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Perils and Precautions: Mining Safety and Public Policy

Kenneth Hawkins

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In the United States the Industrial Revolution brought about many new occupational hazards for workers. This was true for most jobs, but few were more dangerous than that of coal mining in the Crawford-Cherokee region of Kansas and the other main mining areas such as West Virginia, Pennsylvania, Colorado, and Utah. Between 1887 and 1926 there was a great series of accidents, explosions in particular, which became a catalyst for policy change in regards to coal mining safety. Initial measures that were put into place to protect miners from accidents proved to be inadequate. And even with the advent of new technologies and techniques that could be used to protect the lives of miners, companies often did not institute policies to include these because of increased costs. Eventually states and some companies would both require more effective safety techniques to be used.

The greatest danger in American mines was not the threat of explosions. These did not even account for one quarter of fatalities in mining accidents.<sup>1</sup> This was true in every coal state. Most accidents in the coal mines came from falling slate or coal. These accidents did not generate much concern from the public because while they were the leading cause of mining deaths and were much more frequent than explosions, such accidents occurred on a small scale over time. However, with the violent nature of coal mine explosions and the number of fatalities caused by singular events such as these, the public demanded action to improve mining safety based on these events.

Around this time of history, transportation had been transformed by the railroad industry. This was very important to the coal mining industry. Not only did the railroads need coal to heat the water for the steam engines, but the steel industry also needed coal to make the steel for the railroads. Coal also became essential to the growing use of electricity. With the mechanization of

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<sup>1</sup> Mark Aldrich, "Preventing 'The Needless Perils of the Coal Mine': The Bureau of Mines and the Campaign against Coal Mine Explosions, 1910-1940," *Technology and Culture* 36 (Jul. 1995): 487.

our growing economy there was obviously a growing need for sources of energy. In most cases coal was the answer. It was a cheap, plentiful resource upon which society depended. And because it became such a necessary commodity for the American economy, accidents like coal explosions and workers' calls for safety reform were more easily brought into the public eye and the political stage.

One of the first great disasters that sparked public interest into coal mining safety was the explosion at the Frontenac mine near Pittsburg, Kansas on November 10th, 1888. The previous year, according to the report of the State Inspector of Coal Mines of Kansas, there were only four fatal accidents in the state of Kansas. But, on November 10<sup>th</sup>, 1888 a great explosion at the mine rocked the community. In this single disaster, at the time considered the worst to be recorded in the American West, forty-two men lost their lives.<sup>2</sup> The most likely cause was believed to be an overcharge of black powder used for the shot. This was a somewhat common cause for explosions in the mines, but the greatest risks came from the ignition of gasses or coal dust within the mines<sup>3</sup>. Accidents like those in the Kansas mine, that involve the misuse "...of explosives has caused fires and explosions most of which should be charged against ignorance or negligence"<sup>4</sup>. This is to say that most miners and even managers had limited education as to the laws governing coal mining safety and in regards to procedural matters that could be used to limit risks within the mines. However, a lack of knowledge was not always the case. In some cases miners and managers knew the regulations and procedures that were supposed to be used, but they simply ignored them and considered them to be an annoyance because statistically most mines did not explode.

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<sup>2</sup> "The Mine Explosion," *Columbus Star Courier*, November 15-22, 1888

<sup>3</sup> Harrington, D. "Safety in Coal Mining". *Annals of the American Academy of Political and Social Science* 123, Industrial Safety (Jan., 1926): 93.

<sup>4</sup> *Ibid*, 94.

Even if these workers and managers were to be educated, it would be difficult for the trainers to do so. Miners were typically uneducated. Fire bosses and mine foreman, in many cases, could not even read or write. These managers were often times family members of mine owners and knew little about mining in general, let alone safety regulations. There were requirements for those in charge of the mine that called for managers to obtain a certificate in safety as a fire boss or a mine foreman. This was most definitely an inadequate safety requirement. Even though the law required these individuals to receive certification in their specialty area of management, there were initially no provisions that called for renewal of the certificate in most states. Mining companies also employed superintendents that had authority over mine foreman and fire bosses. However, they did not have much legal responsibility when it came to the safety of the miners and they usually were not required to have any kind of certification for these positions.<sup>5</sup> This leaves an obvious disparity in responsibility. If the mine superintendents were not required to have certification in mine safety procedures and techniques, and had little to no legal responsibility, then there would have been very little motivation for these individuals to adhere to the law and accepted safety measures. This practice put many more men in danger than was necessary.

In 1907, there was a series of great mine explosions that received public attention. During this year alone there had been ten explosions in which two hundred men had been killed by the month of November<sup>6</sup>. Kansas also had two mine explosions during this year in which ten men had died.<sup>7</sup> Around this same time mine explosions had become an international issue with explosions occurring in both Britain and France. The explosion in Britain occurred in 1905,

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<sup>5</sup> Harrington, D. "Safety in Coal Mining". *Annals of the American Academy of Political and Social Science* 123, Industrial Safety (Jan., 1926): 95.

<sup>6</sup> Mark Aldrich, "Preventing "The Needless Perils of the Coal Mine": The Bureau of Mines and the Campaign against Coal Mine Explosions, 1910-1940," *Technology and Culture* 36 (Jul. 1995): 483.

<sup>7</sup> State Inspector of Coal Mines of Kansas (Topeka, 1907): 120.

killing 143 miners. France had it much worse. The largest mine explosion in history happened in Courrières in 1906. This single disaster claimed the lives of 1,100 miners alone<sup>8</sup>. This is more than twenty six times the casualties of the Pittsburg, Kansas explosion of 1888. This is relevant because before this time the rate of explosions in the United States had been less than that of Great Britain, but had suddenly worsened and did so in a rapid manner. This gave the United States a negative impression to the international community. In 1903 the English *Colliery Guardian* published information about American mine conditions in correlation to mine explosions. It had said that in the U.S. there was a “general disregard for life that would never be tolerated here” and that the U.S. “enjoys the unenviable reputation of being the most backwards of civilized nations.”<sup>9</sup> This gave off the impression that profits were more important to mine owners in the United States than protecting the lives of the workers who generated those profits.

Even before the 1907 explosions, many people saw the imminent threat that lay ahead for the workers. During that year the United Mine Workers wrote about the “lax administration” of mine laws within West Virginia and noted the lack of enforcement of these laws on the part of the state. Mine inspectors in the main coal mining states took notice that coal mines were becoming increasingly deep and filled with gas. This was often because during the shot firing many mines would slow down the ventilation fan to try to limit the amount of oxygen and prevent a larger explosion, which instead led to a larger accumulation of gas that could then be ignited once the shot was fired.<sup>10</sup> This was not a violation of the law, but it was certainly an unsafe practice on the part of the mine managers. This could either be attributed to the

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<sup>8</sup> *Ibid*, 488.

<sup>9</sup> *Ibid*.

<sup>10</sup> State Inspector of Coal Mines of Kansas (Topeka, 1887).

aforementioned lack of education on safety procedures or the ignorance of basic safety guidelines.

In the Pittsburg, Kansas case of 1888, the same problems were to blame as those that occurred in the explosions 19 years later. According to the *Columbus Star Courier* on November 22<sup>nd</sup>, 1888, the investigation into the explosion had found that the explosion was due to the ignition of powder and gas and that the amount of dust that had been accumulated in the mine was a major contributing factor in the amplification of the damage that was dealt to the mine. The jury in the investigation further found that if the managers in charge of the mine had properly sprinkled the mine entrances with water and had paid close attention to the amount of gas within the mine, then the explosion would not have been so catastrophic. This case shows how the managers often treated safety procedures in the mine with utter disregard. Interestingly enough, the Kansas Inspector of Coal Mines did not issue a report for the year in which this major accident took place. There is only a brief mention of it in the 1890 report. This raises the question of whether or not the state was ignoring safety guidelines when inspecting the mines. This would not be something that was entirely unheard of, but the evidence does not clearly distinguish if that was the case in regards to Kansas mine inspections at this time.

Perhaps it was not the fault of the mine inspectors for ignoring different safety hazards, but rather the fault of the state legislatures for not providing the mine inspectors with sufficient police powers to enforce laws rather than to simply make recommendations to mining companies. This was the case in both Pennsylvania and West Virginia. In fact, just before the Jacob's Creek, Pennsylvania explosion in 1907, which took the lives of 239 coal miners, the state's chief inspector wrote to another state inspector that he had been worrying about the threat

of explosion in the mines for months, but that the law effectively blocked his efforts to improve the situation in the mines.<sup>11</sup>

This began to change after the 1907 disasters. The American public had been outraged by the lack of safety within the mines and called upon their congressmen to address the issue. This caused the House Committee on Mines and Mining to begin to consider forming a bureau of mines to lay out safety policy for mining companies. Mine owners even advocated for federal investigations into finding the root causes of explosions in coal mines so that better legislation could be made in regards to safety policy.<sup>12</sup> This would have most definitely been advocated in Kansas mines as well with the 1888 explosion still in the mix of the debate, as well as the two explosions occurring in 1907.

The United States Geological Survey began investigations of explosions in 1908. The investigation utilized data from both the European and American mines and was meant to be an impartial study to eliminate bias within legislation that would regulate the mines. The main focus of this study became the explosiveness of coal dust and the certification of electrical mining equipment, cap lamps, and other new safety technologies and methods. In 1910 the Bureau of Mines was finally formed and took over the investigations. They had no police powers, but were simply there to "...provide technical support needed to reduce the "needless perils" and other wastes of mining".<sup>13</sup> This was the case in Kansas as well as the other states. As late as 1916 it was recommended by the state Inspector of Mines that the legislature needed to give police

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<sup>11</sup> Mark Aldrich, "Preventing "The Needless Perils of the Coal Mine": The Bureau of Mines and the Campaign against Coal Mine Explosions, 1910-1940," *Technology and Culture* 36 (Jul. 1995): 489.

<sup>12</sup> *Ibid*, 490.

<sup>13</sup> Mark Aldrich, "Preventing "The Needless Perils of the Coal Mine": The Bureau of Mines and the Campaign against Coal Mine Explosions, 1910-1940," *Technology and Culture* 36 (Jul. 1995): 491.



powers to the Mine Inspection Department in order to address the problems associated with getting the Kansas mining companies to comply with the laws that were in place.<sup>14</sup>

One of the interesting things the Bureau found in its investigation was that dangers within the mines were directly related to the “economic interests of both operators and miners.” For instance, the United Mine Workers tended to favor safety procedures, such as better ventilation, rock dusting, and safer machinery, which would place costs on the mine owners instead of the workers. Likewise the operators favored procedures that would transfer the costs to the workers and not on themselves, such as using cap lamps that were often heavy. Rock dusting was simply using the dust from limestone or gypsum to sprinkle it over the coal dust within the mine to render it non-explosive. This required mine companies to purchase the dust which was an added cost to them. However, it was in their best interest to rock dust their mine to protect it from explosions. Not only would they benefit from preventing the loss of labor due to fatalities and injuries, but they would also not have to pay to repair the mine to keep it in operation. This proved to be true in Kansas during 1926 in which six explosions had occurred. Rock dusting was accredited to saving the lives of many of the miners and had saved the mines from a considerable amount of damage that would have been worse if rock dusting had not been used.<sup>15</sup> The same report credited rock dusting with the fact that no shot firer had lost his life to an explosion that year in Kansas during the shot firing period. In order to attempt to educate mine operators about the explosive capability of coal dust, the Bureau held a national first aid meeting in Pittsburgh, Pennsylvania in 1911.<sup>16</sup> This meeting included a surprise demonstration of a coal dust explosion which ended up convincing many people of the need to prevent the ignition of coal dust. However, most operators still did not initially implement rock dusting as a standard practice until

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<sup>14</sup> State Inspector of Coal Mines of Kansas (Topeka, 1916): 29.

<sup>15</sup> State Inspector of Coal Mines of Kansas (Topeka, 1926): 127

<sup>16</sup> *Ibid*, 497.

after another explosion in Colorado killed seventy-nine people. The Bureau was so adamantly promoting rock dusting that it implemented strategies to make this a more economically viable option for mine operators. One such strategy was the development of machines to dust the mines. Eventually it recommended to insurers that rock dusting be used in coal mines. In Pennsylvania during 1919 there was even an extra insurance charge on coal companies that did not water or rock dust.<sup>17</sup> However, rock dusting still did not take effect in most states until 1924 after another series of explosions that began in Utah.

Even in the mid 1920s the laws governing mining safety were not up to date in most cases. During this time the average annual fatality rate in the U.S. mining industry was three per one thousand workers employed, and iron mining alone had four fatalities per one thousand workers. Even with the strides made by companies that began rock dusting and taking other new precautions, this rate was still higher than of mines in Europe.<sup>18</sup> American mining laws were also more lax than those imposed upon mining companies in Europe.

In states where laws were sufficient, they were not enforced very adamantly. There was a large disparity between how closely laws were followed by large mine companies in comparison to smaller mines. Larger mines typically adhered more closely to state mining laws because they had greater resources and financial backing that allowed them to implement stricter and effective safety measures. Smaller mines did not have the same luxury. These mines were financially weak, and even when mining safety laws were enforced, it was rather difficult to get the smaller mines to comply.<sup>19</sup> These smaller mines would often be forced to be more lax on safety measures

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<sup>17</sup> Mark Aldrich, "Preventing 'The Needless Perils of the Coal Mine': The Bureau of Mines and the Campaign against Coal Mine Explosions, 1910-1940," *Technology and Culture* 36 (Jul. 1995): 504.

<sup>18</sup> Hammond, John Hayes. "Inadequacy of Present Laws concerning Accidents". *Annals of the American Academy of Political and Social Science* 38, no. 1 Risks in Modern Industry (Jul., 1911): 74.

<sup>19</sup> Harrington, D. "Safety in Coal Mining". *Annals of the American Academy of Political and Social Science* 123, Industrial Safety (Jan., 1926): 97.

in order to keep their operating costs down and remain competitive in the area. This is applicable to the situation in the Cherokee-Crawford region of Kansas as many of the area mines belonged to smaller companies.

The Bureau of Mines also mounted an effort to educate operators and miners on first-aid and rescue. However, this effort took a back seat to the rock dusting campaign. Kansas actually did make a recommendation based on this effort by the Bureau. In the 1916 Mine Inspector report it was recommended that a mine-rescue station be built in Pittsburg and that each mine should have first-aid and mine rescue crews. During this year Kansas miner and operators began to take a greater interest in mine rescue training and first aid. The U.S. Bureau of Mines even had a first-aid and mine rescue demonstration in Lincoln Park at Pittsburg, Kansas.<sup>20</sup> It was said that this event was a great success in promoting mine rescue and first-aid. At this time, 114 men in Kansas mines were trained in first-aid and mine rescue. Eventually the recommendations made in this report would be carried out and Kansas would be ahead of most mining states in this regard, but ventilation was still poor in many of the local mines.

Explosions and ceiling collapses were not the only risks that the miners faced. Long term health issues arose the longer a person had been working in the mines and living in the coal towns. These are important to safety as well since they pose a long term risk to the worker. Sanitation was a major health concern for miners as well. The water supply was generally considered satisfactory in company towns, but the disposal of sewage was of great concern to the U.S. Public Health Service.<sup>21</sup> Indoor plumbing was not a standard in the homes of miners. In these communities sewers were used approximately 30% of the time, but the sewage in them was

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<sup>20</sup> State Inspector of Coal Mines of Kansas (Topeka, 1926): 12.

<sup>21</sup> Fishback, Price V. and Lauszus, Dieter. "The Quality of Services in Company Towns: Sanitation in Coal Towns in the 1920s," *Journal of Economic History* 49, no. 1 (Mar., 1989): 127.

not normally treated.<sup>22</sup> The most common form of waste disposal was in vault and pit privies. While these did reduce odors and keep flies away, they posed a danger to the ground water. Such concerns were legitimate because having unsanitary conditions could lead to many illnesses including things like dysentery. Just as with safety measures taken by coal companies to prevent explosions, there was a large economic factor involved with the quality of sanitation in coal company towns. Providing sanitation services to workers and their families put added financial strain upon the mine operators and owners. This had to be made up in some way. It came down to either increasing the productivity of the workers in the mine or a reduction of wages paid to them. Often times there was little incentive for the operators to improve sanitation conditions based solely on the cost of doing so. It was not until “changes in the economic environment” that smaller coal towns began to improve sanitation methods.<sup>23</sup>

The related industry of zinc and lead mining also had some major long term health concerns as well. Kansas was included in part of the major lead and zinc producing areas between 1900 and 1950. The new technology that was introduced to the mining industry during this period led to more dust and chemicals being introduced in the air around the workplace. This led to widespread cases of silicosis, which was a serious lung disease similar to the “black lung” that coal miners experienced, and became the center of the debate on work related illnesses.<sup>24</sup> This was not important for the simple fact that it highlighted the risk of silicosis in the mines, but it shed light upon the fact that industrial disease was a serious problem within the new economy. This was paramount for the development of health and safety policy within the United States. The lead and zinc industry was important to the economy in similar ways as coal mining was.

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<sup>22</sup> *Ibid.*

<sup>23</sup> Fishback, Price V. and Lauszus, Dieter. “The Quality of Services in Company Towns: Sanitation in Coal Towns in the 1920s,” *Journal of Economic History* 49, no. 1 (Mar., 1989): 138.

<sup>24</sup> Markowitz, Gerald and Rosner, David. “The Street of Walking Death: Silicosis, Health, and Labor in the Tri-State Region, 1900-1950,” *Journal of American History* 77, no. 2 (Sept., 1990): 526.

Zinc and lead were used in the production of steel which the railroad needed. Both were also used largely for gasoline, batteries, and munitions.<sup>25</sup> Because this was such an important industry as well, silicosis was also brought into the political stage and public attention just as explosions in coal mines had been. Even after the Public Health Service in 1914 officially identified silicosis as a legitimate lung disease caused by working in the dusty conditions of the lead and zinc mines many companies still did not take action. Companies often blamed the diseases the workers and their families were getting on their lifestyles or sanitary conditions they were living in. It was not until many years later that this issue was finally resolved with governmental regulation and promotion of safety measures to guard against this problem.<sup>26</sup>

There is a strong case to suggest that competition itself was a major factor of problems in relation to safety policy in the United States. In a capitalist system such as ours, businesses exist solely for the purpose of making money. With the intense competition involved with companies' endeavors to outperform one another, safety is often of little concern to operators. This is the reason for the disparity in how workers and operators of mines had biases about how policy regulating safety and health practices should be governed. As such it is no surprise that in areas where the unions held sway and exerted greater influence upon operators that conditions in the mines were often better than in other mining areas. It should also be noted that companies are not only in competition to make profits, but also to have the best available workers to produce these large profits. Therefore, it would be in the best interest of operators to work with unions and governmental agencies to improve safety and health policies in their mines. This was made easier through the work of the Bureau of Mines and the recommendations made by the inspectors

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<sup>25</sup> *Ibid*, 127.

<sup>26</sup> *Ibid*, 531.

who were to render unbiased opinions to operators and miners about how they could best improve the quality of safety conditions within the mines.

The main factors for the inadequacy of safety conditions in the mines was the lack of enforcement ability on the part of the inspectors, the initial lack of education that was available to miners and operators in regards to safety policy, capitalist competition in general, biases between miners and operators of how safety regulations should be applied within the individual mines, financial matters for smaller mine companies, the differing preferences of how to allocate costs to either operators or workers when it came to safety equipment and procedures, and inadequate laws passed by the legislatures. Had these factors been better addressed by the companies themselves, there would have been far fewer accidents with less damage done to mines and fewer fatalities. The establishment of mine rescue and first-aid stations was a great stride forward in providing better safety conditions for workers in the mines. Kansas, compared to other states during this time, was more advanced and provided better services to train workers and managers to deal with emergency situations. This was a result of increasing public influence over politicians and calls for stricter laws pertaining to health and safety in the mines. While Kansas was more advanced in this area, the state still lagged behind when it came to matters of ventilation and the storage of black powder in the mines. Rock dusting in mines around the country, including Kansas, proved to be a very effective method of preventing explosions and efforts made by the Bureau of Mines were largely responsible for this. Without the work done by the Bureau of Mines and the insistence upon cooperation from mine operators, many more disasters would have occurred.

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