines. Two years later, a rock fell on another miner named William Sewell, breaking both his hip and leg. However, the company assumed no liability for the accident, and Sewell had to rig his own pulley for traction and crutches for support in order to continue working in the mine and feeding his family.[38] Charlie Cross, another Alabama miner who began working in the TCI mines in 1890 as a young boy, later recounted the effects of the lack of employer liability on the lives of the workers: "There was no safety work of any kind. If a man was hurt, it was his look-out…I've seen men go in [the hospital] and have an arm or leg cut off as a result of an accident without the company taking on responsibility at all."[39] This notion of individual responsibility, rather than corporate

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[35] Lookout Fuel Co. v. Phillips, 657, 66 So. 946 (Alabama, 1914). Westlaw Campus.
[36] Lookout Fuel Co. v. Phillips, 657, 66 So. 946 (Alabama, 1914). Westlaw Campus.
[37] Lookout Fuel Co. v. Phillips, 657, 66 So. 946 (Alabama, 1914). Westlaw Campus.
[38] Flynt, Wayne. *Poor But Proud: Alabama's Poor White.* University of Alabama Press: Tuscaloosa, Alabama, 1989, 129.
[39] Charlie Cross, as quoted in Flynt, Wayne. *Poor But Proud*, 1989, 130.

responsibility, remained the prevailing attitude among the coal owners and the Alabama judges, who rigorously defended their position in almost every mining case brought before the courts.

Of course, this is not to suggest that Alabama judges always favored the defendant company when an injured miner filed a lawsuit against an industrial coal owner. In a few isolated incidences, if the miner managed to prove that his injuries resulted from a specific mechanical malfunction beyond his knowledge, the judge might have awarded him a small sum for damages.[40] However, there exist no cases where a judge actually ordered a company to cease operations or adopt better safety measures due to a miner's work-related injury; and in most cases of equipment malfunction, like that of Jones, if the defendant could prove that the miner was aware of the problem, then the judge found the miner guilty of contributory negligence, regardless of whether he had control over the specific problem. As labor historian Keith Dix explains, "It was generally assumed and frequently expressed that mine accidents were traceable to individual error on the part of the miner himself."[41] Consequently, mine bosses and superintendents, whose only concerns were meeting the production demands of their superiors, routinely engaged in dangerous mine operations with little regard for the safety of individual miners like Jones, Harrison, and Sewell.

4.4 ENVIRONMENTAL INJURY 'FOR THE GREATER GOOD OF SOCIETY'

In addition to contributing to work-related injuries, the lack of corporate liability in the court systems also encouraged significant environmental damage by pardoning irresponsible mining operations. However, whereas the law succeeded in attributing

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[40] See Whatley v. Zenida Coal Company, 26 So. 124 (Alabama 1899), Westlaw Campus.
[41] Dix, Keith. *Work Relations in the Coal Industry.* 1977, 73.

mining injuries to worker negligence, the courts could not blame individual miners for the water contamination and pollution-related illnesses that resulted from hazardous operations. Instead, as Arthur McEvoy explains, both society and the law tended view environmental problems as the "inevitable costs of economic life," thus attributing them to "remote, impersonal social forces rather than individuals."[42] Such attitudes regarding environmental injury pervaded the court systems in Alabama, greatly endangering the health and well being of many nineteenth century families living downstream or within the vicinity of industrial mining operations.

Coal and iron ore, two raw materials mined in the mineral districts of north-central Alabama, both required extensive washing before manufacturers could use them for the production of iron and steel. This requirement meant that mine operators needed lots of fresh water, at least thirty-five gallons per ton of coal or iron, so company owners usually sited washing plants alongside local creeks and streams.[43] Of course, the fresh water used and then discharged from these plants reentered these creeks and streams in a significantly impaired state, laden with heavy metals and impurities like coal particulates, slate, and sulfur.[44] As mining operations expanded and iron production grew, these impurities amounted to significant environmental waste, and by 1905, the daily capacities of Alabama coal washing plants alone was 25,700 tons of coal, producing nearly a thousand tons of slate waste and over 150 tons of sludge waste. Over the course of a

[42] McEvoy, "Working Environments," 1995, 162.
[43] Ramsay, Erskine and Charles Bowron. "Coal Washing in Alabama." *Mines and Minerals.* Volume 25, September 1905.
[44] Green, Jerry E. "Surface Mining." *Encyclopedia of Environmental Issues*, Volume III. Salem Press, Inc. Hackensack, New Jersey, 2000, 712. When exposed to air and water, marcasite, iron pyrites, and sulfur—three common by-products of coal washing operations—can combine to form highly acidic water that seeps into local creeks and streams. This acidic drainage is extremely toxic to aquatic wildlife and can even erode structures like dams, bridges, and docks. The water, when contaminated, is unsafe for human or animal use.

month, this continuous flow of waste amounted to roughly 30,000 tons of waste—enough to clog creeks and streams, decimate entire wildlife populations, and compromise the health of those individuals whose livelihood depended upon use of these local waterways.

Between the years of 1882 and 1886, the Clifton Iron Company in Talladega County, Alabama erected three iron ore washers for the purpose of cleaning the iron ore extracted from its valuable mineral lands in Ironaton. However, within three years of its extensive mining and washing operations, a local farmer by the name of James T. Dye brought a lawsuit against the company for corrupting the local stream flowing through his land. Seeking an injunction against the washing operations, Dye complained that the company continued to deposit large quantities of "muddy water, clay, and other extraneous matter," thus rendering the local creek unfit for watering his horses, cattle, and hogs.[45] However, while acknowledging the damages suffered by Dye, the court refused to grant the injunction on the grounds that water pollution was an inevitable consequence of industrial growth. "The court will take notice," concluded Chancellor S. K. McSpadden, "that in the development of the mineral interests of this state, very large sums of money have been invested. The utilization of these ores, which must be washed before using, necessitates the placing of sediment where it may flow into streams."[46] Rather than controlling the use of iron ore washing technology and holding the Clifton Iron Company responsible for the environmental injuries inflicted upon Dye, the court merely attributed the creek contamination to the "natural" course of industrial development. In doing so, the judge essentially limited the property owner's right to clean water according to the pollution standards of available ore washing machinery.

[45] Clifton Iron Co. v. Dye, 6 So. 192 (Alabama, 1889). Westlaw Campus.
[46] Clifton Iron Co. v. Dye, 6 So. 192 (Alabama, 1889). Westlaw Campus.

Decisions like these not only permitted industry to set the standard for environmental health; they also provided little incentive for the adoption of better pollution controls.

The court also justified the contamination of Dye's property in the interest of the greater public good, which according to Chancellor McSpadden, profited from the industrial development of the region. As he explained to the court, "While this invasion of the rights of the lower riparian owner may produce injury… the great public interests and benefits to flow from the conversion of these ores into pig metal should not be lost sight of."[47] The central problem with McSpadden's analysis is that he essentially framed the public debate over air and water pollution as a choice between economic growth and the environmental health, thus setting the precedent for other mining companies to evade emissions controls and pollution liability on the basis of industrial development. Only four years later, another farmer brought a similar lawsuit against TCI for discharging "large quantities of red mud, filth, and other debris" into Caffee's Creek, which ran through her property. According to the testimony of the plaintiff, Alice Hamilton, the water of the creek was so "poisoned and corrupted" that it completely killed the local fish population, caused the emission of "unwholesome and noxious vapors and odors," and rendered her home so "uncomfortable and unhealthy" that her family grew ill.[48] However, despite the obvious connections between the damages suffered by the farmer and TCI's iron-ore washing operations, the company managed to escape liability by arguing that its iron-ore was "valueless without washing."[49] Like Chancellor McSpadden

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[47] Clifton Iron Co. v. Dye, 6 So. 192 (Alabama, 1889). Westlaw Campus.

[48] Tennessee Coal, Iron & R. Co. v. Hamilton. 100 Ala. 252, 14 So. 167 (Alabama, 1893). Westlaw Campus. The judge's decision provides no description of the specific illnesses suffered by Alice Hamilton and her family following the contamination of the nearby creek.

[49] Tennessee Coal, Iron & R. Co. v. Hamilton. 100 Ala. 252, 14 So. 167 (Alabama, 1893). Westlaw Campus.

before him, Judge W. D. Denson ruled in favor of industry at the expense of individual rights, justifying his decision with the following rationale: “The modification of individual right must be submitted to, in order that the greater good of the public be conserved and promoted.”[50]

One reason McSpadden and Denson were so willing to associate industrial growth with the “conservation” and “promotion” of the greater public good is that the region had recently gained a national reputation as a great industrial metropolis. Visitors passing through the city of Birmingham around the turn of the century could take home souvenir cards that read: “Birmingham: The Metropolis of the South” or “The Steel and Iron City: Great Enterprises in Mining and Manufacturing.”[51] Of course, it likely that the large mining and manufacturing companies financed and endorsed the circulation of these souvenir cards because such propaganda promoted their industrial operations; however, many of the iron and steel workers, whose jobs depended upon the constant supply of coal and iron, also staked their livelihood on the success of Birmingham as a great industrial city. For this reason, local judges often allowed this visible public support for industrial growth to overshadow the environmental health concerns of small landowners in the surrounding agricultural community. Moreover, the concept of one’s right to clean air or water had not yet entered the legal vocabulary, so most judges did not view their decisions as infringements of personal liberties. Of course, this perspective did not prevent them from stripping away such liberties, particularly in underground coal mining disputes regarding the highly contentious issue of surface rights.

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[50] Tennessee Coal, Iron & R. Co. v. Hamilton. 100 Ala. 252, 14 So. 167 (Alabama, 1893). Westlaw Campus.
[51] White, Marjorie Longenecker, *The Birmingham District: An Industrial History and Guide,* 1981, 64.

In several lawsuits over environmental injury, the courts did not merely modify or constrict individual rights; they altogether transferred those liberties from the citizen to the mining company. Surface rights, a long disputed issue in the history of coal mining, refers to the use and enjoyment of the land located atop a large mineral reserve. Around the turn of the twentieth century in Alabama, large coal companies who owned the rights to those reserves often engaged in destructive mining operations that violated the surface rights of the individual who lived and owned the land directly above the mine. In January of 1909, for example, Peter Sampson of Jefferson County, Alabama brought a suit against the Sloss-Sheffield Steel & Iron Company for substantial damages to his home and land as a result of the company's underground mining operations. According to Sampson's testimony, Sloss-Sheffield, while excavating coal beneath his property, caused the surface to part and crack open, "greatly injuring and damaging his estate and the dwelling house situated thereon."[52] Moreover, because the company was excavating beneath an aquifer, its mining operations also drained and "rendered valueless" a well of "pure and wholesome water" that was located on Sampson's property and used by the landowner for domestic purposes.[53]

Following the logic of the previous court case, where Judge Denson declared that TCI could continue with its industrial iron-ore operations that were "valueless without washing," one might expect the judge in this case to apply the same rationale to Sampson's use of his well, "rendered valueless" by the mining company's exploits. However, rather than maintaining legal continuity with respect to one's ownership and use of personal property, Judge A. A. Coleman over-ruled Sampson's complaints in

[52] Sloss-Sheffield Steel & Iron Company v. Sampson, 48 So. 493 (Alabama, 1909). Westlaw Campus.
[53] Sloss-Sheffield Steel & Iron Company v. Sampson, 48 So. 493 (Alabama, 1909). Westlaw Campus.

different terms, arguing that his surface rights did "not apply to wells and springs fed by subterranean streams."[54] Moreover, with respect to the damages sustained by Sampson's home and land, Judge Coleman offered the following argument: "Unless the defendant [Sloss-Sheffield] negligently mined coal from under the plaintiff's [Sampson's] land, then the jury must find for the defendant."[55] In other words, if the mining company could prove that it took all the standard precautions in accordance with existing mining techniques, which it inevitably did, then they could escape responsibility for any unintended damages inflicted upon Sampson's property.

Based on this technocratic reasoning—whereby the use and management of existing mining technology defines one's right to his land and home—Judge Coleman effectively transferred Sampson's surface rights to the company who owned and operated the technology. Indeed, as McEvoy has argued, "new technologies enhanced people's ability to influence the course of events and helped to shift the boundaries between what they categorized as preventable evil and what they chalked up to the natural order of things."[56] In the case of *Sloss-Sheffield Steel & Iron Company v. Sampson*, the use of underground mining techniques enhanced the company's ability to control the fate of Sampson's land and home, and the unwillingness of the court to regulate these techniques turned subsidence and property damage into the "natural" consequences of industrialization. Of course, judges were not the only individuals to express such attitudes regarding industrial development; Birmingham manufacturers and even industry workers also argued that pollution and property damage was a natural and necessary cost of industrialization.

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[54] Sloss-Sheffield Steel & Iron Company v. Sampson, 48 So. 493 (Alabama, 1909). Westlaw Campus.
[55] Sloss-Sheffield Steel & Iron Company v. Sampson, 48 So. 493 (Alabama, 1909). Westlaw Campus.
[56] McEvoy, "Working Environments," 1995, 163.

In 1913, Birmingham city commissioner James Weatherly encountered vehement opposition from the area's business elites when he proposed a smoke ordinance intended to drastically reduce emissions from industry's coal-burning operations. Weatherly modeled the provisions of his smoke ordinance after similar emissions regulations recently enacted by the Chicago city commission, and he intended, first, that the law cut back on existing coal smoke emissions by requiring plants to install "automatic stokers," or air pollution controls. Second, as he explained in an interview, he aimed to "eliminate absolutely the chance of a building or machine being erected which by any chance can become an artificial volcano emitting from its blackened crater billows of disease laden and death carrying smoke."[57] However, instead of receiving a wealth of support for his ordinance intended "for the good of all and the harm of none," business leaders and manufacturers launched a public campaign to bring down Weatherly's proposal.

The business leaders first submitted a petition to the Birmingham *Age-Herald,* signed by over fifty manufacturing companies, protesting the ordinance on the grounds that meeting its requirements would result in numerous lay-offs and employee pay cuts.[58] This threat of economic ruin obviously resonated with the hundreds of steel and iron-workers living in the city because an editorial in the *Labor Advocate* also stood against the proposal, arguing, "Let us try to secure more manufacturing plants, even if we do have to breathe a little more smoke of that character."[59] The large manufacturing companies even managed to enlist prominent Birmingham merchants and physicians in their campaign. W. W. Garrett, for example, co-owner of the wholesale firm Garrett &

[57] "Has Amendment to Smoke Ordinance." Birmingham *Age-Herald.* January 17, 1913.
[58] "Impossible to Prevent Smoke, Say Local Manufacturers." Birmingham *Age-Herald.* January 28, 1913.
[59] Birmingham *Labor-Advocate*, 31 January 1913, as quoted in Stradling, David. *Smokestacks and Progressives: Environmentalists, Engineers, and Air Quality in America, 1881-1951.* Johns Hopkins University Press: Baltimore, 1999, 134.

Hine, submitted his protests to the *Age-Herald*: "Smoke to me means prosperity," he stated. "It shows, in my opinion, that a city is progressing when the tall chimneys belch forth huge clouds of smoke."[60] Dr. Cunningham Wilson, another well-known citizen, put forth similar arguments, stating, "I like pay rolls better than air without smoke. I think the city ought to place a premium on smokestacks."[61] Wilson and Garrett, like the industry workers and their employers, subscribed to the commonly held belief that environmental air pollution was the necessary price of industrial development and prosperity. In all of their arguments, the fear of job loss and economic disaster overshadowed all possibilities of adopting the ordinance and investing in pollution controls, despite the fact that large companies like Sloss-Sheffield had recently invested $500 in upgrades and TCI had reported record-breaking productions at its Ensley mill that month.[62]

The greatest blow to the smoke ordinance, however, was not the widespread fear of job loss and economic ruin but the technical reports submitted by industry-paid engineers, who argued that smoke from bituminous coal was "natural" and impossible to prevent. F. B. Parker, an engineer employed at TCI's Ensley mill with "30 years' practical experience," according to the *Age-Herald*, submitted his objections to the smoke ordinance:

> I do not believe that the abolishment of the smoke evil is practicable where bituminous coal is used. Expert stoking cannot be depended upon continuously. So-called smoke consumers only partially abate the nuisance and are destructive in their effect upon boilers, besides being dangerous.[63]

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[60] "New Law Stirs Protests Among Many Coal Using Concerns." Birmingham *Age-Herald.* January 29, 1913.
[61] "New Smoke Ordinance is Last Straw: Small Plants Prepare to Leave City." Birmingham *Age-Herald.* January 30, 1913.
[62] Stradling, David. *Smokestacks and Progressives: Environmentalists, Engineers, and Air Quality in America, 1881-1951.* Johns Hopkins University Press: Baltimore, 1999, 135.
[63] "Ensley Man Talks About Suppression of Smoke." Birmingham *Age-Herald.* January 31, 1913.

Parker's technical assessment of the problem, along with several other scientific reports submitted by industry engineers, succeeded in blaming the air pollution problem on the natural tendency of bituminous coal to produce excess smoke, thus relieving manufacturers of any agency or responsibility in the matter. Moreover, rather than blame the "smoke evil" on the growing industrial operations throughout the district, these engineers instead attributed the problem to the lack of available technology to curb the smoke pollution. Thus, like the Alabama court judges, coal mining and iron-making companies succeeded in defining one's right to clean air and water according to the technical limitations of available machinery and manufacturing plants.

4.5 CONCLUSIONS

The social, legal, and political aspects of mining problems at the turn of the century in Alabama illustrate that mining technology involved more than simply the use of machines and equipment in the mines. Indeed, if we think of technology as the development and application of devices, machines and techniques for productive processes, then mining technology, or the technics of industry, also involved the social organization of the workforce, the legal support for hazardous work environments, and the transformation of public attitudes toward pollution. Of course, in the same way that these three variables influenced the development and construction of specific technical devices, like the convict prisons, industrial machines in turn influenced society's willingness to accept environmental degradation and overlook the new occupational hazards created by the mechanization of the mines. Historian of science Langdon Winner offers an interesting perspective on this mutually reinforcing dynamic between society, politics, and the industrial machine. “Technological innovations,” he writes, “are similar to legislative acts or political foundings that establish a framework for public order that will endure over many generations.”[64]

The idea of technological innovations endorsing specific standards and ideals, like support for environmental degradation or the absence of employer liability, may seem slightly radical to those accustomed to viewing machines as detached non-political objects. After all, a moving coal car is nothing but a large mass of iron and steel, and it does not discriminate against who it runs over in its path; similarly, an iron ore washing plant does not pick which stream or creek to dispose of its leftover waste. However, when we consider the fact that each machine had a maker, who designed the artifact to serve a specific purpose or goal, then the definition of technology begins to take on a new meaning. As Lawrence Lessig, author of *Code and Other Laws of Cyberspace*, points out, “Too many miss how different architectures embed different values, and that only be selecting these different architectures…can we establish and promote our values.”[65] The earliest Alabama coal miners, whose values included productivity as well as personal safety, constructed long sturdy flatboats that could withstand the strong river rapids and safely transport their bodies and goods to market. However, the industrial coal owner cared little for the safety of a mine he would never enter, and his exclusive emphasis on thrift and expedience meant that the engineers he paid to mechanize the coal mines did so with little regard for the health and safety of its workers or the environment around them. Finally, state politicians, local judges, and the general public complied in the development of these industrial machines, and thus the problems they created, by

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[64] Winner, Langdon. “Do Artifacts Have Politics,” *Daedalus*. (Winter 1980), 121-126.
[65] Lessig, Lawrence. *Code and Other Laws of Cyberspace.* Basic Books: New York, 1999, 58.

endorsing their use and failing to regulate their application. Indeed, as sociologist Robert W. White succinctly offers: “Technology shapes society, and society shapes technology.”[66]

[66] White, Robert W. “Environmental Science and Technology,” as quoted in Rhodes, Barbara and Rice Odell. *A Dictionary of Environmental Quotations*. The Johns Hopkins University Press: Baltimore, 1997.

CONCLUSIONS

When I first sat down to interview John Wathen—long-time environmental activist and current president of the Citizens Coal Council—I had little idea of the extent of coal mining operations in Alabama, much less the long history of death, disease, and environmental degradation that accompanied the industry's nearly two-hundred-year presence in the state.[1] In fact, I must confess I was completely ignorant of the fact that coal mining still existed in the mineral districts of north-central Alabama. At the outset of my research, my familiarity with the coal mining industry merely consisted of antiquated images I had seen in textbooks of men with blackened faces, and the rags to riches story of Loretta Lynn, romantically portrayed in the 1980 Hollywood hit "Coal-Miner's Daughter." One might wonder, given this sugar-coated introduction, why I chose to pursue the topic of coal mining, particularly in the state of Alabama where annual coal production rates still trail behind those of states like West Virginia and Pennsylvania. Indeed, with all the recent publicity surrounding the deaths of the fourteen miners in the Sago Mine disaster and the environmentally devastating practice of mountaintop removal in West Virginia, a historical study of the coal mining industry might have been better placed in the mineral districts of northern Appalachia rather than the trailing southern foothills of these mountainous coal reserves. I soon discovered,

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[1] John Wathen is an Alabama native and President of the Friends of Hurricane Creek, a not-for-profit citizens group from Tuscaloosa dedicated to cleaning up Hurricane Creek. Coal mining remains the number one environmental threat in the Hurricane Creek Watershed, and Wathen is committed to addressing environmental and social justice problems in the Tuscaloosa coal fields. In 2003, he was elected the new Chair of the Citizens Coal Council (CCC), a nation-wide federation comprised of 45 grassroots organizations throughout the country working to protect natural resources and communities in coal mining districts. Since his appointment, Wathen has made a number of public appearances and speeches on the environmental and human costs of coal mining, including an interview on CNN following the Sago Mine explosion in West Virginia.

however, that coal mining holds a very important place in both the history of Alabama as well as the history of technology and the environment.

Compared to most mining regions in the United States, mine mechanization in the coal mines of north-central Alabama escalated very rapidly in the span of only a few decades, completely displacing previous mining economies and wholly transforming the work environment of the individual miner. Prior to the introduction of extensive mining machinery in the Alabama coalfields, most miners were individual entrepreneurs who labored in riverbeds and made their own tools and devices for extraction and productive purposes. While these early miners placed an emphasis on thrift and expedience, their tools and techniques also reflected a concern for human safety. However, with the advent of mine mechanization during the latter part of the 19th century, large coal companies took control over the productive processes of coal mining and restructured these processes to serve their own specific aims—namely, large-scale mass production of coal at the expense of human safety and environmental health. To achieve this end, they enlisted the aid of the state government, who shared a common financial interest in the wide-scale propagation of the convict lease system. They appealed to local judges, who absolved the coal companies from responsibility for accident-related deaths and injuries. Finally, they convinced the public that human injuries and environmental degradation were the natural and inevitable consequences of industrial progress.

While Alabama's industrial mining engineers overlooked technological solutions to human injury and environmental degradation, however, they found innovative ways to meet specific environmental challenges that stood in the way of production demands. Erskine Ramsay, for example, invented his famous endless rope haulage system to fit the unique geological conditions of the Pratt coal mines—a system that consequently introduced new occupational hazards into the workplace environment. By installing by-product coke ovens at the Pratt mines, Ramsay similarly provided a solution to both the growing costs of mine power and the highly sulfuric content of Alabama coals. However, the construction and use of these ovens simultaneously impaired the health of the surrounding environment by releasing large quantities of noxious gases and harmful runoff. The safety and environmental problems of late nineteenth century mining in north-central Alabama thus serve as an example of what happens when corporate concerns for profits and productivity overshadow human needs for environmental health.

Indeed, Alabama coal mines remain among the most technologically sophisticated operations in the United States today; yet, Alabama coal miners and their families still suffer some of the gravest human and environmental injuries as a result of the industry's unregulated growth in the state. In September of 2001, for example, thirteen Alabama miners died in a sudden methane explosion that, according to one newspaper report, "[blew] a crater in the mine thirty feet high and more than fifty feet long" and "spat balls of fire through the long corridors and up the 2,000-foot ventilation shaft."[2] However, like the Pratt Coal Company's president G. B. McCormack, who denied responsibility for the deadly Banner mine explosion in 1911, Jim Walters Resources similarly attributed its Brookwood mine explosion to individual error on the part of the Alabama coal miners.[3] Moreover, unlike West Virginia, where the recent Sago mine disaster induced the state to enhance mine safety measures, the Alabama government responded to the 2001 event by significantly reducing the state inspection agency's budget as well as the number of

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[2] Jackson, David. "The Human Cost of Coal Mining." Second of Three Parts. The *Chicago Tribune.* 23 September 2002.

[3] Interview with John Wathen, Hurricane Creekkeeper, 9 August 2005.

inspectors employed at the agency.[4] An Alabama judge further pardoned Jim Walters Resources by cutting the original fine levied against the company from $435,000 to $3,000—a minor recompense compared to the enormous losses of the thirteen Alabama widows and their families.[5] This particular disaster and the events following thus reflect the same political and legislative support for human endangerment that encouraged the earliest industrial coal owners to skirt safety devices and ignore environmental pollution controls.

Although the state government disbanded the convict labor system in 1928, government-backed labor oppression still exists as a more subtle force that continues to pervade the Alabama coal-mining industry. Drummond Coal Company, one of Alabama's largest coal companies, currently owns the building that houses the state's Surface Mining Commission in Jasper, Alabama—a situation analogous to the early industrial coal companies who built prisons to house the state's convicts.[6] The Surface Mining Commission is responsible for regulating the safety of the underground coal mines and issuing citations for environmental pollution violations; however, as John Wathen explains, "Placing the Surface Mining Commission in the building of a major coal company is like letting the fox guard the henhouse."[7] Indeed, recent mining accidents suggest that state inspectors may be falling short of their duties to ensure the human and environmental safety of Drummond's underground coal mines. In late February of 2006, a series of methane explosions erupted in Drummond Company's Shoal Creek mine, reportedly one of the most sophisticated underground mining

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[4] Beyerle, Dana. "Miners rally for more inspectors: This year's budget pays for 3 inspectors." *Tuscaloosa News*. March 8, 2006.
[5] Interview with John Wathen, Hurricane Creekkeeper, 9 August 2005.
[6] Interview with John Wathen, Hurricane Creekkeeper, 9 August 2005.
[7] Interview with John Wathen, Hurricane Creekkeeper, 9 August 2005.

operations in North America.[8] Although no workers were injured in the accident, the Shoal Creek explosions reminded miners and local citizens alike of the dangers of poorly regulated mining operations. To account for the overlooked methane leak, the state admitted performing an incomplete inspection due to time constraints, and records further indicate that inspectors from the Surface Mining Commission failed to examine the section of the mine where the explosions first occurred.[9] This event serves as yet another example where industry's irresponsible use of mining technology continues to threaten the safety and well being of individual miners and their surrounding environment.

Of course, this historical critique of industrial mining is not meant to suggest a sort of technological fatalism—whereby the development and application of all mining machines necessarily produce increasing human and environmental destruction. Indeed, many philosophers and social commentators have mistakenly subscribed to such beliefs. E. F. Schumacher, in his book *Small is Beautiful*, once wrote, "The system of nature, of which man is a part, tends to be self-balancing, self-adjusting, self-cleansing. Not so with technology."[10] However, contrary to Schumacher's assessment of technology, an historical analysis of pre-industrial coal mining reveals that the earliest Alabama miners managed to strike a healthy connection with their surrounding environment through the use of specific technologies, like flatboats and crowbars. Even in the "subterranean wilderness" of the underground coal mines, where the coal companies created some of the most dangerous work environments, industrial miners still sought innovative techniques in order to mediate between their basic human needs and the occupational hazards of the new underground mines. They often failed to meet these basic needs, but

[8] Wortham, April. "Weekend explosions rock Shoal Creek Mine." *Tuscaloosa News*. February 28, 2006.
[9] Wortham, April. "Weekend explosions rock Shoal Creek Mine." *Tuscaloosa News*. February 28, 2006.
[10] Schumacher, E. G. *Small is Beautiful: Economics as if People Matter*. Harper Perennial: London, 1989.

it was less the fault of a particular mining machine and more a product of the coal owner's relentless desire to increase production rates.

By highlighting the influence of human agency in the development of these machines and nesting technology within the aggregate of government, politics, and society, this thesis actually challenges the assumptions of technological fatalism. Mining machines, in fact, do not spell automatic doom and destruction for the human environment; they merely accommodate the needs of those who own and operate them. Indeed, there exist safety devices and machines designed to protect miners and environmental quality, but most Alabama coal companies, both past and present, neglected to invest in such technologies because they did not serve their immediate production goals. Even when Birmingham city officials like James Weatherly attempted to implement better pollution controls and safety measures, they encountered vehement opposition from the industrial elite and thus refrained from instituting the new laws. The Canadian government, on the other hand, recently passed a law requiring that every underground mine be equipped with a "safe room," or sealed oxygen chamber, to which men can retreat in the event of a mine explosion. Early in 2006, this "safe room" saved the lives of over seventy Canadian workers trapped underground, but the thirteen miners who died in the Brookwood mine explosion did not have the advantage of this life-saving technology because there existed no Alabama law compelling the coal companies to adopt it.[11]

Alabama coal companies still fail to implement appropriate safety measures even when required by law. In January of 2002, Black Warrior Minerals caused significant environmental injury when the company's spillway, lacking the required steel

[11] Wathen, John L. "Mining Risks Outweigh Benefits." *Tuscaloosa News*. February 28, 2006.

reinforcements, broke away releasing a "tidal surge of black rock and millions of gallons of acidic water," according to Wathen.[12] This toxic stream of sulfuric acid, heavy metals, and other hazardous pollutants turned the entire creek orange for days, killing all the local stream wildlife and contaminating the drinking water of the nearby community. However, Black Warrior Minerals later denied that the toxic sediment and water had ever escaped from its settling pond, and the report of the Surface Mining Commission included no mention of the company's failure to use steel reinforcements in its spillway.[13] This environmental injury to Hurricane Creek, as well as the coal owner's lack of efforts to prevent or manage the toxic spill, is similar to Alabama's early industrial coal companies, who also neglected to address the safety and environmental problems they created through their mining operations. Even if solutions to these problems existed, they simply failed to see worker safety and environmental pollution as challenges warranting technological redress. As John Wathen concludes, "Coal is a necessary part of our lives. Coal does not have to be a necessary part of our deaths."[14]

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[12] Interview with John Wathen, Hurricane Creekkeeper, 9 August 2005.
[13] Interview with John Wathen, Hurricane Creekkeeper, 9 August 2005.
[14] Wathen, John L. "Mining Risks Outweigh Benefits." *Tuscaloosa News*. February 28, 2006.

BIBLIOGRAPHY

ARCHIVES AND MANUSCRIPT COLLECTIONS

Erskine Ramsay Papers. Birmingham Public Library Archives.

Alfred M. Shook Papers. Birmingham Public Library Archives.

W. S. Hoole Special Collections Library. University of Alabama.

ORAL HISTORIES

Alabama Coal Miners, Volume Six, Alfred J. Renshaw (Jefferson County), By Carl Elliot, Sr. and Susan Crittenden, Northwest Alabama Publishing Company: Jasper, Alabama, 1979. Birmingham Public Library Archives.

Dr. E. L. McFee by Jim Nogalski, April 26, 1975. Oral History in Samford University Oral History Collection, Archives, Birmingham, Alabama.

PERSONAL INTERVIEWS

John Wathen, Hurricane Creekkeeper and President of the Citizens Coal Council. August 9, 2005.

Reese Millet, Alabama Mining Engineer and Geologist. August 10, 2005.

GOVERNMENT DOCUMENTS

"Second Biennial Report of the Alabama Board of Inspectors of Convicts: From October 1, 1886 to September 30, 1888." Montgomery, Alabama: W. D. Brown & Company, State Printers, 1888.

Krauss, Allen K. "Smoke and Pulmonary Tuberculosis," 29 *Bulletin of Johns Hopkins Hospital*, Number 327, May 1918.

Tuomey, Michael. *First Biennial Report on the Geology of Alabama.* Tuscaloosa, Alabama: M.D.J. Slade, 1850.

W. A. Buckout, "The Effect of Smoke and Gas Upon Vegetation," *Annual Report of the Pennsylvania State Department of Agriculture.* Harrisburg, Pennsylvania, 1900.

COURT CASES

Clifton Iron Co. v. Dye, 6 So. 192 (Alabama, 1889). Westlaw Campus.

Lookout Fuel Co. v. Phillips, 657, 66 So. 946 (Alabama, 1914). Westlaw Campus.

Sloss-Sheffield Steel & Iron Company v. Sampson, 48 So. 493 (Alabama, 1909). Westlaw Campus.

Tennessee Coal, Iron & R. Co. v. Hamilton. 100 Ala. 252, 14 So. 167 (Alabama, 1893). Westlaw Campus.

Tennessee Coal, Iron & RR Co. v. Wilhite. 100 So. 135 (Alabama, 1924). Westlaw Campus.

Whatley v. Zenida Coal Company, 26 So. 124 (Alabama 1899), Westlaw Campus.

Woodward Iron Company v. Jones, 1885 WL 426 (Alabama, 1885), Westlaw Campus.

NEWSPAPERS

The Alabama Sentinel, 1891.
Blocton Journal, 1895.
Birmingham *Age-Herald*, 1913.
Birmingham *Labor-Advocate*, 1911-1913.
Birmingham Ledger, 1911.
Jasper Walker County News, 1911.
Tuscaloosa News, 2006.

THESIS AND DISSERTATIONS

Bergstresser, Jack Roland. "Raw Material Constraints and Technological Options in the Mines and Furnaces of the Birmingham District: 1876 – 1930." Ph.D. dissertation, Auburn University, 1993.

Fuller, Justin. "History of the Tennessee, Coal, Iron, and Railroad Company, 1852-1907." Ph.D. dissertation. University of North Carolina at Chapel Hill, 1966.

PRIMARY SOURCE BOOKS

Armes, Ethel. *The Story of Coal and Iron in Alabama.* Cambridge, Massachusetts: The University Press, 1910.

Du Bose, John Witherspoon. *Jefferson County and Birmingham, Alabama: Historical and Biographical, 1887.* Caldwell Printing Works, Birmingham, Alabama, 1887.

Green, Homer. *Coal and the Coal Mines.* Houghton, Mifflin and Company: Boston, 1889.

SECONDARY SOURCE BOOKS

Adams, Charles Edward. *Blocton: The History of an Alabama Coal Mining Town.* Cahaba Trace Commission: Brierfield, Alabama, 2001.

Aldrich, Mark. Safety First: Technology, Labor, and Business in the Building of American Work Safety, 1870-1939. Johns Hopkins University Press: Baltimore, 1997.

Brown, Dee. *The Year of the Century: 1876.* Charles Scribner's Sons: New York, 1966.

Cronon, William. *Nature's Metropolis: Chicago and the Great West.* W. W. Norton & Company: New York, 1992.

Cronon, William. *Uncommon Ground: Toward Reinventing Nature.* W. W. Norton & Company: New York, 1995.

Darwin, Charles. *The Origin of Species by Means of Natural Selection.* London: John Murray, 1872.

Dix, Keith, *What's a Coal Miner to Do? The Mechanization of Coal Mining.* University of Pittsburgh Press: Pittsburgh, Pennsylvania, 1988.

Dix, Keith. *Work Relations in the Coal Industry: The Hand-Loading Era, 1880-1930.* Morgantown: Institute for Labor Studies, West Virginia University, 1977.

Emmons, David and Stewart Udall. *The Forgotten Founders: Rethinking the History of the Old West.* Shearwater Books: September, 2002, 135.

Flynt, Wayne. *Poor But Proud: Alabama's Poor White.* University of Alabama Press: Tuscaloosa, Alabama, 1989.

Freese, Barbara. *Coal: A Human History.* New York, New York: Penguin Books, 2003.

Gordon, Robert and Patrick Malone. *The Texture of Industry: An Archaeological View of the Industrialization of North America*. Oxford: Oxford University Press, 1994.

Harris, Carl V. *Political Power in Birmingham, 1871 – 1921.* The University of Tennessee Press, Knoxville: 1977.

Kelly, Brian. *Race, Class and Power in the Alabama Coalfields, 1908-1921.* Chicago, Illinois: University of Illinois Press, 2001.

Lessig, Lawrence. *Code and Other Laws of Cyberspace.* Basic Books: New York, 1999.

Lewis, W. David. *Sloss Furnaces and the Rise of the Birmingham District: An Industrial Epic.* University of Alabama Press: Tuscaloosa, 1994.

Montrie, Chad. *The Save the Land and the People: A History of Opposition to Surface Coal Mining in Appalachia.* The University of North Carolina Press: Chapel Hill, 2003.

Mumford, Edward. *Myth of the Machine: Technics and Human Development*. New York: Harcourt, Brace & World, 1966, 5.

Mumford, Lewis. *Technics and Civilization*, Harcourt, Brace and World, Inc: New York, 1934.

Rhodes, Barbara and Rice Odell. *A Dictionary of Environmental Quotations.* The Johns Hopkins University Press: Baltimore, 1997.

Rosen, George. *The History of Miner's Diseases: A Medical and Social Interpretation*. Schuman's: New York, 1943.

Schumacher, E. G. *Small is Beautiful: Economics as if People Matter.* Harper Perennial: London, 1989.

Stradling, David. *Smokestacks and Progressives: Environmentalists, Engineers, and Air Quality in America, 1881-1951.* The Johns Hopkins University Press: Baltimore, 1999.

Ward, David Robert and William Warren Rogers. *Convicts, Coal, and the Banner Mine Tragedy.* University of Alabama Press, Tuscaloosa, 1987.

Ward, David Robert and William Warren Rogers. *Labor Revolt in Alabama: The Great Strike of 1894.* University of Alabama Press: Tuscaloosa, 1965, 59.

White, Marjorie Longenecker. *The Birmingham District: An Industrial History and Guide.* Birmingham, Alabama: Birmingham Historical Society, 1981.

PRIMARY SOURCE ARTICLES

Armes, Ethel. "Spirit of the Founders." *Survey*, Volume 27. January 6, 1912.

Crane, W. R. "Iron Mining in the Birmingham District, Alabama." *The Engineering and Mining Journal.* Volume 79. February 9, 1905.

Crane, W. R. "The Pratt Coal Mines in Alabama." *The Engineering and Mining Journal.* Volume 79. January 26, 1905.

Harrison, Shelby M. "A Cash-Nexus for Crime." *Survey*, Volume 27. January 6, 1912.

Hooper, John de B. "Shaft No. 1 Pratt Mines." *The Alabama Sentinel.* September 5, 1891.

Hooper, John de B. "The Pratt Mines Explosion Report." *The Alabama Sentinel.* June 13, 1891.

Howells, William Dean, "A Sennight of the Centennial." *Atlantic Monthly*, Vol. 38, 1876.

Lynch, G. E. "Power for Coal Mining Machinery." *Mines and Minerals.* Volume 25, June 1905.

Milton, Fies. "Coal Seams of Alabama." *Coal Age.* Volume 26, October 1924.

Neil, Hutchings. "Electrical and Steam Haulage At Slope No. 3, Pratt Mine, of the Tennessee Coal, Iron, & Railroad Company at Ensley, Alabama." *Mines and Minerals*. Volume 25, November 1904.

Ramsey, Erskine. "New Endless-Rope Haulage Plant." *Mines and Minerals.* Volume 24, December 1903.

Ramsey, Erskine. "The Pratt Mines and Coke Plant." *The Colliery Engineer.* Volume 8, January 1888.

Ramsey, Erskine. "Underground Boiler Plants." *Mines and Minerals.* Volume 25, September 1904.

Ramsay, Erskine and Charles Bowron. "Coal Washing in Alabama." *Mines and Minerals.* Volume 25, September 1905.

Taylor, William H. "Alabama's Coal and Iron." *The Colliery Engineer.* Volume 9, January 1889.

SECONDARY SOURCE ARTICLES

Blackmon, Douglas A. "From Alabama's Past, Capitalism Teamed with Racism to Create Cruel Partnership." *Wall Street Journal.* July 16, 2001.

Fuller, Justin. "Boom Towns and Blast Furnaces: Town Promotion in Alabama, 1885-1893." *The Alabama Review.* Volume 24, Issue 1. January, 1976.

Green, Jerry E. "Surface Mining." *Encyclopedia of Environmental Issues*, Volume III. Salem Press, Inc. Hackensack, New Jersey, 2000.

Hudgins, Carter Lee: A Natural History of Village Creek. *The Journal of the Birmingham Historical Society.* Volume 9, Issue 1, December 1985.

Jackson, David. "The Human Cost of Coal Mining." First of Three Part. The *Chicago Tribune.* 22 September 2002.

McEvoy, Arthur. "Working Environments: An Ecological Approach to Industrial Health and Safety," *Technology and Culture*, vol. 36 (April 1995).

Stine, Jeffrey K. and Joel A. Tarr, "At the Intersection of Histories: Technology and the Environment." *Technology and Culture*, Volume 39, Number 4 (October, 1998).

Stine, Jeffrey K. and Joel A. Tarr. "Technology and the Environment: The Historians' Challenge." *Environment History Review: Special Issue on Technology, Pollution, and the Environment.* Volume 18, Number 1, Spring 1994.

Straw, Richard A. "Soldiers and Miners in a Strike Zone: Birmingham, 1908." *The Alabama Review.* Volume 38, Issue 4, October 1985.

Tarr, Joel A. "Searching for a 'Sink' for an Industrial Waste: Iron-Making Fuels and the Environment." *Environment History Review: Special Issue on Technology, Pollution, and the Environment.* Volume 18, Number 1, Spring 1994.

Telle, Whitney R. "Digging 'Stone Coal': A Brief Account of Alabama's Early Coal Mining." *Alabama Heritage,* Summer, 2003.

Winner, Langdon. "Do Artifacts Have Politics," *Daedalus.* (Winter 1980), pp. 121-126,

ADDITIONAL PRIMARY SOURCE READING:

"A Pennsylvania Miner's Impressions of Alabama." *Colliery Engineer.* July 9, 1889.

Birkinbine, John. "Speculation in the Southern Iron Trade." *The Iron Age.* Volume 40, November 1887.

"Blowing Engines for the Pioneer Mining and Manufacturing Company." *Iron Age.* Volume 41. April 5, 1888.

"Coalburg, Alabama Coal Mines of the Sloss Iron and Steel Company." *The Colliery Engineer.* Volume 8, February 1888.

"Coke Industry in Alabama." *The Iron Age.* Volume 41, March 1888.

"Fall Meeting of the Alabama Industrial and Scientific Society." *Science.* Volume 22, Number 568, December 22, 1893.

Fitch, John A. "Birmingham District: Labor Conservation." *Survey*. Volume 27. January 6, 1912.

Knowles, Morris. "Water and Waste: The Sanitary Problems of a Modern Industrial District." *Survey*, Volume 27. January 6, 1912.

Taylor, Graham Romeyn. "Birmingham's Civic Front." *Survey*, Volume 27, January 6, 1912.

"The Alabama Mining Camp." By a camp physician. *New York Independent.* October 3, 1907.

"The Birmingham Disaster," by our special correspondent. *The Engineering and Mining Journal*. Volume 79, March 2, 1905.

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