West Virginia Coal Mine Fatalities: The Subculture of Danger and a Statistical Overview of the Pre-enforcement Era

Paul H. Rakes

The human drama conveyed by continuous televised coverage of the Sago mine disaster in January 2006 may have seemed a novel occurrence to a much younger generation of West Virginians. Yet, in reality, those who watched much of the twenty-four-hour coverage of events at Sago may have found themselves virtually participating in a historical pattern of emotional trauma all too common among earlier coalfield generations. Tearful families gathered in crowds near a mine awaiting news regarding missing loved ones underground represented a scenario played out all too often in coal industry history. Before 1969, death and injury in the mines had been so frequent that it became part of the cultural thinking of coal communities.

Historically, residents of coal mining areas knew the risks and realities of the coal mining work environment. Stories of men killed in roof falls, crushed by machinery, or trapped after massive explosions remained a part of the folklore as well as contemporary events. In fact, most miners died or received injuries not in the more publicized disasters, but in individual mishaps. These day-to-day accidents coupled with the cycle of disasters provided the basis for the formation of a subculture of danger.

The miner of the earlier era was also more visible to the coal community than those of today. Although the automobile resulted in an exodus from the older coal camps, most miners could not afford a second "work vehicle," and paid for transportation to work, usually in the pickup trucks of other miners. Thus, it was not uncommon into the 1960s to see a coal miner dressed in "bank clothes"[1] waiting at the side of the road for his ride. Holding a round, silver-colored dinner bucket and covered with the grayish-black residue of coal and rock dust, this miner provided a visible sign of an individual headed into a world where death and injury were common. No doubt, in the minds of the more impressionable coalfield residents, the solitary miner waiting by the roadside symbolized a subculture that had come to accept the dangers of mining. Residents of mining areas knew all

WEST VIRGINIA HISTORY, New Series, vol. 2, no. 1 (Spring 2008): 1-26.
Correspondence to Paul H. Rakes, WVU Institute of Technology, History Dept., 405 Fayette Place, Montogomery, WV 25136-2436.

too well that there existed the real possibility that the waiting miner could be someone who might be seeing the light of day for the last time. In many ways, the miner's working life represented something akin to a soldier about to enter combat. Although it served as combat with Mother Nature rather than opposing human armies, the potential of death and injury remained high for many decades.

Catastrophe, both individual and collective, existed as a real component of the mining community experience and memoirs of life in the coalfields invariably contain references to accidents and disasters. In his reminiscence of life in West Virginia's southern coalfields, W. P. Tams painted an overall positive portrait of operators and miners, but did not refrain from describing the horror of the 1907 Stuart explosion or to remind his audience that "coal mining has remained a hazardous occupation."[2] In the minds of some, coal mining, death, and injury were synonymous. Recalling his early years in a Maryland coal town, Raymond Densmore observed that "anytime coal mining is mentioned in my presence, immediately there comes to mind a picture of a horse-drawn hearse carrying a dead or injured miner."[3]

This conceptualization of a dangerous occupation permeates scholarly studies as well. Anthony Wallace's comprehensive analysis of Pennsylvania's nineteenth-century Schuylkill region includes a lengthy description of the dangers of coal mining. Although Crandall Shifflett portrays twentieth-century coal towns in a rather positive light, he cannot ignore the inherent dangers of the mining occupation. Drawing from the earliest history of the nation's coal mines, Ronald Lewis relates that the fear of death and serious injury underground proved stronger than a slave coal miner's fear of punishment for escaping. Lewis reminds us that as late as 1968 the general public accepted the "truth" of coal mining as an inherently dangerous occupation in which people die.[4]

Whatever the basis of scholarly interpretation, acknowledgment of the hazards of mining remain consistent. David Corbin uses a Marxist analysis in his study of West Virginia's mine wars, but his remarks concerning the dangers could easily have been written by more conservative historians: "[The mining environment was a] brutal world filled with deadly slate falls and car accidents and murderous gas explosions that killed friends and coworkers in a single flash."[5] Caroline Giesen's sociological study of more recent mining communities consistently refers to the psychological impact of the dangers of mining on family relationships. Perhaps this overall concept of a hazardous occupation is exemplified in the 1943 comment of a citizen from outside the coalfields: "I would not be a coal miner for $100 an hour."[6]

Popular perceptions of an inherently dangerous occupation had already become well-established when a series of disasters in the first decade of the twentieth century produced a public outcry that contributed to the founding of the United States Bureau of Mines. Lacking enforcement powers and initially mandated to study the cause of mine explosions, the bureau's basic mission of research and education remained consistent over the years. From its founding in 1910, the bureau's primary purpose centered on the communication of the knowledge of dangers based on experimentation and research which could be passed on to miners and operators in an effort to decrease the number of accidents. By 1976, the bureau had taken on powerful regulatory functions, but central to its mission was the idea that coal mining could be removed from the "list of high risk industries [by] improvement of the health and safety conditions in mines through education and training."[7]

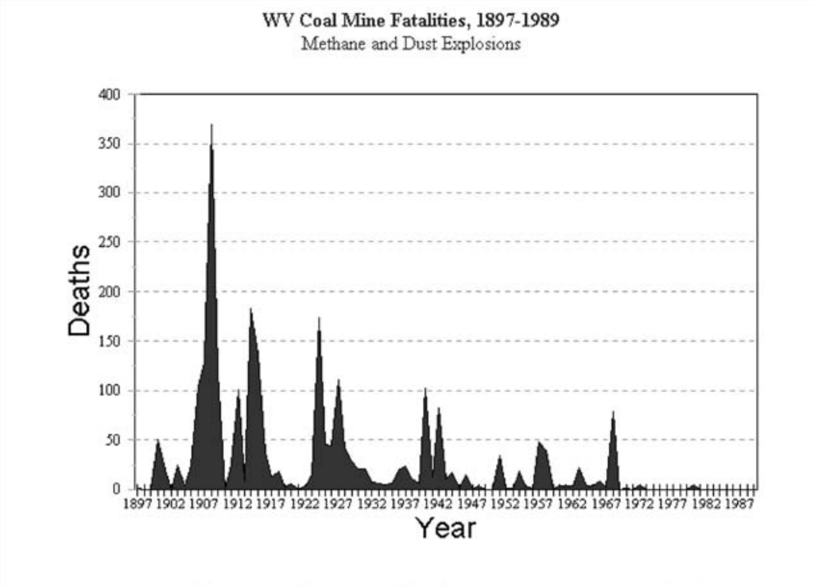
Yet, in terms of the popular perception of mining and official analysis, the concept of educating the workforce in order to prevent accidents seemed to have little impact. Newspapers of the 1940s lamented that coal mine fatalities reflected the unavoidable reality of the enterprise, and, in the aftermath of the massive Farmington explosion in 1968, both government and mine union officials reiterated the traditional justification that fatalities represented the inherent hazards of the business.[8]

Studies conducted in West Virginia provide evidence that coal mining remained perilous over the years. In 1933 Robert Lambie, the chief mine inspector of West Virginia, noted that fatalities had decreased in recent years, but he remained concerned that expanded mechanization and the loss of skilled miners in the economic downturn would lead to an increase in casualties. Lambie's apprehensions seem to be supported by observations that came nearly forty years later. In 1970, an interdisciplinary study at West Virginia University noted the continuity of fatalities in the state's coal mines and, in the same year, the school's Coal Research Bureau observed that "the individual miner is not significantly safer now than he was ten or twenty years ago."[9]

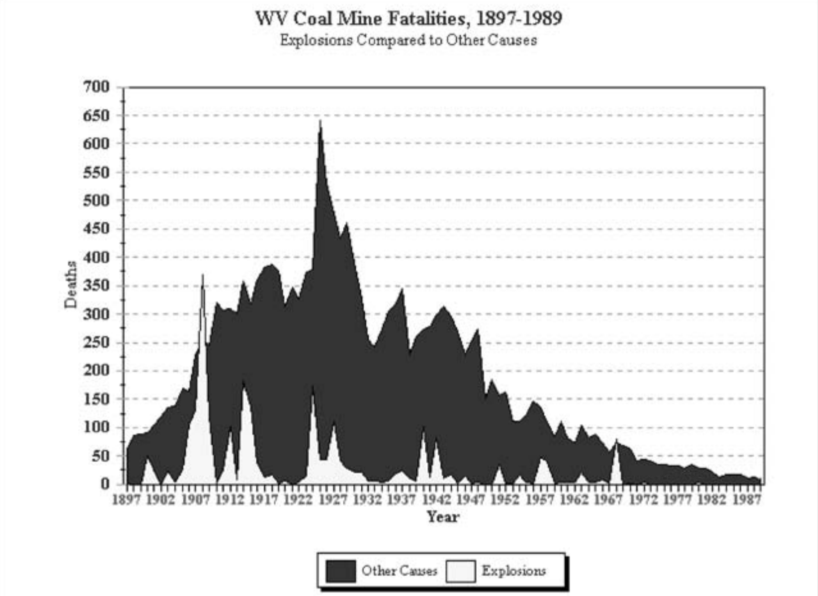
Indeed, West Virginia provides an excellent case study for the history of the perils of coal mining. Shortly after the turn of the twentieth century, immigration officials refused to recommend West Virginia coal mines as an option for new arrivals because of the state's high fatality rate. By World War I, a union official complained to President Woodrow Wilson that the death rate among West Virginia's miners exceeded that of America's combat force in Europe. Whether or not the state lost this dubious reputation in popular thinking over the next fifty years remains unclear, but the 1970 study concluded that West Virginia miners suffered the proportionately highest fatality rate in the nation.[10]

Coal mine explosions attract public interest more than any other mine disaster, and the 1907 Monongah blast provided West Virginia with the ignominious distinction of being home to the worst such incident in the nation's history. Events at Monongah, coupled with lesser explosions and disastrous fires elsewhere in the country, fueled a public outcry for coal mining reform and led to the formation of the federal Bureau of Mines.[11]

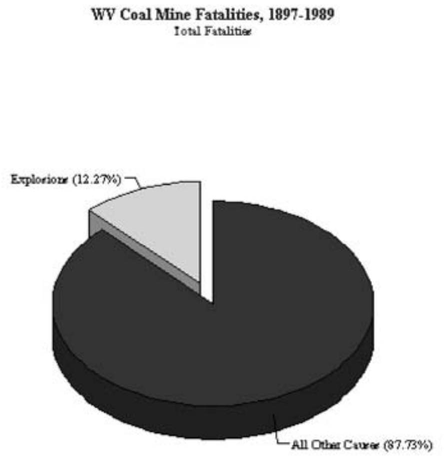
Although such events capture popular attention, statistics demonstrate that, overall, mine explosions pale in comparison to other causes of coal industry deaths. Graph 1 depicts the number of explosion-related fatalities in West Virginia from 1897 to 1989. Certainly, the industry endured a large number of deaths from coal mine blasts during a few years, but, throughout the historical span of time represented by the chart, explosions were intermittent in occurrence and represent only a small number of the total deaths (see Graph 2).[12] In fact, Graph 3 illustrates that, of the 20,354 West Virginia coal mine fatalities occurring between 1897 and 1989, only



Graph 1: Generated from spreadsheet compiled from W. Va. Department of Mines Reports.



Graph 2: Generated from spreadsheet compiled from W. Va. Department of Mines Reports.



Graph 3: Generated from spreadsheet compiled from W. Va. Department of Mines Reports.

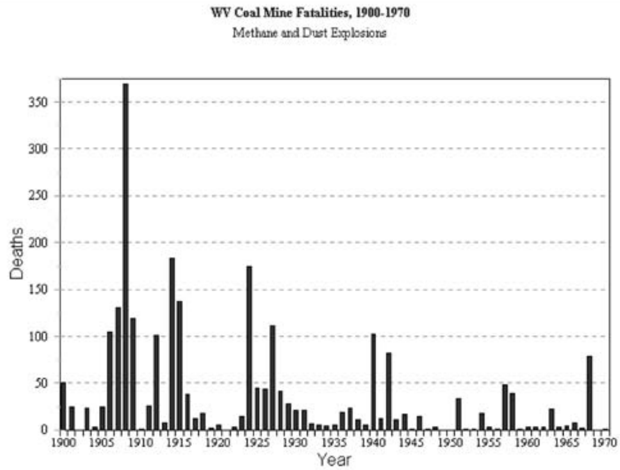
12 percent or 2,498 resulted from explosions.[13]

Although casualties resulting from mine explosions represented just a small percentage of fatalities, the publicity generated by these events contributed to a popular image that conjured visions of miners consumed by instantaneous blasts of heat, falling prey to the noxious fumes that follow explosions, or succumbing to the slow death associated with barricaded miners entombed underground.[14] Significantly, the notoriety surrounding these periodic catastrophes reminded mine workers of what could befall them on any given day.

In terms of creating an impressionable fear of explosions, the resulting 2,498 deaths over the ninety-two years included in the graphs would average as twenty-seven fatalities a year. Undoubtedly, because mining tended to be a family occupation, this figure meant that a vast number of working miners had some history of relatives, or possibly friends, who had perished in explosions. Coupled with the periodic problems that many miners experienced in dealing with methane on a daily basis, the threat of mine blasts must have permeated the inter-occupational rhetoric of mining and the workers' own perceptions of the occupation.

While the history of explosions in the coalfields, in other states as well as West Virginia, became an intricate component of the occupational folklore, statistics seem to indicate that the threat of an explosion loomed much larger than the actual incidence. Undoubtedly, miners working in gaseous mines tended to maintain stronger vigilance against explosion hazards, but Graph 1 indicates that this prudence may have been similar to military forces guarding against an attack by commandoes; in both cases a real threat, but one that rarely visits.[15]

However, despite the small contribution of explosions to total mine fatalities depicted in Graphs 2 and 3, one must be cautious in diminishing the overall influence of these events on the attitudes of working miners. Graph 4 indicates that between 1900 and 1970, when the federal Bureau of Mines assumed strict regulatory powers, at least one miner died in a gas or dust explosion every year but five—1902, 1921, 1949, 1950, 1969. In most instances, three or more miners were killed in these mishaps and the public curiosity concerning explosions leaves little doubt that most workers heard some news about these events. Regardless of the scale or human price of these occurrences, they were constant reminders to working miners of the possibility of massive explosions at any time. This increased awareness of the potential for explosion decreases the likelihood of their occurrence. Indeed, in 1941, mining expert R. D. Currie informed an assembly of

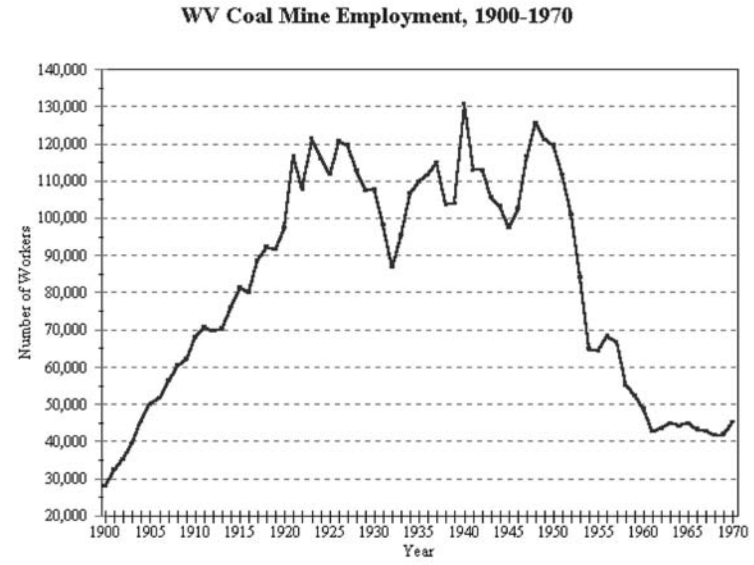


Graph 4: Generated from spreadsheet compiled from W. Va. Department of Mines Reports.

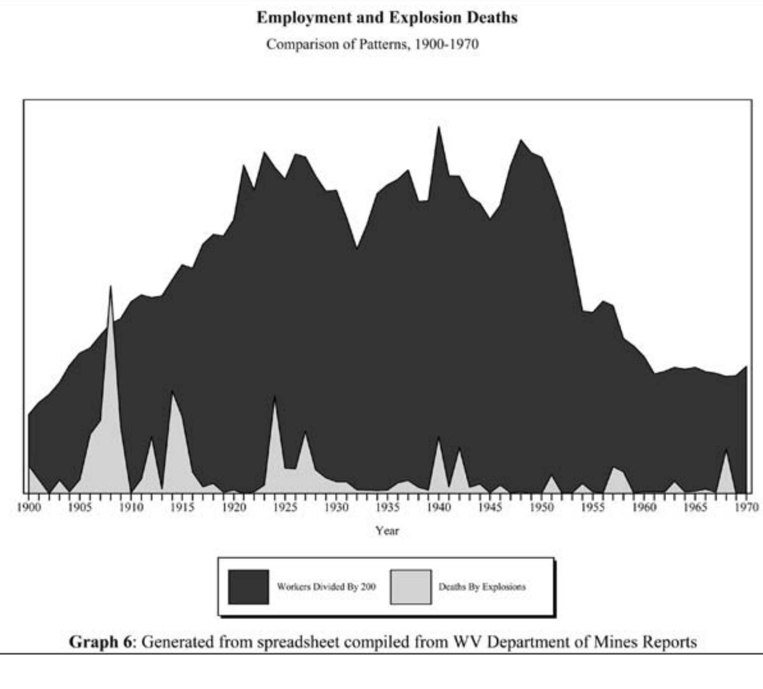
mine inspectors that violent gas or dust explosions were more difficult to produce than to prevent. He pointed out that "the right accumulations of gas and dust, a potent source of ignition, and a group of victims unaware or unheeding the danger would be extremely difficult to set up in an ordinarily well-managed mine."[16]

Accepting Currie's analysis encourages one to question the reasons behind the peaks in coal mine explosions depicted in Graph 1. Economic considerations are among the factors that may be considered. From its earliest days, the nation's coal mining industry has experienced radical cycles of boom and bust. If employment figures indicate a loss of jobs during these periods of numerous explosion fatalities, it might follow that miners had engaged in careless practices in an effort to produce more and protect their jobs. Graph 5 illustrates the employment figures of West Virginia's coal industry between 1900 and 1970. This employment pattern is transposed to Graph 6 and compared to explosion deaths. Analysis of Graph 6 indicates that periods of employment decline do not correspond to an increase in mine explosions. The graph does not compare specific numbers, but, rather, the relationship pattern of explosions with rise and fall in employment.

Employment experienced a substantial rise during the 1908 and 1914-1916 peaks of explosion deaths. The 1928 peak corresponds with an employment decrease, but the loss of jobs does not appear drastic. Although the 1958 increase occurred during an era of severe job loss, close



Graph 5: Generated from spreadsheet compiled from W. Va. Department of Mines Reports.



Graph 6: Generated from spreadsheet compiled from WV Department of Mines Reports

examination of the chart indicates that even this incidence corresponds to a small increase in employment. The 1968 Farmington disaster provides the peak for that year, but the employment figures for this period indicate that jobs had remained stable for several years.

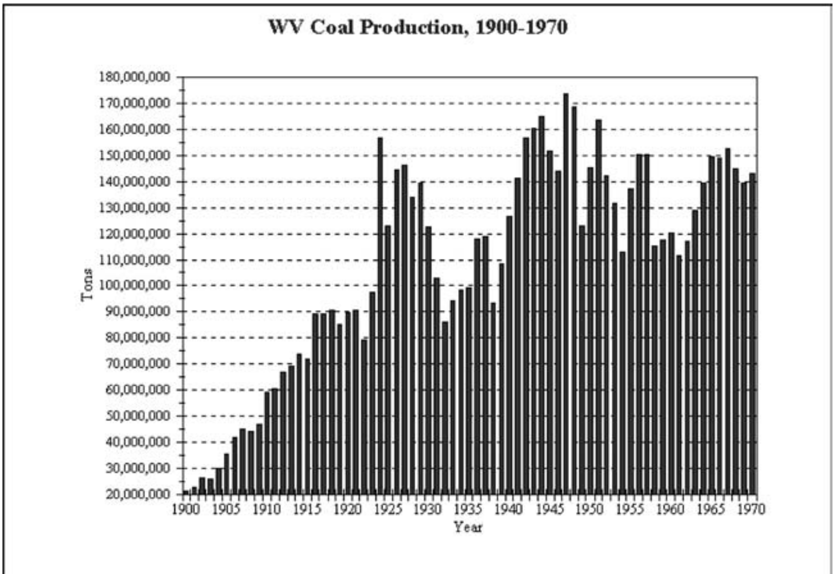
In fact, explosion peaks seem to actually match various crests of employment and suggests another possibility: an expansion of employment may have increased the number of less-knowledgeable miners. Anthony Wallace speculated that the National Academy of Sciences 1982 study, *Toward Safer Underground Mines*, suggests that older mines were safer than newer mines.[17] Mining experience coupled with study of the West Virginia Department of Mines' yearly reports indicates that this axiom can be applied to workers. A 1925 analysis of West Virginia's mining accidents indicated that workers with less than five years experience made up a majority of the fatalities.[18]

The lack of experience may certainly have contributed to the severe explosions early in the century. Large numbers of inexperienced immigrants, native whites, and blacks migrated to West Virginia's coalfields.[19] James W. Paul, West Virginia's chief mine inspector in the early 1900s, complained that many of these miners had scant knowledge of the hazards involved in mining. Paul further complained that, even when mine owners posted rules governing safety practices, a vast number of workers could not read the notices.[20] Although it is difficult to correlate accidents with unskilled foreigners, fatality figures for West Virginia from 1904 to 1908 indicate that Italian immigrants composed 12 percent of the workforce, but accounted for 20 percent of the deaths.[21] Disillusioned by increasing mechanization and immigration influences on reducing the traditional craftsmanship of the trade and particularly disgusted with the failure to unionize, many of the skilled British miners had left West Virginia by 1902. Undoubtedly, the migrants with rural backgrounds who then made up the majority of the workforce had only rudimentary knowledge of the art of coal mining. Such skills as blasting coal required a degree of expertise, and the large number of explosions caused by poorly prepared blasts—usually referred to as "blown-out shots"—attest to the consequential dangers.[22]

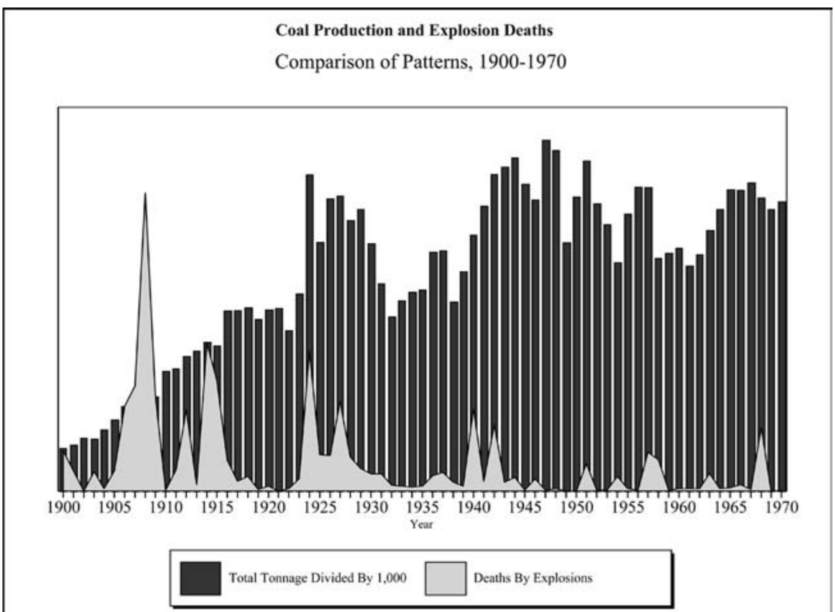
It may be difficult to establish a definitive correlation between economics and workforce and periods of increased explosion deaths, but there can be little doubt that a lack of technological knowledge played a significant role. The scale of individual mines increased dramatically during the early twentieth century. Steam-driven mechanical ventilation fans permitted operators to expand underground mining areas to distances unheard of in earlier years. Miners at the working face continued to profitably extract coal by the cut, shoot, and load cottage-type methods, but more efficient means for transporting coal to the surface and the better ventilation capabilities enabled operators to employ virtual armies of men within a maze of tunnels that stretched for miles beneath the earth. Unfortunately, the use of huge fans tended to dry out the coal dust, and the expanded use of machinery to undercut the face increased the volume of fine material. Removing moisture from minute coal particles made it easier to ignite a dust explosion whenever some violent force suspended the material in the atmosphere. During this period explosive powder provided the means for extracting coal from the face, and, consequently, increased the potential of raising a dust cloud that could be ignited by a miner's open lamp or other spark. The presence of methane and poor ventilation techniques increased the likelihood of a violent concussion setting off the explosive chain, and the expansive workings released large amounts of the gas.[23]

Regrettably, mining officials did not yet understand the extent of the forces unleashed by expanded mines. Without such knowledge, workers and management continued to operate along the same guidelines used during the years prior to expansion. One mine official, realizing the need for a more professional and knowledgeable approach to mining, cautioned fellow operators that traditional methods clouded the judgment of mine owners and that they would have to cease doing "certain things" simply because "we have been in the habits . . . which until late years were taken for granted to be right."[24] In essence, operators and miners did not fully understand the extent of the increased potential for explosions. The early history of the federal Bureau of Mines provides evidence of this lack of knowledge. Despite the realization by government officials that falls of roof and coal killed the majority of miners, practically all of the bureau's resources and energy were concentrated on studying mine explosions and educating the mining industry in the knowledge gained from that research.[25]

Although at first glance the factors discussed relating to the explosion peaks of the first two decades of the century seem inapplicable to the later periods of mechanization, they do apply when one considers coal production as the common denominator. Graph 7 illustrates West Virginia's pattern of yearly tonnage figures and Graph 8 compares the curves of explosion peaks and production. Significantly, each of the periods of high explosion deaths corresponds to either a peak in production or to an interval of high tonnage. Graph 8 does not compare specific numbers, but, rather, the relationship pattern of production with explosion deaths.



Graph 7: Generated from spreadsheet compiled from W. Va. Department of Mines Reports.



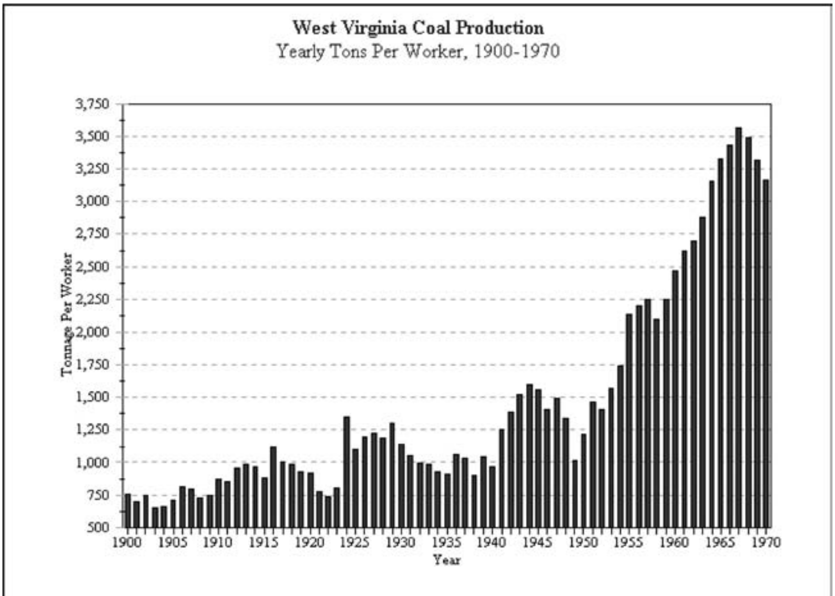
Graph 8: Generated from spreadsheet compiled from WV Department of Mines Reports

If, as previously suggested, expanded mining practices advanced beyond the ability of workers and operators to deal with the forces unleashed, the influence of these forces increased during the peak periods of the mid-1920s, early-1940s, and mid-1950s depicted by Graph 8. In short, R. D. Currie's scenario of the necessary gas and dust accumulations, ignition source, and workers unmindful of the danger increased in probability.[26] The expertise that had created the technological advances in surface machinery, such as steam and electrically driven hoists and fans, was eventually concentrated on development of the underground operations.

West Virginia mines often served as the vanguard of mechanization, and mining experts soon noted the effects. In 1933, the state's chief mine inspector informed an audience of mining officials that mechanization had indeed brought an increase in annual tonnage, but he cautioned that these changes resulted in a substantial increase in hazards, not the least of which was larger volumes of coal dust and numerous ignition sources from electrical equipment. He acknowledged mechanization as the reason for West Virginia's then peak tonnage year of 1927, but the chief inspector neglected to note that the same year experienced 111 deaths from explosions (see Graph 1). Pointing to evidence that "mechanization . . . progressed more rapidly in West Virginia than in most of the other states," the inspector cautioned that "electrification of coal mines for the operation of motors, machines, pumps, etc., has added two dangerous factors unknown to the early miners: ignition of gas or dust and electrocution. Several serious explosions in West Virginia mines have been traced to this cause."[27]

By the 1920s, underground coal dust levels increased as more operations relied on newer, faster, and more efficient cutting machines and as mine owners turned to the more productive conveyor systems. In addition, electrically driven locomotives hurried through the maze of underground tunnels and increased the likelihood that critical ventilation doors within the mine would be left ajar. Although face work had not yet fully mechanized, these advances enabled miners to elevate individual tonnage levels because of the availability of cars pulled by machinery and the efficiency of the cutters. Gathering-locomotives operated in close proximity to the working faces and generated electrical sparks in the areas most likely to produce a sudden release of methane.[28]

By the early 1940s, another peak explosion period, loading machines had increased the tempo of mining even further. This brought still another electrically powered machine, with its ignition source danger, directly into the working face. Dust further increased as the mechanical arms of the ma-



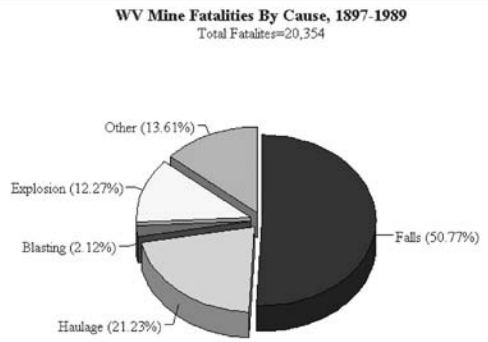
Graph 9: Generated from spreadsheet compiled from W. Va. Department of Mines Reports.

chine gathered coal onto its conveyor chain. In addition, the elevated speed of mining with mechanical loaders exposed rock strata and virgin coal faces at a rate unprecedented for the time and, thus, increased the possibility of releasing dangerous amounts of methane into the operating areas.[29]

In the mid-1950s, the advent of the continuous-mining machine further raised the speed of coal excavation and drastically elevated the levels of fine coal dust. The operations of cutting, drilling, and blasting became obsolete. Continuous miners cut and loaded in one motion. The rapid exposure of fresh coal face placed the rotating drums of cutting bits directly in the midst of any sudden methane liberation, increasing the likelihood of ignition caused by a spark generated from the cutting apparatus striking the solid rock of the roof or floor.[30]

The Bureau of Mines had expanded the available knowledge concerning the causes of mine explosions, but the continuous development of faster mining methods probably limited the successful application of the agency's findings.[31] With study and experimentation, the bureau had substantially improved the scientific knowledge of underground workings, but the explosion peak of 1940 left little doubt that mechanized mining diminished the impact of the agency's research and recommendations: Six major explosions occurred across the nation during that year, five of them in mechanized mines.[32] Significantly, the 102 miners killed in West Virginia explosions that year died in mechanized operations.[33] Apparently, technological innovation augmented the dangers faster than the bureau's safety research could be applied or, just as probable, a lack of enforcement powers enabled mining operations to avoid the serious application of governmental recommendations.

The potential for explosions, although infrequent, existed as a real threat, but the possibility of death from falls of roof or coal remained the veritable nemesis of mining. Graph 10 illustrates that slightly over one-half of coal-mine-related deaths in West Virginia from 1897 to 1989 resulted from falls of roof or coal. Explosions required an accumulation of factors, but roof-fall deaths usually resulted from one scenario—a miner in the "wrong-place-at-the-right-time." Falls of rock and coal occurred constantly in the mines, and a miner's inopportune proximity was often the determining factor.



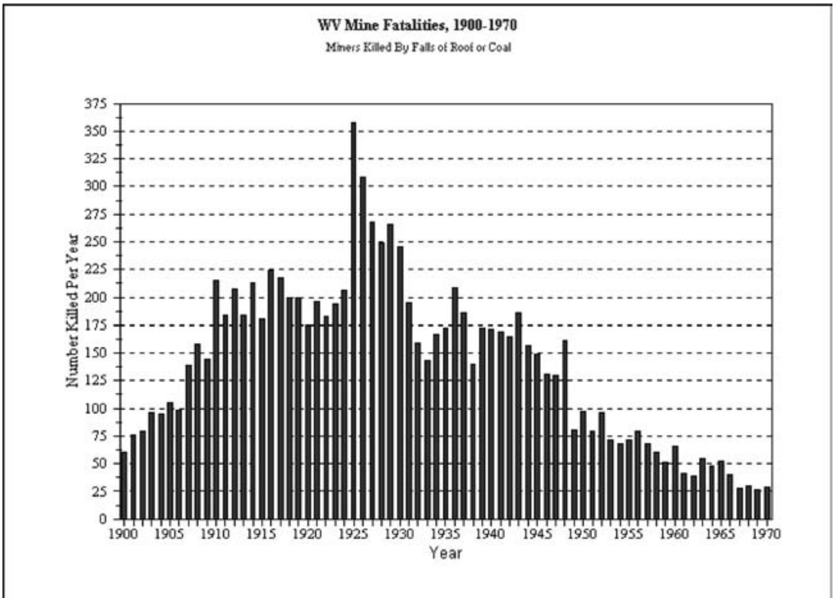
Graph 10: Generated from spreadsheet compiled from W. Va. Department of Mines Reports.

Some historians have pointed out that the advent of loud machinery underground inhibited a miner's ability to hear the sounds of impending falls.[34] Certainly, machinery forced miners to rely on visual signs of such danger, but most miners remained aware that often death came with no warning at all. All miners experienced the near-misses of falls at one time or another, and the kettle bottom reminded workers of the unpredictable potential of becoming a fatality.

Fossilized remains of trees present in the mine roof, kettle bottoms resembled the bottom of old iron-type cooking kettles. Prevalent in certain coal veins and usually undetectable, kettle bottoms proved extremely dangerous because they fell without any warning. Even highly skilled miners who migrated to West Virginia's expanding coal industry intensified their vigilance in veins plagued by the phenomenon.[35] State mine inspectors realized that even the most skilled miners could not detect the location of kettle bottoms and acknowledged that many deaths by roof falls were simply unforeseen accidents. The roof itself proved unpredictable. Indeed, a fatality recorded by chief inspector John Paul in 1908 suggested that even during times of relaxation the miner needed to be constantly alert: "While sitting along side the rib eating his dinner, coal and slate fell on him fracturing his spinal column, his ribs, and lacerating his foot from which he died."[36]

Undoubtedly, falls offered the greatest danger. Graph 11 illustrates the number of deaths from this cause from 1900 to 1970. Of particular interest is a comparison of the number of roof- and coal-fall fatalities in the first few years of this century and the 1950s. The numbers are similar and suggest that, by the mid-1950s, miners were barely safer from roof falls than they were during the early stages of West Virginia's coal industry expansion.

Graph 12 compares the pattern of fatalities by falls with employment. The graph does not compare specific numbers, but, rather, the overall relationship pattern of roof-fall deaths with employment. Based on this

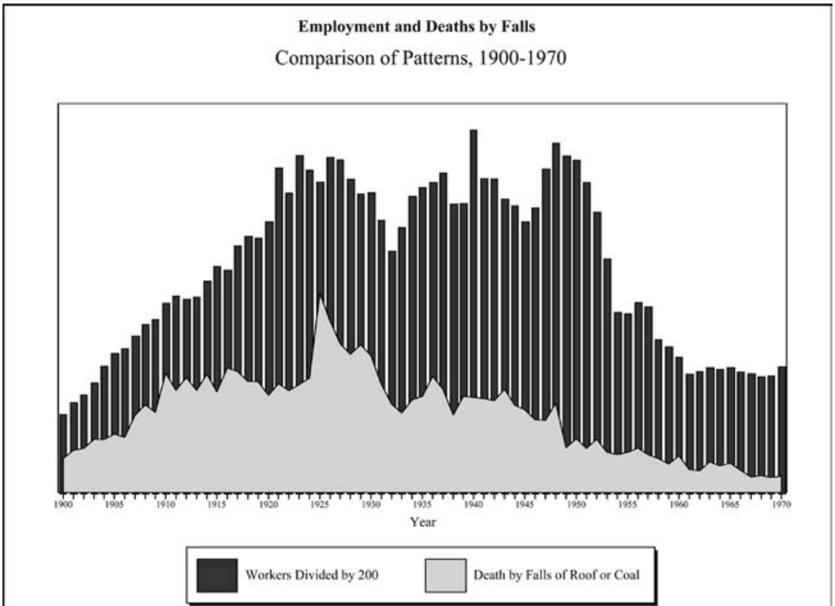


Graph 11: Generated from spreadsheet compiled from W. Va. Department of Mines Reports.

graph there seems to be little correlation between the two. In fact, one might conclude that more workers simply translates to a greater number exposed and, thus, a higher number of accidents. However, the concept that older-is-safer mentioned in the analysis of explosions may also apply to roof falls. Conceivably, an increase in employment may have exposed more inexperienced or lesser skilled individuals to roof dangers, and the simple wrong-place-at-the-right-time, or bad luck, scenario may add another confusing factor.

However, the comparison of tonnage and falls illustrated in Graph 13 suggests a partial explanation. The graph does not compare specific numbers, but provides the relationship pattern of production tonnage and deaths by roof falls. Overall, the rise in roof-fall fatalities matches periods of increased production. Excluding 1925, the broader cycle of death by falls matches the periods of technological expansion described in the explosion analysis. Mechanization affected the dangers associated with roof falls just as it did with explosions. Some mining officials pointed out that machinery exposed the roof at a faster rate and that miners should move under exposed roof as rapidly as possible because the strata would not have time to deteriorate. Such ill-fated reasoning resulted in 74 percent of roof-fall fatalities occurring within twenty-five feet of the face. In addition, as the Bureau of Mines pointed out, "any increase in concentration of employees due to mechanical loading causes an equal increase in the destructive potentialities of each fall of roof."[37] Optimistic outlooks during the early periods of mechanization suggested that mechanical loading was inherently safer, and many mining officials as well as miners became lax in their application of safety measures.[38] Apparently, the transition to mechanical mining demanded an adjustment period to the realities of the dangers.

One technological advance did lessen the potential of roof falls as a killer. Graph 11 demonstrates that, from the late 1950s to 1970, deaths by falls took a precipitous decline. Because this occurred before the regulatory powers of the 1969 mining law were implemented, it seems obvious that a factor other than coercion contributed to the decrease. That factor is undoubtedly the expanded use of roof bolts for support. First introduced in the 1940s, unfortunately when the rationing of steel prevented full development of the principle, this device used a threaded chuck at the end which would expand and anchor itself when placed in a predrilled hole in the roof. As a result, various strata of thin rock were bound together to create a beamlike structure and, consequently, limit falls of smaller individual strata, and distribute the weight of geological forces over a wider and stronger area



Graph 12: Generated from spreadsheet compiled from WV Department of Mines Reports

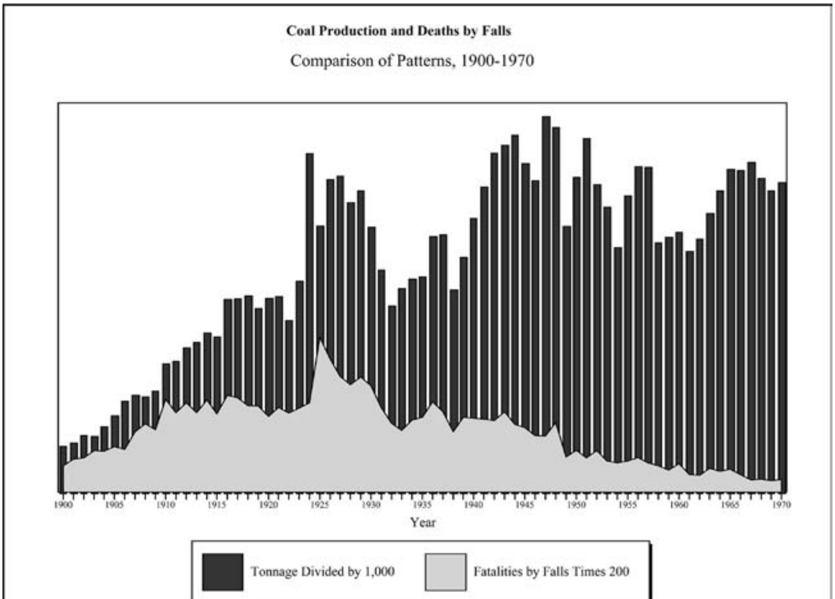
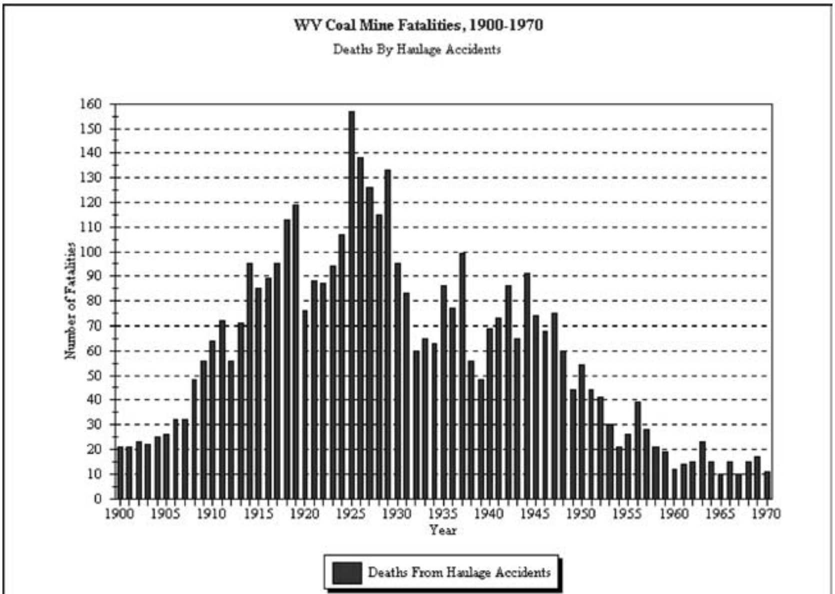


Chart 13: Generated from spreadsheet compiled from WV Department of Mines Reports

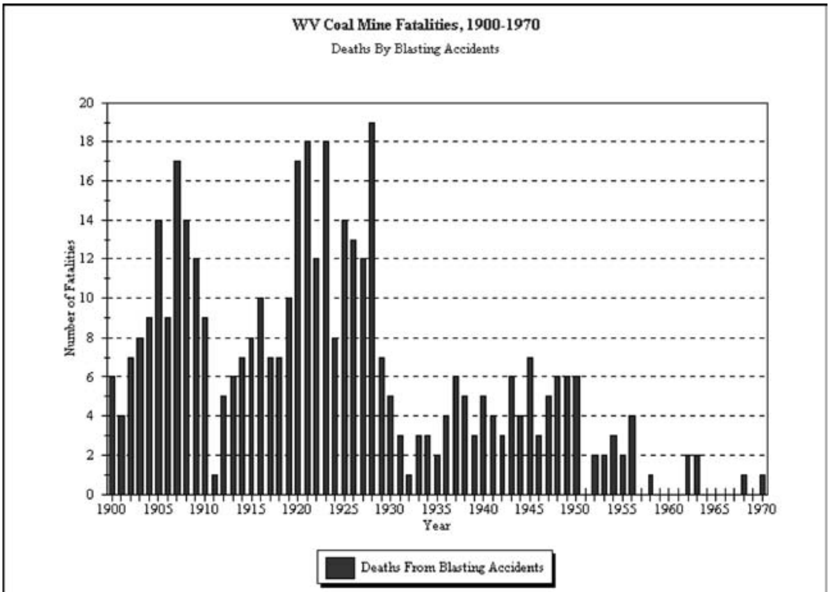


Graph 14: Generated from spreadsheet compiled from W. Va. Department of Mines Reports.

of support.[39] The sharp decline of roof-fall deaths in the late1960s depicted by Graph 11 resulted from the widespread replacement of the old timbering methods by roof bolting. For once, technological advancement did not implement a rise in fatalities at first use, but rather a decline.

Haulage accidents proved to be the second leading cause of coal mine fatalities. Graph 14 illustrates that haulage deaths follow the basic pattern of mechanization. Indeed, electric locomotives used for track haulage served as one of the earliest forms of mechanized mining. The nation's railroads had demonstrated the dangers inherent with extensive trains of cars and their movement, and the technologically advanced rail system applied in the close quarters underground drastically expanded those hazards. Early mule drivers had fallen prey to cantankerous animals or runaway cars, while spragger boys[40] had become caught in massive pile-ups. Yet, these occurrences pale in comparison to the potential dangers associated with the high-speed locomotives in close quarters pulling lengthy trains of loaded mine cars.

Runaway trips, brakemen falling in front of the moving cars, and a low roof that could decapitate an operator took an extensive toll of lives during this era. By the 1960s, the advent of continuous belt haulage reduced the use of underground track haulage and, consequently, decreased the numbers of fallen motormen and brakemen, but until that period the



Graph 15: Generated from spreadsheet compiled from W. Va. Department of Mines Reports.

use of powerful locomotives exacted a serious loss of life.[41] Again, improved methods of production tended to outrace the industry's ability to counter increased dangers.

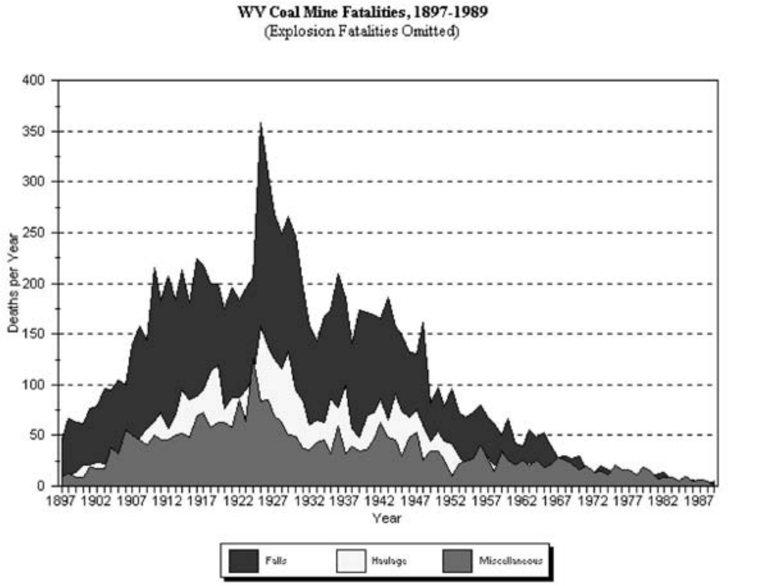
Although the causes of fatalities previously discussed proved difficult to control, deaths from blasting accidents may represent an area where definite progress was made. Graph 15 records the number of deaths from this cause between 1900 and 1970. No discernable pattern seems evident. Obviously, deaths from this cause practically ceased with the introduction of continuous-mining machines, but the Bureau of Mines' research with permissible, less volatile powders and requirements that certified shot-firemen blast coal apparently contributed to a decrease in deaths from mishaps with blasting powder.[42]

Miners died from other miscellaneous causes as well. The introduction of machinery brought new hazards such as electrocution or the potential for being crushed by the swinging mechanisms attached to a variety of equipment. Graph 16 compares the cycle of deaths by falls, haulage, and miscellaneous causes, but excludes explosions. Interestingly, the peaks of all three categories appear to follow the same basic cycle. Certainly, the factors contributing to the rise of deaths in each case indicate common denominators. While such things as a fear of job loss during economic downturns or introduction of less-experienced miners at particular periods defy definitive analysis, the transformation of mining methods in the late 1920s to early 1930s, the early 1940s, and the 1950s appears to have been a substantial factor in the upswings of fatalities.

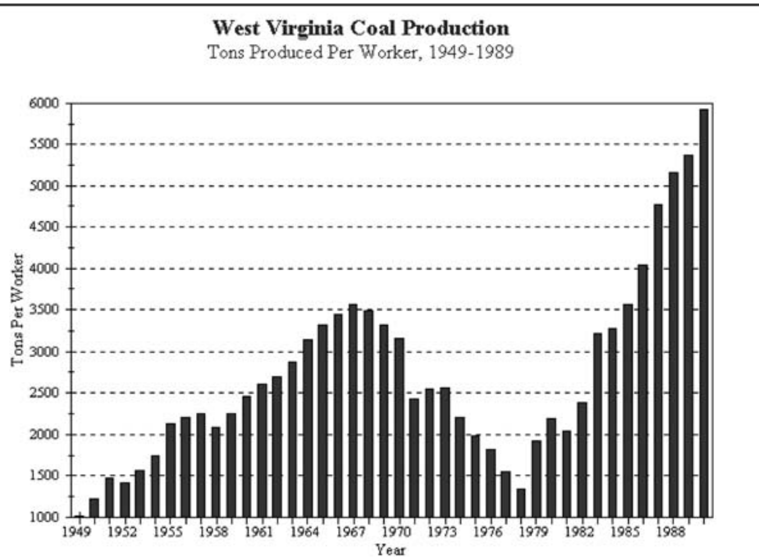
These technological stages which initially brought higher casualty rates did accomplish the original purpose of increasing the tonnage per worker. However, the inability of safety measures to keep pace with expanded tonnage eventually led to federal government regulation in 1969. Graph 17 depicts the drastic increase in tonnage per miner from 1949 to 1989. Significantly, the rapid increase beginning in 1949 falls into a precipitous decline in 1970. Work stoppages did plague West Virginia's coal industry in the 1970s, but it seems probable that much of the decrease in tonnage partially resulted from the demands of conforming to government regulations. The consistent expansion of tonnage per man halted when mine inspectors forced operators and miners to implement safety practices to match the innovative techniques of production.

Certainly mechanization resulted in fewer miners exposed to danger and, therefore, fewer overall casualties. Yet, there can be no doubt that the enforcement era reduced the percentage of workforce casualties. This is evident in comparisons of the individual miner's risk in the decade before and after enforcement began. In 1966, with mechanization dominant in West Virginia's mines, one miner in 535 died on the job, while in 1976, one in 1,869 perished.[43]

Hard statistics can be misleading, but it seems obvious that the 1950s coal miner described in the introduction probably was no safer than the underground worker of the pre-mechanization era earlier in the century. Mine reports from the 1950s indicate a wide range in the number of fatalities: from one miner killed for every 363 in 1957 to one in 744 in 1953. These are, of course, humbling figures if one happened to be a working miner during that period. Obviously, most miners had a career lasting longer than one year and, consequently, the chances of being killed were probably higher than the yearly listing. In addition, severe injuries abounded, but, because of the erratic nature of injury reporting, attempts to draw conclusions from the figures have severely limited value. However, it is probable that, over the course of a miner's experience before the regulatory era that began in 1969, every miner witnessed crippling injuries and at least one fatality.[44] This reality suggests that the miner in the introduction did have some similarity to the combat soldier. The dangerous environment became part-and-parcel of a miner's thinking, and his dangerous world developed



Graph 16: Generated from spreadsheet compiled from W. Va. Department of Mines Reports.



Graph 17: Generated from spreadsheet compiled from W. Va. Department of Mines Reports.

as part of the web of verbal history, folklore, and legend. Whatever the thoughts of the impressionable who witnessed the worker waiting for his ride, West Virginia's pre-regulation era miners, like soldiers adjusting to the risks of combat, must have developed "an emotional armor which enabled [them] to face the unknown daily." [45]

Notes

1. Use of the phrase "bank clothes" to refer to one's coal-stained working apparel remained common among southern West Virginia miners well into the 1970s. The phrase itself evolved from the era when miners labored at the "coal bank."
2. W. P. Tams, *The Smokeless Coalfields of West Virginia: A Brief History* (Morgantown: West Virginia University Library, 1964), 49-50.
3. Raymond E. Densmore, *The Coal Miner of Appalachia* (Parsons, WV: McClain Printing Company, 1977), 1.
4. Anthony F. C. Wallace, *St. Clair: A Nineteenth-Century Coal Town's Experience with a Disaster-Prone Industry* (New York: Alfred A. Knopf, 1981), 249-313; Crandall A. Shifflett, *Coal Towns: Life, Work, and Culture in Company Towns of Southern Appalachia, 1880-1960* (Knoxville: University of Tennessee Press, 1991), 101-7 and 205; Ronald L. Lewis, *Black Coal Miners in America: Race, Class, and Community Conflict, 1780-1980* (Lexington: University Press of Kentucky, 1987), 5-9.
5. David Alan Corbin, *Life, Work, and Rebellion in the Coalfields: The Southern West Virginia Miners, 1880-1922* (Chicago: University of Illinois Press, 1981), 169.
6. Caroline Giesen, *Coal Miners' Wives: Portraits of Endurance* (Lexington: University Press of Kentucky, 1995), passim; "Public Relations: Coal's No. 2 Job," in *Practical Coal Mining Methods* (New York: Coal Age, 1944), 20. The No. 1 job was winning the war.
7. William Graebner, *Coal-Mining Safety in the Progressive Period: The Political Economy of Reform* (Lexington: University Press of Kentucky, 1976), 1; Michael G. Zabetakis, Superintendent, *National Mine Health and Safety Academy, General Catalog* (Washington, DC: U.S. Department of the Interior, 1976), 1.
8. *Fairmont* (WV) *Times*, Jan. 10, 1943; *Charleston* (WV) *Gazette*, Nov. 22, 1968; Ben A. Franklin, "The Scandal of Death and Injury in the Mines," *New York Times Magazine*, Mar. 30, 1969, 26-27.
9. Robert M. Lambie, *West Virginia: Giant of the Coal Industry: An Address Delivered before the Kanawha Valley Mining Institute at Cannelton, West Vir-*

ginia, January 13, 1933 (Charleston: Jarrett Printing Co., 1933), 8; Davitt J. McAteer, *Coal Mine Safety and Health: The Case of West Virginia* (New York: Praeger, 1973), 1; William F. Lawson, Lionel L. Craddock, Edwin B. Wilson, and Joseph W. Leonard, *Roof-Fall Accidents in West Virginia Coal Mines, Report No. 56* (Morgantown, WV: Coal Research Bureau, 1970), 1.

10. Corbin, *Life, Work, and Rebellion in the Coalfields*, 181; Lawson, *Roof-Fall Accidents in West Virginia*, 2-3.
11. Graebner, *Coal-Mining Safety in the Progressive Period*, 4 and 19.
12. Some caution must be used in assessing the graph peak in 1925 when West Virginia altered its fiscal year based on June to one based on January. Thus, 1925 records 18 months of mine fatalities. However, one must also consider that the numbers remained rather consistent: in 1924, 551 deaths; in 1925 (18 months), 686; in 1926, 574 fatalities.
13. All graphs generated from a database created with statistical information from *W.Va. Dept. of Mines Annual Reports*, 1897-1989.
14. Graebner, *Coal-Mining Safety in the Progressive Period*, 1.
15. This discussion of miners in gassy mines is drawn from the author's own behavior and observations of fellow miners. While working at Siltix in Fayette County, West Virginia, an extremely gassy mine that had experienced an explosion only a few years before the author arrived, the threat of methane ignition was always somewhere in one's consciousness. At Meadow River Mine, also in Fayette County, a practically non-gassy mine, this thought rarely visited the author. A return to the methane-rich atmosphere—a gross understatement—of Beckley No. 2 mine in Wyoming County encouraged the author to consistently contemplate the explosion potential and to strictly adhere to safeguards.
16. Hiram B. Humphrey, *Historical Summary of Coal-Mine Explosions in The United States, 1810-1958,* Bulletins 586-591, Bureau of Mines (Washington, DC: U.S. Government Printing Office, 1960), 227.
17. Wallace, *St. Clair*, 448. For an extension of this theory to smaller versus larger mines, see David R. Henderson, "The Economics of Safety Legislation in Underground Coal Mining," (PhD diss., University of California at Los Angeles, 1977): 140-43.
18. *W.Va. Dept. of Mines Annual Report*, 1925, 14.
19. Tams, *Smokeless Coalfields*, 60-61; Corbin, *Life, Work, and Rebellion*, 26-28; Graebner, *Coal-Mining Safety in the Progressive Period*, 162.
20. *W.Va. Dept. of Mines Annual Report*, 1905, 3.
21. Graebner, *Coal-Mining Safety in the Progressive Period*, 121. For a fuller discussion of this issue, and a challenge to the "unsafe immigrant" conclusion, see ibid., 118-22, and Mark Aldrich, *Safety First: Technology, Labor, and Business*

in the Building of American Work Safety, 1870-1939 (Baltimore: Johns Hopkins University Press, 1997), 56-57.

22. Corbin, *Life, Work, and Rebellion*, 28; *Mines and Minerals* 26 (Aug. 1905), 23; Ronald L. Lewis, "Americanizing Immigrant Coal Miners in Northern West Virginia: Monongalia County between the World Wars," in *Transnational West Virginia: Ethnic Communities and Economic Change, 1840-1940,* edited by Ken Fones-Wolf and Ronald L. Lewis (Morgantown: West Virginia University Press, 2002), 270; Tams, *Smokeless Coalfields*, 36; Humphrey, *Historical Summary of Coal-Mine Explosions*, passim.

23. Tams, *Smokeless Coalfields*, 32 and 50; Walter R. Thurmond, *The Logan Coal Field of West Virginia: A Brief History* (Morgantown: West Virginia University Library, 1964), 39; Harry Atherton, "Present Mining Methods from the Standpoint of the Fire Boss," in *Proceedings of the Coal Mining Institute of America for 1908* (Greensburg, PA: C. M. Henry & Co., 1908), 270 (hereafter cited as *Proceedings, Coal Mining Institute of America)*; Thomas C. Adams, "Recent Mine Explosions and Their Lessons," *Proceedings, Coal Mining Institute of America,* 40. For an example of the potential danger of continuous-miner cutting bits, see *W.Va. Dept. of Mines Annual Report*, 1980, 30-31.

24. Thomas Keighley, "Present Mining Methods of the Bituminous Regions of Pennsylvania from the Standpoint of the Mine Owner and Manager," *Proceedings, Coal Mining Institute of America*, 261.

25. Graebner, *Coal-Mining Safety in the Progressive Period*, 43.

26. Humphrey, *Historical Summary of Coal-Mine Explosions*, 227.

27. Lambie, *West Virginia: Giant of the Coal Industry*, 8-11, quotations on 8. Lambie also suggested that West Virginia mines were handicapped by the higher railroad freight rate to distant markets and, consequently, quickly mechanized to lower production costs. Historian Keith Dix provides evidence that the lack of unionization in West Virginia may have enabled the state's operators to add machinery without significant worker resistance. In 1930, U.S. Bureau of Mines Chief Safety Engineer Daniel Harrington pointed to the increase in fatalities in mechanized mines, but he contradicted Lambie by insisting that Illinois and Wyoming were the most highly mechanized coal states (*What's a Coal Miner to Do?: The Mechanization of Coal Mining* [Pittsburgh: University of Pittsburgh Press, 1988], 70 and 100).

28. For a discussion of the change to mechanized mining, see Dix, *What's a Coal Miner to Do?*

29. Paul H. Rakes, "Casualties on the Home Front: Scotts Run Mining Disasters during World War II," *West Virginia History* 53 (1994): 97.

30. Many contemporaries of mechanized advancements voiced concerns about the relationship between the increased speed of mining and corresponding

hazards. For examples, see "Speed Up Mining on Three Shift Operation Deals Death to 20 in Pursglove, W.Va.," *United Mine Workers Journal* 54 (Jan. 15, 1943): 7; "Bureau of Mines Issues Circular Giving Results of Three Decades of Research," ibid., 53 (July 15, 1942): 7; and Edward A. Wieck, "Preventing Explosions in Coal Mines," ibid., 53 (May 15, 1942): 6-7.

31. For a synthesis of the bureau's research, see Humphrey, *Historical Summary of Coal-Mine Explosions*, passim.

32. Wieck, "Preventing Explosions in Coal Mines," 7.

33. *W.Va. Dept. of Mines Annual Report, 1940*.

34. Dix, *What's a Coal Miner to Do*? 101.

35. John R. Williams to William Thomas, Nov. 10, 1895, in *The Welsh in America: Letters from the Immigrants*, edited by Alan Conway (Minneapolis: University of Minnesota Press, 1961), 205.

36. *W.Va. Dept. of Mines Annual Report, 1908*, 263. Interestingly, official policy of modern inspectors does not regard such occurrences as "accidents." At a safety meeting attended by the author in 1991, an accident exactly like the one described by Paul was considered. Officials insisted that the fatality was the fault of the miner because he failed to adequately determine the condition of the roof. It is easy to imagine the groans of disapproval by experienced miners at this official assessment of the accident.

37. Dix, *What's a Coal Miner to Do*? 102.

38. For a discussion of mechanization and safety, see ibid., 92-106.

39. Joseph Bierer, West Virginia Department of Mines, *The First Year of Roof-Bolting in West Virginia Mines* (Charleston, WV: Jarrett Printing Co., 1950) 7-10; Dix, *What's a Coal Miner to Do*? 102.

40. The term "spraggers" referred to young boys positioned near inclines along the underground entries who placed sprags (sticks of wood or steel) between the spokes of moving coal cars that locked the wheel once rotated against the bottom of the car. Often, the coal cars began sliding along the rails and spraggers had to run alongside the moving trip to insert more sprags. Spraggers were referred to as "runners" in the anthracite fields. Later, the advent of underground locomotives resulted in the use of brakemen who assisted in managing the long trains of empty or loaded cars.

41. D. L. McElroy, *Coal Mine Haulage in West Virginia* (Morgantown: West Virginia University, n.d.), 9-13; *W.Va. Dept. of Mines Annual Reports*, 1901 and 1903, 134 and 74 respectively; Dorothy Schwieder, *Black Diamonds: Life and Work in Iowa's Coal Mining Communities* (Ames: Iowa State University Press, 1983), 51-52; Donald L. Miller and Richard E. Sharpless, *The Kingdom of Coal: Work, Enterprise, and Ethnic Communities in the Mine Fields* (Philadelphia:

University of Pennsylvania Press, 1981), 99-102; Dix, *What's a Coal Miner to Do*? 102-3; West Virginia Department of Mines, *Mine Haulage Accidents: Their Cause and Prevention* (Charleston, WV: Rose City Press, 1951), 2-25; Paul J. Rakes, interview by author, Oak Hill, W.Va., Oct. 21, 1995.

42. "Practical Rules for Blasting Coal," *Mines and Minerals* 26 (March 1906): 357; Graebner, *Coal-Mining Safety in the Progressive Period*, 48.
43. Figures computed from spreadsheet compiled from West Virginia Department of Mines Annual Reports, 1897 through 1989.
44. It should be noted that the author's twenty-year experience in the coal industry, beginning in 1972, resulted in his exposure to five fatalities, several crippling injuries, and a myriad of smaller wounds. Interestingly, a majority of these occurred through 1978, a period of time when government agencies were slowly implementing the mandates of stricter mining regulations.
45. M. H. Ross, "Life Style of the Coal Miner: America's Original Hard Hat," *Appalachia Medicine* 3 (March 1971): 10.