UPDATED PRELIMINARY REGULATORY IMPACT ANALYSIS

AND

REGULATORY FLEXIBILITY ANALYSIS

PROPOSED RULE ON 30 CFR 18 AND PART 75

PROPOSED STANDARDS AND REGULATIONS FOR HIGH-VOLTAGE LONGWALL IN UNDERGROUND COAL MINES

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Office of Standards, Regulations, and Variances

Mine Safety and Health Administration

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TABLE OF CONTENTS

LIST OF TABLES

I. EXECUTIVE SUMMARY

Introduction

The Mine Safety and Health Administration (MSHA)is updating its Preliminary Regulatory Impact and Regulatory Flexibility Analysis (PRIA) of Part 18, and Part 75 Subparts A, I, and K of Proposed Standards and Regulations for High-Voltage Longwall in Underground Coal Mines to allow analysis of the most current data on high-voltage longwalls and to address several mandates that were not in existence when the original PRIA was completed in 1992. These legislative mandates and Executive Orders require us to evaluate the impact of regulatory action on small mines, state and local governments, and manufacturers.

In 1996, Congress enacted the Small Business Regulatory Enforcement Fairness Act (SBREFA) amending the Regulatory Flexibility Act (RFA). The SBREFA amendments require a regulatory agency to include in the preamble to a rule the factual basis for any certification that the rule has no significant impact on a substantial number of small entities. This updated PRIA addresses these matters where appropriate.

At the time the high-voltage longwall proposal was published, MSHA defined a small mine to be one that employed fewer than 20 miners. In order to comply fully with RFA requirements, MSHA must use the Small Business Administration’s (SBA’s) criteria for a small entity. For the mining industry,

SBA defines “small” as a business with 500 or fewer employees. To ensure that MSHA complies with the SBREFA requirements, this updated PRIA analyzes the proposed rule’s impact on “small” mines, using the SBA definition of a small entity. MSHA applied current data to the PRIA to estimate the compliance costs for mines with 500 or fewer employees and also for mines with fewer than 20 employees. The Agency has also analyzed the rule’s impact on small entities engaged in high-voltage equipment manufacture. SBA defines these manufacturers as “small” if they have 750 or fewer employees.

MSHA is establishing standards applicable to high-voltage longwall equipment. These proposed standards would allow the use of high-voltage electrical equipment in longwall face areas of underground coal mines. These proposed standards would also provide the electrical safety requirements necessary to operate high-voltage longwall equipment. Based upon its analysis of compliance costs, MSHA has determined that these proposed standards would not have an annual effect of $100 million or more on the economy. In accordance with this and other criteria specified in Executive Order (E.O.) 12866, MSHA has determined that this rulemaking is not a significant regulatory action.

MSHA estimates that this rulemaking would initially affect approximately 16,992 miners at 48 large underground coal mines and 9 additional mines employing about 3,200 miners that would

begin using high-voltage longwall equipment in Year 1 of the proposed rule. The proposed rule would not increase costs to small mines, which MSHA has traditionally defined as having fewer than 20 employees, because such mines do not use longwall equipment.

During the early years of longwall mining, voltages of 1,000 or less were needed to power motors used in operating longwall face equipment. As technology advanced, longwall mining equipment became more productive due to the use of more reliable heavy duty equipment that allowed for bi-directional cutting. This equipment required larger motors which at the lower voltages caused voltage regulation problems (voltage fluctuations) in the electrical power system. Less available voltage reduced the output torque produced by the motor, inducing it to slow down and draw more current which, in turn, promoted motor overheating. In order to combat these problems, voltages needed to be increased from 1,000 volts to 2,400 volts or 4,160 volts. However, under the existing rules, mine operators must file with MSHA a "Petition for Modification" pursuant to § 101(c) of the Federal Mine Safety and Health Act of 1977 and have such petitions granted before installing and using equipment and cables exceeding 1,000 volts inby the last open crosscut or within 150 feet of pillar workings.

The use of high voltage in longwall mining operations has increased over the years. MSHA granted its first 3 petitions allowing high-voltage in longwall mining operations in 1986, and by the end of 1996, there were 56 operating high-voltage longwall faces in 48 large underground coal mines. In 1996, there were 9 such petitions granted. Considering the average of granted high-voltage petitions from 1986 through 1996, MSHA anticipates that up to 9 medium-voltage longwall units would be available to convert to high-voltage usage annually based on the medium-voltage longwall count. One commenter, who manufactures electrical controls and equipment for longwall operations, expects that with the promulgation of this rule virtually all longwall operations would shift to high-voltage equipment.

Benefits Summary

When higher voltage is used, the potential for electrical accidents decreases due to the design and construction criteria for high-voltage equipment. In addition, the required use of SHD (Shielded Power Conductors with Ground in Each Cable Interstice) shielding with high-voltage systems reduces the chance of high-energy short circuits that may cause a fire or burns to miners. Ground-fault protection is also improved for high-voltage equipment. Replacement of a 950 volt system with a 4,160 volt system can result in smaller cables that weigh less and, thereby, reduce the potential for cable handling injuries

arising from the installation, movement, or replacement of longwall equipment. Using high voltage instead of low voltage to power larger motors and heavier-duty longwall equipment reduces overheating of motors and damaging of cables that can lead to miner injury. Finally, the proposed rule increases safety requirements for work practices on high-voltage longwalls.

Estimated Compliance Costs Summary

The proposed rule would result in annualized net savings of approximately $8,078,229 from Year 1 through Year 10 of the proposed rule. This includes a net savings per conversion of $4,431,202 attributed to each medium-voltage unit that converts to high-voltage usage. Of that amount, $4,409,988 comes from lost production savings while $21,214 derives from filed petition savings. Net total savings attributed to the proposed rule in Year 1 would be $39.90 million, while annual compliance costs would be approximately $17,810, or $274 per longwall unit. By comparison, the total revenue of high-voltage longwall mines is approximately $3.046 billion.

The net economic effect of the proposed rule includes substantially increased productivity and cost savings for each longwall unit that converts to high-voltage equipment and cables, and small cost savings annually for each longwall unit that uses high-voltage equipment and cables. Lost production savings are

savings due to increased production when a medium-voltage longwall unit converts to a high-voltage longwall unit, while filed petition savings are cost savings associated with the elimination of the petition process. Cost savings also arise from increased equipment and cable safety and from efficiency benefits associated with high-voltage systems. Medium-voltage longwall units would realize increased productivity and cost savings when they convert to high-voltage usage under the proposed rule.

MSHA estimates that the petition process, as required under the existing rule, imposes costs for legal fees and expenses of about $6,000 for an unopposed petition filing and $112,500 for an opposed petition requiring an Administrative Law Judge's (ALJ's) decision. Since 14.3 percent (1 out of 7) of all petitions granted by MSHA in 1995 were contested and required an ALJ’s decision, MSHA assumes this same percentage would be contested were future petitions to be filed. Thus, elimination of the petition process would generate a one-time filed petition savings per high-voltage longwall unit of $21,214.

In addition, eliminating the petition process would produce further savings for medium-voltage longwall units that convert to high-voltage units. The proposed rule would eliminate lost production that could occur as a result of a mine not being able to synchronize initial start-up of its high-voltage longwall

equipment with the granting of a petition. The medium-voltage longwall units that convert would have the opportunity to obtain higher productivity yields from the use of high voltage sooner under the proposed rule than under current procedures. Based on an average 32.6 percent increased productivity of high-voltage longwalls over lower voltage longwalls and an average lost production time of 56 working days, MSHA estimates that the one-time conversion lost production savings due to the petition process would be about $4,409,988 per high-voltage longwall unit.

With respect to individual provisions concerning the 48 existing mines (56 high-voltage longwall units) that currently use high-voltage equipment and the medium-voltage longwall units that would shift to high voltage, § 75.821(e) would reduce the frequency with which examination and testing of longwall equipment must be documented, resulting in annual cost savings of approximately $525 per high-voltage longwall unit.

Section 75.818(b)(4) would require mines to perform an electrical test of personal protective equipment every six months. Section 75.820(d)(3) would require electricians to wear properly-rated rubber gloves to perform troubleshooting and testing on low- and medium-voltage circuits that are contained in a compartment with high-voltage circuits. Compliance costs increases of $106 per longwall unit and $168 per longwall unit are identified with §§ 75.818(b)(4) and 75.820(d)(3),

respectively. MSHA estimates that of the $17,810 compliance costs ($274 per longwall unit) in Year 1, small mines (those with fewer than 20 miners) would not incur any costs; large mines (those with 20 or more miners) would incur all compliance costs. Small mines as defined by SBA (those with 500 or fewer miners) would incur compliance costs of $14,275, or $274 per longwall unit.

Economic Impact

The proposed rule would enhance productivity in affected mines because it would allow more efficient, high-voltage longwall equipment to be introduced more rapidly in the relatively few underground coal mines in which it can be profitably employed. MSHA has concluded that the proposed rule would have only a small (but favorable) effect on coal output, costs, and profitability.

Regulatory Flexibility Certification and Analysis

The Regulatory Flexibility Act (RFA) requires regulatory agencies to consider a rule's impact on small entities. Under the RFA, MSHA must use SBA's criterion for a small entity in determining a rule's economic impact unless, after consultation with SBA and an opportunity for public comment, MSHA establishes an alternative definition for a small mine and publishes that

definition in the Federal Register. For the mining industry, SBA defines "small" as a mine with fewer than 500 employees. MSHA traditionally has considered small mines to be those with fewer than 20 employees. To ensure that the high-voltage longwall proposed rule conforms with the RFA, MSHA has analyzed the impact of the proposed rule on mines with 500 or fewer employees (as well as on those with fewer than 20 employees). MSHA has determined that the proposed rule would not impose a substantial cost increase on small mines, whether a small mine is defined as one with 500 or fewer miners or one with fewer than 20 miners.

Based upon MSHA's analysis, the Agency has determined that the proposed rule would not have a significant economic impact on a substantial number of small underground coal mine operators, specifically, the 85.4 percent (41 out of 48) of high-voltage longwall mines which are considered to be small mines according to SBA's definition. The Agency has further determined that the proposed rule would not have a significant economic impact on a substantial number of small manufacturers of high-voltage longwall equipment (which SBA has defined, for this industry, as those with 750 or fewer employees). MSHA has certified these findings to the Small Business Administration. The factual basis for this certification is discussed in Part V of this updated PRIA and will be published in the Federal Register with a notice to reopen the rulemaking record to receive comments about it or

any other aspect of the updated PRIA.

II. INDUSTRY PROFILE

Introduction

This industry profile briefly describes the structure and characteristics of the coal mining industry. This profile also provides more detailed information about the longwall mining sector of underground coal mines.

Longwall mining began in the United States in 1952 and, as technology in this type of mining advanced, the number of longwall units increased from an average of six longwall operations between 1950-1960, to about 20 before 1970, to an average of more than 100 installations during most of the 1980s.[1] The number of longwall facilities has steadily declined since, to 85 units in 1993, and to 70 units by 1996. The number of mines using longwalls increased from 58 in 1975 to 89 in 1984, then declined to 73 mines in 1993 and to 60 mines in 1996. The decline in longwall installations and mines may reflect economic and market conditions for coal to some extent, and may also reflect increased productivity in longwall mining, whereby, due to technological advances, fewer mines are needed to maintain or expand longwall production. A majority of the longwall mining systems operating are located in the Appalachian region of the

[1] U.S. Dept. of Energy, Energy Information Administration, March 1995, pp. 10-13.

United States.

MSHA collects and maintains data on the coal mining industry pertaining to mine type, size, and employment. MSHA categorizes mines by size based on employment. In general, MSHA defines small mines to be those having fewer than 20 employees and large mines to be those having 20 or more employees. MSHA has used this small mine definition for rulemaking purposes for more than 20 years. However, for the purposes of the Small Business Regulatory Enforcement Fairness Act amendments to the Regulatory Flexibility Act, MSHA has evaluated the impact of this proposed rule on mines with 500 or fewer employees, in accordance with the SBA definition.

Coal Industry Profile

The U.S. coal industry produced a record 1.06 billion short tons of coal in 1996, of which about 0.410 billion were mined in underground mines.[2] The Mine Safety and Health Administration estimates that the total value of coal produced during the year was $19.6 billion, with underground coal production accounting for $7.6 billion, based on the average price of coal of $18.50 per short ton. The value of coal produced by longwall mining is estimated to be $3.6 billion.[3]

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[2] U.S. Dept. of Energy/EIA, November 1997, pp. 10-11.

[3] U.S. Dept. of Energy/EIA, November 1997, pp. 10-11 and 162.

Table II-1 contains the number of small and large underground coal mines and the corresponding number of miners based on MSHA's definition that a small mine is one that employs fewer than 20 miners. Table II-2 provides the same mine operator information as Table II-1 except that the information is based upon SBA's definition of a small mine as one that employs 500 or fewer miners. As can be seen, 44.4 percent of all underground coal mines (436 mines out of 981 mines) are small mines and employ 8.8 percent of all underground coal miners (4,473 miners out of 50,672 miners) based on the fewer than 20 miners definition. Under the SBA definition (500 or fewer miners), 99.1 percent of all underground mines (972 out of 981) are small and employ 89.4 percent of all underground miners (45,285 out of 50,672).

Table II-3 presents the number of longwall installations with their voltage to face distribution in 1996. Longwalls are categorized as low, medium, or high voltage. Low voltage is defined as up to and including 660 volts; medium voltage includes voltages from 661 to 1000 volts; and high voltage refers to those with more than 1,000 volts.[4] MSHA estimates that in 1996, 20 percent (12 out of 60 mines) of longwall mines were medium voltage while 80 percent (48 out of 60 mines) were high voltage.

[4] Office of the Federal Register, Code of Federal Regulations, July 1, 1997, p. 448.

Table II-4 provides data on the distribution of high-voltage longwall mines based on MSHA's definition of small and large mines while Table II-5 uses SBA's definition of small and large mines. These tables categorize mines affected by this proposed rule according to size, whereas Table II-3 identifies mines according to the voltage used, medium- or high-voltage. In 1996, there were 56 high-voltage operating longwalls in 48 large mines and no high-voltage longwalls operating in small mines, based on MSHA's definition. Thus, approximately 4.9 percent of all underground coal mines (48 out of 981 mines) would be affected by the proposed rule. There are 16,992 miners (about 33.5 percent of all underground coal miners) employed at these 48 large underground mines. Employment at the 48 mines ranges from 98 miners to 842 miners, with the average number being 354. Based on SBA's definition, 85.4 percent of the high-voltage longwall mines are small (41 out of 48), while 14.6 percent (7 out of 48) are considered large.

Since 1986, about 9 longwall units per year, on average, have been granted petitions to use high voltage in longwall operations. Thus, in order not to overestimate the increase in the future use of high-voltage longwalls, MSHA assumes that no more than 9 longwall units annually would adopt this technology.

TABLE II-1

DISTRIBUTION BY SIZE OF UNDERGROUND COAL FACILITIES IN THE U. S., 1996

Detail	Number of Mines	Percent of All Mines	Number of Miners	Percent of All Miners
Small Mines				
< 20	436	44.4	4,473	8.8
Large Mines				
≥ 20	545	55.6	46,199	91.2
Total	981	100	50,672	100

Source: U.S. Department of Labor, Mine Safety and Health Administration. Denver Safety and Health Technological Center. Coal 1996 Size-Group Report (Final) - CM441, cycle 96/168. Unpublished data. August 1997.

TABLE II-2

DISTRIBUTION BY SIZE OF UNDERGROUND COAL FACILITIES IN THE U. S., 1996

Detail	Number of Mines	Percent of All Mines	Number of Miners	Percent of All Miners
Small Mines				
≤ 500	972	99.1	45,285	89.4
Large Mines				
> 500	9	0.9	5,387	10.6
Total	981	100	50,672	100

Source: U.S. Department of Labor, Mine Safety and Health Administration. Denver Safety and Health Technological Center. Coal 1996 Size-Group Report (Final) - CM441, cycle 96/168. Unpublished data. August 1997.

TABLE II-3

DISTRIBUTION BY VOLTAGE OF LONGWALL FACILITIES IN THE U. S., 1996

Voltage	No. of Active Faces	Percent of All Faces	Number of Mines	Percent of All Mines
Medium: 661-1000				
950	7	10.0	6	10.0
995	2	2.9	2	3.0
1000	5	7.1	4	7.0
Subtotal	14	20.0	12	20.0
High: > 1000				
2300	33	47.2	28	46.7
2400	1	1.4	1	1.6
4160	22	31.4	19	31.7
Subtotal	56	80.0	48	80.0
Total	70	100.0	60	100.0

Source: Fiscor, S. The 1997 U.S. Longwall Census. Coal. pp.28-33. February 1997.

TABLE II-4

DISTRIBUTION OF HIGH-VOLTAGE LONGWALL FACILITIES ACCORDING TO MSHA'S SMALL MINE DEFINITION, 1996

Detail	Number of Mines	Percent of All Mines	Number of Miners	Percent of All Miners
Small Mines				
< 20	0	0	0	0
Large Mines[a]				
≥ 20	48	100.0	16,992	100.0
Total	48	100.0	16,992	100.0

Source: U.S. Department of Labor, Mine Safety and Health Administration. Denver Safety and Health Technological Center. Coal Part 50 Master File Report, Selected Information for Coal, cycle 96/168. Unpublished data. December 1997.

[a]An active mine, not producing in 1996, was classified as a large mine even though it had nine miners; it had an average of 76 miners when it was producing in 1994 and 1995.

TABLE II-5

DISTRIBUTION OF HIGH-VOLTAGE LONGWALL FACILITIES ACCORDING TO SBA'S SMALL MINE DEFINITION, 1996

Detail	Number of Mines	Percent of All Mines	Number of Miners	Percent of All Miners
Small Mines				
≤ 500	41	85.4	12,794	75.3
Large Mines				
> 500	7	14.6	4,198	24.7
Total	48	100.0	16,992	100.0

Source: U.S. Department of Labor, Mine Safety and Health Administration. Denver Safety and Health Technological Center. Coal Part 50 Master File Report, Selected Information for Coal, cycle 96/168. Unpublished data. December 1997.

Longwall Mining in Underground Coal Mines

The first longwall mining equipment was installed in the U.S. in 1952. The number of longwalls first substantially increased in 1966 when chock-type, self-movable roof support was introduced. Another substantial increase in the number of longwalls began in 1975 when the first hydraulic shield self-movable for roof support was introduced. In 1975, there were an estimated 58 operating longwalls in the nation's underground coal mines. At the end of 1996, there were 69 operating longwalls in the United States.

Longwall mining is expensive: the equipment can cost between $12 million and $20 million depending on the width and length of the panel. Thus, any promise of increased production from longwall mining must be weighed against its cost. Decisions to invest in longwall equipment are primarily based on the greater production per shift and the increased amount of coal that can be recovered by using longwalls rather than conventional or continuous mining. For example, the average production of coal per shift from longwall mining is nearly double the average from either conventional or continuous mining methods.[5]

In longwall mining, shears or plows (two types of cutting devices) are used to extract coal from long underground coal panels which range in length from 2,000 to 24,000 feet. The

[5] U.S. Dept. of Energy/EIA, May 1989, p. 11.

broken coal is removed from the cutting area to the surface by conveyor. Current longwall mining is done under movable roof supports that are automatically advanced as the bed is cut. The roof in the mined-out area is then allowed to fall as mining advances.

The longwall mining method recovers between 80 and 85 percent of the coal, whereas the room and pillar method of mining recovers between 50 and 60 percent of the coal. However, offsetting these advantages of longwall mining are: (1) the greater amount of time it takes to begin mining coal using a longwall; and (2) the greater loss of production should there be a breakdown.

When using the longwall method to produce coal, there is a dependency among several pieces of equipment. The shearer, motors, conveyor system, and roof supports or shields must all be set up and operating correctly before coal production can begin. Due to the great size of the assorted pieces of longwall equipment, they must be assembled in the mine. It generally takes about one month to set up the various parts of longwall equipment and check that the equipment is running properly. In addition, when production moves from one panel site to another, the process of disassembling longwall equipment and setting it up elsewhere cuts into production time.[6]

[6] Blakely, December 1976, p. 55.

However, the dependency among assorted pieces of equipment is not a problem when mining coal with a continuous miner. The start-up time for coal production is less, about 1 week, because production is dependent on a single machine. Once the continuous miner is examined to ensure that it is operating properly, it can be brought into the mine (or moved to another mine area without reassembling) in order to begin production.

In longwall mining, every component must continue to operate properly in order to maintain coal production. The entire production comes to a complete stop when a wrong fitting is used, when a hose on one of the roof supports breaks, or when anything goes wrong on the conveyor unit.[7] In comparison, on a continuous miner section, a shuttle car breakdown may cause productivity to decline by only half because the second car is still available to haul coal.

Table II-6 illustrates the increase in longwall's share of total and underground coal production, for selected years, from 1969 through 1996. In its original PRIA, MSHA requested data from the public on longwall production for the years 1979 through 1982 and 1984 through 1989, but received no information in response.

The data in Table II-6 show that in 1969 longwall production accounted for about 1 percent of all coal production and about

[7] Euler, April 1978, p. 72.

2 percent of underground production. By 1978, longwall's share had increased to about 2 percent of total coal production and about 5 percent of underground production. From 1978 to 1996, longwall production increased significantly to 18.3 percent of total production and to 47.4 percent of underground production.

Irrespective of this growth in longwall's share of coal production, there are certain conditions in many mines that may make longwall mining impractical. Two of these conditions are the presence of water which can lead to severe flooding and the presence of active or capped gas wells, which present increased explosion hazards.

In addition, geologically heavily-faulted areas are not conducive to longwalling. Longwall mining is not workable under certain roof and bottom conditions, like a soft top or bottom or a too strong top. A soft top or bottom can result in the supports being driven into the soft surface or collapsing. A too strong top may not cave properly, causing irregular roof hazards. Also, under a low cover condition, such as 50 or 60 feet of overburden, longwall mining can cause serious subsidence (surface ground movement) problems, and gob areas can break through to the surface.[8] One commenter noted that subsidence can have serious effects at the surface even when the coal seam is 3,000 feet below the surface. Thus, surface features (i.e., buildings,

[8] Scott, February 1979, p. 68.

lakes, rivers, roads, and railroads) are a concern whenever a longwall operation is being considered.

Furthermore, in coal seams of less than 36 inches, use of some pieces of longwall mining equipment may not be practical. Shearers or plows are needed in longwall mining, and there are two principal limitations to the height in which a shearer can operate. The first limitation is the height of the machine and the second limitation is the ability of the drum to cut and load the coal. Conventional conveyor-mounted machines must have sufficient clearance from the roof support beams and the armored face conveyor. In general, as noted above, the

TABLE II-6
U.S. COAL PRODUCTION
(THOUSAND SHORT TONS)

Year	Total Coal Production (Tonnage)	Underground Coal Production (Tonnage)	Longwall (Tonnage)	Longwall Percent of Total Coal Production	Longwall Percent of Underground Coal Production
1969	560,505	347,132	6,344	1.13	1.83
1970	602,932	338,788	7,132	1.18	2.11
1971	552,192	275,888	6,552	1.19	2.37
1972	595,386	304,103	7,763	1.30	2.55
1973	591,738	299,353	9,442	1.60	3.15
1974	603,406	277,309	9,574	1.59	3.45
1975	648,438	292,826	9,113	1.41	3.11
1976	678,685	294,880	11,234	1.66	3.81
1977	691,344	265,950	13,300	1.92	5.00
1978	665,127	242,177	11,981	1.80	4.95

1983	776,635	298,320	47,257	6.08	15.84

1990	1,029,276	424,546	114,992	11.17	27.09
1991	995,984	407,225	118,948	11.94	29.21
1992	997,545	407,239	127,711	12.80	31.36
1993	945,424	351,053	109,905	11.62	31.31
1994	1,033,504	399,103	181,218	17.50	45.40
1995	1,032,974	396,249	189,421	18.30	47.80
1996	1,063,856	409,849	194,344	18.30	47.40

Source: Merritt, P., 1997, p. 58; U.S. DOE/EIA Coal Production, various years.

practical minimum coal seam limit for efficient longwall operation is about 36 inches.

High-Voltage Longwall Mining

The first longwalls used voltages of 1,000 or less to power their motors. Voltages of 1,000 are considered the top end of the medium-voltage range.[9] As longwalls were developed to use more reliable heavy duty equipment, mine operators were able to mine more coal and increase panel dimensions. Extending longwall panel width puts greater amounts of coal and rock on the longwall haulage system which, in turn, requires larger horsepower motors to move the larger equipment and heavier loads.[10] Thus, higher voltages, in the range of 2,400 to 4,160 volts, are required for these larger motors that increase the efficiency and reliability of heavy duty longwall equipment.

Although 30 CFR, Subpart B, Part 18.47 allows the voltage levels for high-voltage equipment to reach 4,160 volts, 30 CFR, Subpart K, Part 75.1002 limits the operation of equipment and the cables feeding it in the face area to a 1,000 volt maximum. Therefore, in order to install and use equipment and cables exceeding 1,000 volts inby the last open crosscut or within 150 feet of pillar workings, mine operators must file with MSHA a

[9] Green, December 1985, p. 42.

[10] Green, December 1985, p. 42.

"Petition For Modification" under § 101(c) of the Federal Mine Safety and Health Act of 1977 and have such petition granted.

Table II-7 shows the number of petitions granted by MSHA to mine operators to use voltages greater than 1,000 to power longwall equipment. Table II-7 demonstrates that the use of high voltage to power longwall face equipment is increasing. In 1986, when mine operators first petitioned MSHA to use high voltage in longwall operations, only 3 such petitions were granted. However, in the last two years, 1995 and 1996, 12 and 9 petitions, respectively, were granted, clearly indicating the growth in the number of mines using high-voltage equipment. Since 1986, 9 mines per year, on average, have been granted petitions to use high voltage in longwall operations.

A longwall census, reported yearly by Coal magazine, also indicates that although total longwall activity has been decreasing slightly since 1987, high-voltage longwall activity has been consistently increasing. Table II-8 shows the number of operating longwall faces and those that use high voltage for years 1987 through 1996. It also reveals under what mine parameters high-voltage equipment is utilized in longwall mining.

As shown in Table II-8, of the mines using longwalls, high-voltage operations have increased from about 10 percent in 1987 to 80 percent in 1996. In 1996, about 48 percent of high-voltage longwall mining utilized 2,300 and 2,400 volts and about

32 percent utilized 4,160 volts. This information is also documented in Table II-3. From 1987 through 1996, high-voltage longwall mining had an average seam of about 84 inches, and an average panel width of about 771 feet. The average panel length since 1990 has been about 7,336 feet.

High-Voltage Longwall Equipment Manufacturer Profile

There are approximately seven manufacturers of high-voltage longwall equipment in the United States. For the most part, they obtain various equipment, from transformers to power centers to telephone communication systems, from other manufacturers and redesign and adapt the equipment for underground coal mine use. They are required to comply with 30 CFR, Part 18 in submitting equipment design plans to MSHA for approval. Although a proposed revision of Part 18 is included along with Part 75 revisions in this regulation package, the Part 18 revision does not impact these manufacturers, in terms of compliance costs, any more than do the current Part 18 requirements. In fact, the proposed Part 18 revision, by outlining more specific design and approval requirements, lessens the cost burden on the affected manufacturers by giving them advanced notice of specific design requirements, thereby minimizing trial and error design submissions to MSHA concerning these matters. In addition, even though these companies assemble the longwall equipment, the mine

operator usually obtains the design approval from MSHA and pays for any associated expense.

Conclusion

Longwall mining offers high productivity and, as a result, its share of underground coal production has increased from less than 2 percent in 1969 to over 47 percent in 1996. If advances in longwall mining equipment and technology can augment these productivity gains so as to overcome the method’s higher costs relative to continuous mining and, at the same time, maintain or increase miner safety, longwall use will continue to grow.

TABLE II-7
PETITIONS GRANTED BY MSHA
FOR THE USE OF HIGH-VOLTAGE EQUIPMENT
IN UNDERGROUND COAL MINES

Year	Petitions Granted	Number of Mines
1986	3	3
1987	8	8
1988	8	6
1989	7	7
1990	6	6
1991	19	16
1992	13	13
1993	6	6
1994	13	13
1995	12	12
1996	9	9

Source: Mine Safety and Health Administration, Office of Standards, Regulations, and Variances. Based on data from Coal Mine Safety Division. December 1996.

TABLE II-8
LONGWALL MINING OPERATIONS
1987 THROUGH 1996

		High-Voltage (HV)					
Year	Total Active Faces	HV Active Faces	Volts To Face (2,400)	Volts To Face (4,160)	Seam Avg.	Panel Width Avg.	Panel Length Avg.
1987	102	10	4	6	75"	658'	N/A
1988	92	19	14	5	80"	760'	N/A
1989	95	20	15	5	83"	739'	N/A
1990	96	28	21	7	77"	749'	6,550'
1991	93	34	26	8	86"	794'	7,017'
1992	89	36	26	10	90"	735'	6,515'
1993	85	42	29	13	88"	823'	7,575'
1994	81	48	33	15	87"	835'	7,952'
1995	72	54	35	19	89"	844'	7,842'
1996	70	56	34	22	86"	823'	7,902'

Source: Coal Magazine, February 1988 through 1996 editions.

III. BENEFITS

Introduction

The Mine Safety and Health Administration has qualitatively determined that this proposed rule governing the use of high-voltage longwalls would reduce the potential for electrical-related fatalities and injuries. This potential reduction derives from the greater electrical safety inherent in high-voltage longwall systems due to: better design and construction criteria; required use of SHD shielding; improved ground-fault protection; in certain cases, handling of fewer and lighter cables; efficient use of equipment; and, the increased safety requirements for work practices on high-voltage longwalls. These particular design and practice requirements offer greater protection against electrical shock and ignition hazards, equipment overheating, fire hazards, and unsafe work and repair practices.

Methodology

MSHA first reviewed the various fatality and injury data bases and determined that they did not contain sufficient information for even the most speculative of quantitative risk assessments. The Agency then reviewed the technical aspects of high-voltage and low and medium-voltage longwall equipment in

order to evaluate their relative safety characteristics. MSHA also reviewed the technical aspects of the differences between the proposed rule requirements and high-voltage longwall petition for modification approval conditions.

Benefits

There will be two general types of benefits resulting from this proposed rule. The first type is the increased safety resulting from the substitution of high voltage for lower voltage. The second type is the increased safety resulting from new electrical procedures that are not currently required in most petitions for modification.

Benefits From Substitution Of High Voltage For Low and Medium Voltage

The substitution of high voltage for lower voltage in longwall operations can reduce several potential electrical hazards. For example, the criteria for construction of explosion-proof electrical controls are more stringent for high-voltage systems than for low-voltage systems. In addition, a well designed high-voltage system segregates high voltages from lower voltages, has interlocked compartment covers to prevent access to energized high-voltage conductors, and has equipment designed to facilitate safer testing procedures. One commenter noted that the more stringent criteria and design features

associated with high-voltage systems decrease the likelihood of electrical accidents.

Also, power conductors generally have a SHD or SHC (Power Conductors with Braid Shield Over Assembly and Ground in Each Cable Interstice) type of shielding depending on the voltage of the circuit in which the conductors are used. The SHD type is a shielding around each power conductor. The SHC type is a shielding over the assembly instead of around each power conductor. Existing § 75.804 requires that underground high-voltage cables be equipped with SHD type shielding. Section 75.907 allows medium-voltage circuits to have either SHD or SHC type shielding.

The SHD type is considered to be safer than the SHC type because the SHD type shielding surrounds each power conductor and provides for a segregation of power conductors. One commenter noted that SHD shielding makes it virtually impossible for two power conductors to become shorted together without a preceding connection between the power conductor and ground resulting in a ground fault that de-energizes the circuit. Thus, the SHD design eliminates the majority of high-energy short circuits that may cause a fire or a burn resulting from a miner touching a cable. Furthermore, the chances of a miner receiving an electrical shock from an exposed cable decreases when SHD shielding is used. With SHD shielding, it is unlikely that a cable will be damaged in a

manner that will expose miners to the energized power conductor(s). Before this will happen, the energized conductor or strand will contact the grounded shield and trip the ground-fault protection, which cuts off power to the cable and eliminates the hazard.

Also, the ground-fault current available in a low- or medium- voltage system is more than that available in a high-voltage system. As one commenter noted, on a 1,000 volt system the maximum ground-fault current is 15 amps whereas the corresponding ground-fault currents on 2,400 volt and 4,160 volt systems are 6.5 amps and 3.75 amps, respectively. This reduction in current results in reduced heating, arcing, and damage to cable shields when ground faults occur. Reducing heat in the cable decreases the likelihood that the cable will be damaged in such a manner that a miner could be shocked by touching an exposed power conductor. Further, more sensitive ground-fault relays are used with high-voltage systems. These relays respond to 0.150 amps instead of 5 amps on low- and medium-voltage systems. Thus, the potential shock hazard to miners is lower.

In certain cases smaller cables can be used when high voltage replaces low and medium voltage. Reduction in power cable size and weight decreases the risk of sprains and strains resulting from handling power cables during installation, movement, or replacement of longwall equipment. Although there

is no significant reduction in cable size when replacing a 960 volt system with a 2,400 volt system, cable size reduction can be meaningful when replacement involves a 4,160 volt system. For example, when considering the use of high voltage, Empire Energy Corporation (Empire) calculated that No. 2 cable could be used for 4,160 volt longwalls. If Empire had used a lower voltage of 960 volts, then 350-MCM cable would have been needed. Ten feet of length of No. 2 cable weighs only 22 pounds as opposed to 74 pounds for the same length of 350-MCM cable.[11] The No. 2 cable is only about 2 inches in diameter as compared to about 3.2 inches for the 350-MCM cable.[12]

Also, since the amount of current needed in higher voltage systems is less than the amount of current needed in low- and medium-voltage cables, not only smaller but also fewer cables are required between various pieces of longwall equipment. Fewer cables going to the longwall face will involve less cable handling by miners. The less electric cables are handled, the lower the potential for a sprain or strain and the lower the potential of an electrical shock or burn from handling a damaged cable.

Furthermore, the introduction of heavy duty (or increased capacity) longwall equipment, such as shearers and face

[11] Richardson, and DuBe, 1986, p. 3.

[12] Green, December 1985, p. 43.

equipment, necessitates the use of larger motors to drive such equipment. When large motors are used to power more heavy duty longwall equipment in low voltage systems, voltage regulation problems (voltage fluctuations) occur and reduce the output torque produced by the motor. Reduced torque causes the motor to slow down and draw more current. Increased current leads to overheating of the motor and/or the cables. Using high voltage to power larger motors that drive heavier duty equipment improves output torque which lowers current requirements and, thus, reduces the probability of motor failure due to overheating. Reducing current by using high voltage also decreases heat build-up in the cable and thus diminishes the danger of cable overheating. In addition to the potential for high voltage to reduce equipment failure, there is also an improved ability to start motors when using higher voltages. These benefits also help increase equipment longevity and reduce repair and maintenance downtime.

One other consideration is that longwall motors and other longwall equipment are large pieces of machinery for which physical handling of the machinery, often in very cramped spaces, has the potential for miner injury. Thus, the more reliable these motors are, the less often they are replaced, and the lower the potential for miner injury.

Benefits From New Electrical Procedure Requirements

Section 75.820(d)(3) requires qualified electricians to wear properly-rated rubber gloves in order to perform troubleshooting and testing on low- and medium-voltage circuits in a high-voltage compartment. Currently, petitions for modification do not have this requirement. Thus, § 75.820(d)(3) would provide a safety benefit which would diminish the risk of electrical shock hazards during this troubleshooting and testing.

Section 75.818(b) requires that insulated personal protective equipment be electrically tested every six months in order to determine any damage or defects. This equipment, primarily high-voltage rubber gloves, will be removed from the mine area or destroyed if found to be damaged or defective. Presently, petitions do not have this requirement. Thus, § 75.818(b) would ensure the reliability of high-voltage rubber gloves to protect miners against shocks while handling cables.

Although no fatalities or injuries associated with working on or near high-voltage circuits on high-voltage longwalls have occurred, the number of miner exposures has been somewhat limited. However, as more high-voltage longwalls become active, the accident potential would correspondingly increase. By way of recognizing and addressing these hazards, the Occupational Safety and Health Administration’s final rule for safety standards for Electrical Power Generation, Transmission, and Distribution

contains similar work practice requirements.[13]

Potential Safety And Health Concerns

The use of high voltage in longwall mining operations could be used to increase panel dimensions. Some commenters on high-voltage petitions have voiced concerns that increasing the longwall panel may adversely affect miner safety.[14]

One concern is that extended panel length could affect a miner's ability to escape a hazardous situation, thereby increasing the potential for entrapment in the event of a fire or other emergency. A second concern is that extended panel dimension will create a "gob" area larger than gob areas created by other conventional mining methods. The gob is the space left in a coal mine after the coal is removed and in which caving occurs. A larger gob area can be more difficult to ventilate. A third concern is that there may be a reduction in the ability of the mine operator to maintain the respirable dust concentrations and methane concentrations within the allowable limits due to the increased distance the air must travel on a wider face and the high-speed, bi-directional cutting of coal that occurs on high-voltage longwalls.

In reviewing these concerns, MSHA notes that one of its

[13] 29 CFR 1910.269.

[14] Docket No. M-87-300-C, May 1988, p. 3.

studies evaluated these three safety and health concerns associated with the use of high-voltage longwall systems.[15] MSHA has standards and policies that specifically address mine escapeways, fire safety, ventilation, and dust concentrations. Since an operator must comply with all of these standards regardless of the panel's dimensions, no diminution of miner safety or health should occur from the use of high-voltage longwalls.

Conclusion

MSHA has determined that the proposed rule would qualitatively improve the safety and health of the miners in longwall coal mines. The proposed rule would reduce the potential for electrical-related fatalities and injuries due to better design and construction criteria, efficient use of equipment, and increased safety requirements for work practices on high-voltage longwalls, to name a few. The Agency concluded, however, that the fatality and injury data reviewed did not contain sufficient information to enable quantitative estimates of the safety benefits.

[15] El-Bassioni, March 22, 1991.

IV. COMPLIANCE COSTS

Introduction

This chapter contains MSHA's estimates of the cost of complying with the proposed standards. The baseline for these estimated costs is established by current industry practices. The proposed rule would result in a substantial one-time conversion savings per high-voltage longwall unit resulting from lost production savings and filed petition savings. Lost production savings are savings due to increased production when a medium-voltage longwall unit converts to a high-voltage longwall unit. Filed petition savings are savings that result from the elimination of the current petition process. The proposed rule would also impose minimal costs of compliance on high-voltage longwall mine operations and would impose no new costs on longwall equipment manufacturers. In this chapter, MSHA will use its traditional definition of small and large mines, with a small mine being one employing fewer than 20 miners. Since there are no small mines that use high-voltage longwall mining equipment, only large mines that use or will use such equipment would be affected.

Methodology

For this updated Preliminary Regulatory Impact Analysis (PRIA), MSHA estimated initial costs, annualized capital costs, and annual costs, as appropriate. Initial costs are those costs that are incurred once, usually during the first year of compliance with new or revised rules. Annualized capital costs are capital costs that are allocated over the economic lifespan of the equipment using a specified interest (or discount) rate. For this proposed rule, MSHA used the 7 percent interest rate specified by the Office of Management and Budget. All initial costs are annualized in order to recognize that business operations finance the purchase of equipment over a certain period of time, or that a plan or program developed in one year will be used for several years. Initial costs that are converted to annualized costs can be added to annual costs in order to obtain the yearly cost of a rule. Examples of annual costs include operating, maintenance, and recordkeeping costs.

The compliance costs in this updated PRIA were developed utilizing information received from MSHA's District Offices and Coal Mine Safety Division, and from discussions with various industry representatives. Costs are presented in 1996 dollars. MSHA used an hourly compensation rate of $26 for a coal miner and $42 for a supervisor.[16] These hourly wage rates include fringe

[16] U.S. Dept. of Labor, Bureau of Labor Statistics, 1993, p. 13.

benefits of 40 percent.[17]

The baseline used for the compliance cost estimate is established by the current requirements contained in granting petitions for modification to use high-voltage cables in longwall face operations. This baseline is compared to the proposed rule's requirements to determine the expected compliance cost.

Summary of Compliance Costs

The proposed rule would result in annualized net savings of $8,079,267 from Year 1 through Year 10 under the proposed rule. This includes a net savings per conversion of $4,431,202 attributed to each medium-voltage longwall unit that converts to high-voltage usage. These conversion savings consist of $4,409,988 for lost production savings per unit, and $21,214 for filed petition savings per unit. Lost production savings are savings due to increased production when a medium-voltage longwall unit converts to a high-voltage longwall unit. Filed petition savings refer to savings due to eliminating legal fees and expenses connected with a filed petition. The elimination of the need to file petitions for modification to use high-voltage longwalls would reduce the costs associated with the petition process and would require less paperwork.

With respect to individual provisions, proposed § 75.821(d)

[17] Western Mine Engineering, Inc., 1996.

would result in annual cost savings of approximately $525 per unit, while § 75.818(b)(4) and § 75.820(d)(3) would result in annual cost increases of approximately $90 per unit and $168 per unit, respectively. Annual net savings connected with these provisions are approximately $251 per unit.

PART 18 - ELECTRIC MOTOR-DRIVEN MINE EQUIPMENT AND ACCESSORIES

This part specifies design requirements for high-voltage electrical equipment in longwall face areas of underground coal mines. Development of part 18 requirements are based on existing § 18.47(d)(6), which allows modification of requirements to recognize improved technology. Since manufacturers are already in compliance with the requirements of § 18.53, there are no compliance costs associated with this part.[18] These changes are needed to conform part 18 to the part 75 proposed rule and to accommodate new technology.

As indicated in the original 1992 PRIA, there are no compliance costs associated with this Part 18 revision. For any new manufacturers, large or small, no compliance costs would be imposed by the promulgation of this modified proposed standard. Any new manufacturers are required under current Part 18

[18] It should be noted that it is usually the mine operator who pays for the redesign of electrical equipment. However, the mine operator's redesign costs are likely to be reduced under the proposed rule because the proposal outlines more specific design and approval requirements.

requirements to submit design specifications which do not result in any less burden or costs than those presented by the new provisions of Part 18 under this proposed rule. Moreover, their costs and economic burden may be less under the new provisions since the revisions describe specific design requirements. Manufacturers would have prior notice of design parameters so that they could submit approval documents accordingly with less chance of new, unforeseen design enhancements imposed under the current Part 18 provisions such as §18.47(d)(6) and §18.20(b).

PART 75, SUBPART A - GENERAL

Section 75.2

This provision establishes certain electrical safety definitions. There are no compliance costs associated with this provision.

PART 75, SUBPART K - TROLLEY WIRES and TROLLEY FEEDER WIRES

Section 75.1002 - Installation of Electric Equipment and Conductors; Permissibility

This section allows certain high-voltage conductors and cables to be used within 150 feet of pillar workings or longwall faces. Currently, existing §§ 75.1002 and 75.1002-1 prohibit the use of all high-voltage cables within 150 feet of pillar working or longwall faces. There are no compliance costs associated with this section.

PART 75, SUBPART I - UNDERGROUND HIGH-VOLTAGE DISTRIBUTION

Section 75.813 - High-voltage Longwalls; Scope

This section states that §§ 75.814 through 75.821 are electrical safety proposed standards applicable to longwall mining equipment and that other existing standards in 30 CFR part 75 currently applicable to longwall mining equipment continue to apply. There are no compliance costs associated with this provision.

Section 75.814 -Electrical Protection

This section is derived, in part, from existing §§ 75.518-1, 75.800, and 75.800-2, and addresses requirements for short-circuit, overload, ground fault, and undervoltage protection for high-voltage trailing cables extending from the section power center, the shearer motor cable(s), and the remaining motor cables. There are no compliance costs associated with this proposed standard because petitions granted for use of high voltage in longwall operations already require mine operators to follow these requirements.

Section 75.814 (a)(1) through (2) specify a current setting and a time setting for short circuit protection. Also, overload protection must be provided to prevent heat damage to motor circuits. Overload devices shall be set in values specified in the longwall approval documentation or 0.25 second, whichever is less.

Section 75.814 (a)(3) requires that ground-fault currents be limited by a neutral grounding resistor to be not more than 6.5 amperes when the nominal voltage of the power circuit is 2,400 volts or less, and 3.75 amperes when the power circuit voltage is greater than 2,400 volts.

Section 75.814(a)(4)(i) through (iii) requires high-voltage circuits extending from the section power center to have ground-fault protection set at no more than 40 percent of the current rating of the neutral grounding resistor. Also, there should be

a backup ground-fault protection to detect an open grounding resistor. Finally, the high-voltage neutral grounding resistor must be provided with overtemperature protection that will open the ground wire monitor circuit for the high-voltage circuit supplying the section power center if the grounding resistor is subjected to a sustained ground fault.

Section 75.814(a)(5) requires that high-voltage motor and shearer circuits be provided with instantaneous ground-fault protection set at not more than 0.125 amperes.

Section 75.814(a)(6) provides that time delay settings of ground-fault protective devices, used to provide coordination with the instantaneous ground-fault protection of motor and shearer circuits, not exceed 0.25 second.

Section 75.814(a)(7) requires that undervoltage protection be provided by a device that operates on loss of voltage to cause and maintain the interruption of power to a circuit so as to prevent automatic restarting of equipment.

Section 75.814(b) provides that current transformers used for ground-fault protection specified in paragraphs (a)(5)(i) and (a)(6) of this section be a single window-type and be installed to encircle all three phase conductors. Further, equipment safety grounding conductors must not pass through or be connected in series with ground-fault current transformers.

Section 75.814(c) requires a ground-fault test circuit to

inject a current of 50 percent or less of the current rating of the grounding resistor. This is required to verify that a ground-fault condition will cause the circuit interrupting device to open.

Section 75.814(d) requires that circuit interrupting devices not reclose automatically.

Section 75.815 -Disconnect Devices for High-Voltage Longwall Equipment

This section concerns conditions for disconnecting devices used to de-energize circuits and components of high-voltage longwall equipment. Existing petitions granted for high-voltage longwall mining require mine operators to adhere to these requirements. Since manufacturers must already comply with these requirements, there are no related compliance costs.

Section 75.815(a)and(b) Part (a) requires a disconnecting device in the power center that supplies power to longwall equipment. Part (b) requires a disconnecting device in the enclosure that contains the motor contractors. In addition, part (b) also requires a caution label on the covers of each starter enclosure compartment containing the main disconnecting device.

Section 75.815(c) requires disconnecting devices to have voltage and current ratings compatible with the circuits in which

they are used.

Section 75.815 (d)(1) through (3) requires that disconnecting devices be designed to provide visual evidence that all underground power conductors are disconnected when the device is open, and that disconnecting devices be equipped with means to ground all power conductors when the device is “open.” In addition, each device is required to be equipped with a means for locking the device in the open position.

Section 75.815 (e) requires that disconnecting devices, with the exception of those installed in explosion-proof enclosures, be capable of interrupting the full load current of the circuit or designed and installed to cause the current to be interrupted automatically prior to the opening of the device. Disconnecting devices installed in explosion-proof enclosures must be maintained pursuant to approval requirements of paragraph (f)(2)(iv) of § 18.53.

Section 75.816 - Guarding of Cables

This section is partially derived from existing § 75.807 and would set guarding guidelines for high-voltage cables supplying longwall equipment. Existing petitions require mine operators to follow the guidelines in this section. Since manufacturers must currently comply with these requirements, there are no additional compliance costs.

Section 75.816(a)(1) and (2) requires that high-voltage cables be guarded where persons regularly work or travel over or under cables, and where cables leave cable handling or support systems to extend to electric components.

Section 75.816(b) requires that guarding prevent the possibility of miners contacting the cables and protect the cables from damage. The guarding shall be made of grounded metal or nonconductive flame-resistant material.

Section 75.817 - Cable Support Systems for High-voltage Longwall Equipment

This section is derived from existing requirements in § 75.807 and addresses the handling and support systems of high-voltage cables serving longwall equipment. The proposed standard requires that longwall mining equipment be provided with cable handling and support systems that are constructed, installed, and maintained to prevent the possibility of miners contacting the cables and to protect high-voltage cables from damage.

Existing petitions require mine operators to comply with these requirements. Since manufacturers are already in compliance, there are no compliance costs.

Section 75.818 - Use of Insulated High-voltage Cable Handling Equipment

This section is derived, in part, from existing §§ 75.705-6,

75.705-8, and 75.812 requirements and addresses personal protective equipment use when handling energized high-voltage longwall cables. Only § 75.818(b)(4) of this section would involve compliance costs.

Section 75.818(a) requires that energized high-voltage cables not be handled except when motor or shearer cables need to be trained (that is, guided by hand into the hold trough). It also specifies the types of personal protective equipment, high-voltage insulated gloves, mitts, hooks, tongs, slings, aprons, or other personal protective equipment, capable of providing protection against shock hazard that are required to be used to prevent direct contact with the cables.

Section 75.818(b)(1)through (3) requires that high-voltage insulated gloves, sleeves, and other insulated personal protective equipment be rated for a minimum of 20,000 volts and be visibly examined before each use for signs of damage or defects, and that such equipment shall be destroyed or removed from the underground area of the mine when damaged or defective.

Section 75.818(b)(4) requires that insulated personal protective equipment be electrically tested every six months. This is neither an existing requirement nor found in the petitions. Mines that employ high-voltage longwall mining equipment currently use high-voltage personal protective equipment that would now be required to be tested every six

month. For purposes of estimating the cost of the proposed rule, MSHA assumes that, presently, this equipment is not tested.

MSHA determined that coal mines do not have the equipment necessary to test their own gloves or mitts so that this testing would require the use of an independent laboratory. MSHA estimates that it costs an average of $10 to test a pair of high-voltage gloves rated for 20,000 volts or higher. Two pairs of such gloves or mitts would need testing twice a year at each high-voltage longwall unit (existing mines and those expected to convert annually). The annual costs per unit for testing high-voltage gloves or mitts would therefore be about $40 ($10 x 2 pairs x 2 times annually), per unit.

In addition, MSHA determined that other personal protective equipment such as hooks or tongs (any material less than 10 feet long) would also require testing. MSHA estimates that it costs an average of $25 to test hooks or tongs twice a year at each high-voltage longwall unit, including those that are expected to convert each year. Thus, the annual costs per high-voltage longwall unit for testing hooks or tongs would be about $50 ($25 x 2).

The total annual costs per high-voltage longwall unit for testing of high-voltage personal protective equipment would be approximately $90 ($40 for gloves or mitts and $50 for hooks or tongs).

Section 75.819 Longwall Equipment Safety Devices

This section requires that compartment separation and cover interlock switches for motor starter enclosures be maintained in accordance with approval requirements of paragraphs (a) and (b) of § 18.53.

This section establishes requirements for devices designed to prevent miner contact with energized internal components of high-voltage electric equipment. Since petitions already have such requirements, there is no associated compliance cost.

Section 75.820 Electrical Work; Troubleshooting and Testing

This section is derived from existing §§ 75.509, 75.511, and 75.705 and establishes requirements for performing work on low, medium, and high-voltage circuits and equipment associated with high-voltage longwall operations. The requirements in this section are similar to the those in existing §§ 75.509, 75.511, and 75.705 for work on electric circuits and equipment, with additional standards specifically applicable to work with circuits and equipment connected with high-voltage longwall operations. With the exception of § 75.820(d)(3), there are no compliance costs associated with this section.

Section 75.820(a) requires electrical work on all circuits and equipment associated with high-voltage longwalls be performed by qualified persons pursuant to § 75.153. This provision is

similar to § 75.511-1, and mine operators are currently in compliance.

Section 75.820(b)(1) through (4) requires that four safety procedures be performed before any electrical work can be done. The first procedure is de-energizing the circuit or equipment with a circuit interrupting device. This requirement is similar to 30 CFR § 75.509. The second procedure is opening the circuit disconnecting device when work is performed on high-voltage circuits and grounding power conductors until completion of the work. This requirement is similar to 30 CFR § 75.705. The remaining 2 safety procedures, identified by this proposed standard, are similar to requirements in § 75.511. The third procedure is locking out the disconnecting device with an individual padlock for each person performing work. The fourth procedure is tagging the disconnecting device to identify each person performing work.

Section 75.820(c) requires that each padlock and tag be removed by the person who installed them, except that if that person is unavailable at the mine, the lock and tag may be removed by a person authorized by the operator provided: (1) the authorized person is qualified under § 75.820(a); and (2) the operator ensures that the person who installed the lock and tag is aware of the removal before that person resumes work on the affected circuit or equipment.

Section 75.820(d)(1) and (2) requires that testing and troubleshooting of energized circuits to determine voltages and currents be performed only on low and medium-voltage circuits and when the purpose is to determine voltages and currents.

Section 75.820(d)(3) requires that only qualified electricians wearing properly rated rubber gloves be permitted to perform troubleshooting and testing on low and medium-voltage circuits that are contained in a compartment with high-voltage circuits. MSHA determined that, on average, the affected mines would need to buy 2 pairs of low-voltage rubber gloves per shift, each costing $28 per pair. MSHA also determined that these gloves have an average lifespan of 1 year. Thus, the annual costs per high-voltage longwall unit for low-voltage gloves would be about $168 ($28 x 2 pairs x 3 shifts).

Section 75.820(e) requires that troubleshooting and testing of low or medium-voltage circuits contained in the same compartment as high-voltage circuits be de-energized, disconnected, grounded, locked out, and tagged in accordance with paragraph (b) of § 75.820.

Section 75.820(f) requires that high-voltage cables extending from the section power to longwall equipment and located in conveyor belt entries be de-energized prior to removal of the conveyor belt structure.

Section 75.821 Testing, Examination, and Maintenance

This section establishes procedures for testing and examining high-voltage longwall equipment and for recording results. There are no compliance costs for this section because the requirements are similar to existing requirements under the petition process. However, § 75.821(d) would generate cost savings to mine operators.

Section 75.821(a) requires that only persons qualified pursuant to 30 CFR § 75.153 test, examine, and maintain high-voltage longwall equipment and circuits, at least once every 7 days, to determine that the electrical protection, equipment grounding, permissibility, cable insulation, and control devices, are being properly maintained. Tests must include actuation of the ground-fault test circuit required by § 75.814(c).

Section 75.821 (b) requires that each ground monitor and corresponding circuitry be examined and tested at least once every 30 days to verify that the ground monitor is operating properly and will cause the corresponding circuit-interrupting device to open.

Section 75.821(c) requires that equipment be removed from service or repaired when examining or testing reveals a fire, electric shock, ignition, or operational hazard. This is similar to § 75.512.

Section 75.821(d) requires the person who performs weekly

examinations and tests to certify by signature and date that they have been conducted. In addition, a record shall be made of any unsafe condition found and any corrective action taken. Such records shall be kept for at least one year and be made available at the mine for inspection by authorized representatives of the Secretary and miners.

Although this is similar to § 75.512, this provision would reduce costs to mine operators. Under § 75.512, the weekly examination and test results are required to be recorded regardless of the examiner's findings. Under § 75.821(d), records are required only when fire, electrical shock, ignition, or operational hazards are found.

MSHA estimates that it now takes a supervisor (earning $42.00 an hour) an average of 30 minutes to record such information weekly. Thus, existing annual costs per high-voltage longwall unit for recording such information are $1,050 ($42.00 x 0.5 hours x 50 weeks). Under the proposed rule, MSHA estimates that the average time to record such information would be reduced from 30 minutes to 15 minutes. Therefore, annual compliance costs per high-voltage longwall unit for recording the results of tests and examination would be $525 ($42.00 x 0.25 hours x 50 weeks).

Thus, the annual cost savings per high-voltage longwall operation would be $525 ($1,050 - $525).

Cost Savings From Elimination Of Petition Process

Since 1986, an average of 9 petitions for modification to use high-voltage cables in longwall operations have been granted annually. Thus, until all longwall operations have converted to high-voltage, MSHA assumes that 9 mines annually would continue to file a petition for modification to use high-voltage cables in longwall operations.

With respect to the costs of filing a petition, one source estimated that it costs between $5,000 and $10,000 for legal fees and expenses related to an unopposed petition, while another source estimated that such costs are between $2,000 and $4,000. Taking an average of these two estimates, MSHA calculated an average cost of $6,000 for legal fees and related expenses to file an unopposed petition.

If the petition is opposed and a decision by an Administrative Law Judge (ALJ) is required, then legal fees and related expenses for such a contested petition would increase substantially. One source estimated that this process costs about $75,000 ($50,000 for legal fees and another $25,000 for expenses), while another source estimated that it costs about $150,000. The average of these two estimates is $112,500. Because approximately 14.3 percent of all petitions granted by MSHA since 1995 (11 out of 77) were contested and required an ALJ’s decision, MSHA assumes that this same percentage would be

contested and require an ALJ's decision for future petitions. Table IV-1 shows that the proposed rule would generate one-time conversion savings per high-voltage longwall unit of $21,214 [($6,000 x 6/7) + ($112,500 x 1/7)] due to the fact that petitions for modification would no longer need to be filed or contested.

Operators currently attempt to synchronize the delivery of purchased longwall equipment with the expected date the petition would be granted so that production can begin when the equipment is ready to operate. Elimination of the petition process would diminish the potential risk of lost production that could occur when the delivery of longwall equipment does not coincide with the granting of the petition. For example, the operator may file a petition to use high-voltage longwall equipment before the related equipment is ordered. In some cases, the petition would be granted before the high-voltage longwall equipment is delivered. In this case, the lost production would occur from the fact that, absent the petition process, the operator could have ordered and been using the more productive high-voltage longwall equipment sooner. Alternatively, the operator may order high-voltage longwall equipment before filing a petition and then receive, but not be permitted to operate, the equipment because the petition has not yet been granted. In this case, the lost production would occur from the time the equipment is ready to

operate until the time the petition is granted. MSHA anticipates that the principal economic benefit of the proposed rule would be the removal of potential lost production time.

Based on petitions granted by MSHA from 1986 through 1995, the Agency determined that there was an average of 252 workdays (assuming 5 workdays a week) from the time a petition was filed to when it was granted and became effective. Using the 9 month time period (196 workdays) between a mine operator ordering the equipment and beginning longwall operation, MSHA estimates that, on average, there are 56 days (252 - 196) of lost production.

For those longwall operations that reported both capacity (raw coal, tons per shift) and voltage to face figures, MSHA used Coal magazine's data for medium- and high-voltage longwall operations for 1994, 1995, and 1996. The average capacity for medium-voltage longwalls in 1994, 1995, and 1996, was 6,425, 6,238, and 5,650 tons per shift, respectively, based on MSHA's estimates.[19] The three year average capacity for medium-voltage longwall operations was 6,104 tons per shift. For high-voltage longwall operations, MSHA's estimates of average capacity figures for 1994, 1995, and 1996 are 7,862, 7,879, and 8,500 tons per shift, respectively. The three year average capacity for high-

[19] Fiscor, 1997, p. 26; Merritt, 1996, p. 33; and Merritt, 1995, p. 28.

voltage longwalls was 8,080 tons per shift.[20] MSHA used the capacity utilization for longwalls in 1994, 1995, and 1996, which was 83.82%, 85.16%, and 87.99%, respectively, to obtain estimates of production for the medium- and high-voltage longwalls.[21] When capacities were adjusted by these factors, production of medium-voltage longwalls for 1994, 1995, and 1996 was 5,385, 5,312, and 4,971 tons per shift, respectively; production for high-voltage longwalls for 1994, 1995, and 1996 was 6,590, 6,710, and 7,479 tons per shift respectively. Thus, average medium-voltage longwall production (tons per shift) for 1994, 1995, 1996 was 5,223, while that for high-voltage longwall was 6,926.[22] Based on these average production figures over this three-year period, high-voltage, on average, out-produced medium-voltage by 32.6 percent [(6,926-5,223)/5,223]. MSHA used the 32.6 percent in its calculation to account for the percentage difference by which high-voltage operations out-produce medium-voltage longwall operations.

Using the 1996 price of coal of $18.50 per short ton of coal,[23] and assuming that longwall operations run about 2.5

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[20] Fiscor, 1997, p. 26; Merritt, 1996, p. 33; Merritt, 1995, p. 28.

[21] Capacity utilization is the ratio of total production to annual productive capacity as reported by mining companies on form EIA-7A, according to Coal Industry Annual 1996, p.29.

[22] Averages obtained after adjusting for capacity utilization.

[23] U.S. Dept. of Energy/EIA, November 1997, p. 154.

shifts per day for 56 working days, then the amount of lost production savings attributable to the petition process translates into approximately $4,409,988 as a one-time conversion savings per high-voltage longwall unit.[24] Thus, this amount would be saved on a one-time per-unit basis as a result of a medium-voltage longwall facility converting to the usage of high-voltage longwall cables.

The net savings attributed to the proposed rule in Year 1 would be $39.88 million. Since there were 70 longwall units in 1996, of which 56 were high-voltage units and 14 were medium-voltage, MSHA assumes the existing 14 medium-voltage units would be available for conversion to high-voltage units when the proposed rule takes effect. MSHA assumes that 9 medium-voltage longwall units would convert to high-voltage units during Year 1, while 5 would convert during Year 2 of the proposed rule. There would be no conversions after Year 2 since all the available medium-voltage longwall units would have already converted.

There are two components to savings associated with this proposed rule: a one-time conversion savings per high-voltage longwall unit and an annual net savings per high-voltage longwall unit. The one-time conversion savings associated with a medium-voltage longwall unit that converts to a high-voltage longwall unit is summarized in Table IV-1. The table identifies lost

[24](5,223 x 32.6% x 2.5 x 56 x $18.50) = $4,409,988

production savings and filed petition savings as factors that contribute to the one-time conversion process. Lost production savings refer to savings that would result from increased production due to the use of high-voltage longwall equipment instead of the use of medium-voltage longwall equipment. A one-time lost production savings per high-voltage longwall unit of approximately $4,408,988 occur whenever a medium-voltage longwall unit converts to a high-voltage longwall unit. If there are no conversions, then there would be no lost production savings. Filed petition savings refer to savings obtained from not having to file a petition since legal fees attributed to the petition filing process would be nonexistent under the proposed rule. The cost that the mine operator would have incurred under the current petition filing process would become savings. Noting that one out of seven petitions granted by MSHA in 1995 were contested and required an ALJ approval, eliminating the petition process would result in a one-time conversion savings per high-voltage longwall unit of approximately $21,214.

Annual net savings per high-voltage longwall unit under the proposed rule are summarized in Table IV-2. Section 75.821(d) provides for a reduction in time required to record hazards, from 30 minutes per week (50 weeks per year) before the proposed rule became effective to 15 minutes per week under the proposed rule. If a supervisor were to perform this task at an hourly wage of

$42, savings would approximate $525 per unit a year. Section 75.818(b)(4) which mandates testing of gloves and other personal protective equipment would result in an estimated cost increase of $90 per high-voltage unit per year. Cost increases of about $168 would be attributed to Section 75.820(d)(3), which would require the use of low-voltage gloves. Annual compliance cost per longwall unit would be $258. Annual net savings per high-voltage longwall unit based on the preceding savings and costs would approximately $267.

MSHA assumes 9 conversions during Year 1 of the proposed rule because, since 1986, an average of 9 petitions have been approved to allow mine operators to use high-voltage longwall equipment. The total number of longwall units using high-voltage in Year 1 would therefore be 65. In Year 2, the remaining 5 medium-voltage longwall units would convert to high-voltage units, making the high-voltage stock 70, the same as the total number of longwall units. Savings from lost production filed petition would be based on 5 conversions. In Year 3 and Year 4, as a result of attrition, MSHA estimates that there would be a loss of two high-voltage longwall facilities in each year and there would be zero conversion.

TABLE IV-1
ONE-TIME CONVERSION SAVINGS PER
HIGH-VOLTAGE LONGWALL UNIT

Detail	Savings/Unit
Lost Production Savings	$4,409,988
Filed Petition Savings	$21,214
Total Conversion Savings	$4,431,202

TABLE IV-2

ANNUAL NET SAVINGS PER

HIGH-VOLTAGE LONGWALL UNIT

Detail	Provisions	Dollars/Unit	Dollars/Unit
Savings:			
	Sec. 75.821(d)		$525
Cost Increases:			
	Sec. 75.818(b)(4)	$90	
	Sec. 75.820(d)(3)	$168	
Subtotal			$258
Net Savings			$267

The stock of high-voltage longwall would reduce to 68 in Year 3 and to 66 in Year 4. From Year 5 through Year 10, MSHA estimates that there would be an attrition of one high-voltage longwall unit per year until the stock reaches 60 in Year 10. Since all medium-voltage longwall units would have converted to high-voltage longwall equipment by Year 2, there would be no conversions from Year 3 onward. The one-time conversion savings per high-voltage longwall unit was estimated to be $4,431,202. Annual net savings per high-voltage longwall unit in operation was estimated to be $267.

Table IV-3 shows what the net savings of the proposed rule would be over a 10 year period, from Year 1 to Year 10. Net total savings would be $39.90 million in year 1 and $22.17 million in Year 2 and decline to $16,020 in Year 10. The present value of net total savings and annualized savings were calculated using a discount rate of 7%.[25] The annualized net savings over the 10 year period would be $8,079,267, the equivalent stream of uniform

[25]Annualized net savings (annual value) is the sum of present values divided by the sum of present value factors——or, equivalently, the sum of present values multiplied by the annualization factor. The formula for the annualization factor is

$$(i * (1+ i)^n)/((1 + i)^n - 1),$$

where i is the discount (or interest) rate and n is the duration of the sequence of costs and benefits in years. As n becomes large, the annualization factor approaches the discount rate in value.

net savings over a 10 year period.[26]

There is a difference in net savings calculated in the original PRIA and in this updated PRIA. In the updated PRIA, net savings are annualized for Year 1 through Year 10 of the proposed rule. This is a different approach which emphasizes estimating costs and savings on a per unit and per conversion basis. The updated PRIA does not add lost production savings after all longwall mines have converted to high-voltage. In the original PRIA, estimated costs and savings were calculated based on the assumption that 7 mines would convert annually to high-voltage usage. The updated PRIA assumes 9 mines would convert to high-voltage in Year 1, while the remaining 5 would convert in Year 2.

The updated PRIA incorporates the average of three years of capacity data (1994, 1995, and 1996). These data are adjusted for capacity utilization so that a more realistic estimate of medium- and high-voltage longwall production can be provided. There was a substantial increase in high-voltage longwall productivity, while medium-voltage longwall productivity declined during the same period. This resulted in a larger difference between high- and medium voltage longwall production, whereby the

[26]Annualized net savings (or annual value) refers to a uniform annual series of money for a given period of time which is equivalent in amount to the specified sequence of annual cash flows under consideration. Annual value = ($\sum$PV of cash flows) X the annualization (or capital recovery) factor, where $\sum$PV refers to the present value of the sequence of annual cash flows. (Gentry and O'Neal, 1984, p. 262).

percentage change increased from 4.1 percent in the original PRIA to 32.6 percent in this updated PRIA. However, additional data concerning the processing of high-voltage petitions for modifications have decreased the number of lost production days from 73 days (used in the original PRIA) to 56 days and the average number of granted petitions from 6 (used in the original PRIA) to 9. The reduction in the average number of days is probably due to the fact that, over time, procedures for applying for and reviewing petitions have become more efficient. Finally, the overall price of coal used in the calculations has decreased slightly from $22 in the original PRIA to $18.50 in this updated PRIA.

Lost production from having to use medium-voltage equipment rather than high-voltage equipment can be substantial for an individual company. For example, McElroy Coal Company's (McElroy) underground longwall coal mine, located in Marshall County, West Virginia, purchased longwall equipment, including high-voltage motors, to operate in its mine. Although the high-voltage longwall petition had been granted by MSHA, the West Virginia Department of Energy contested that decision. While McElroy sought relief from the United States District Court (Northern District of West Virginia) to use high voltage,[27] it

[27] McElroy Coal Company (vs.) West Virginia Department of Energy, Civil Action No. 90-130-W, February 19, 1991, p. 17.

had to use medium-voltage motors in its longwall operation. In the judge's decision, which allowed McElroy to use high voltage, the company reported a daily productivity and efficiency loss of $70,000 by using medium-voltage, instead of high voltage, in its longwall operation. In addition, the judge noted that McElroy also presented testimony that it experienced additional losses of $86,250 due to the burnout of a medium-voltage motor every three months.[28]

Conclusion

As seen in Table IV-3, the annualized net savings of $8.08 million were derived mainly from the one-time lost production savings per high-voltage longwall unit conversion. One-time productivity increases resulting from the conversion of a medium-voltage longwall unit to a high-voltage longwall unit was the major source of annualized net savings. Elimination of the petition process and associated legal fees contributed a smaller portion of the savings. Newly-converted longwall mines would benefit from increased coal productivity due to the elimination of the petition process and the increased coal production associated with high-voltage longwalls. Existing high-voltage longwall operations would not receive conversion benefits but

[28] McElroy Coal Company (vs.) West Virginia Department of Energy, Civil Action No. 90-130-W, February 19, 1991, p. 17.

would derive modest net savings due to more flexible recordkeeping requirements.

TABLE IV-3
ANNUALIZED NET SAVINGS FROM HIGH-VOLTAGE LONGWALL RULE

(1) Period	(2) # of Conversions	(3) Net Savings/ Conversion	(4) Conversion Net savings	(5) # of HV Units	(6) Net Annual Cost Savings/Unit	(7) Net Annual Cost Savings	(8) Net Total Savings	(9) PV Factor	(10) Present Value Net Total Savings
1	9	$4,431,202	$39,880,818	65	$267	$17,355	$39,898,173	0.934579	$37,288,012
2	5	$4,431,202	$22,156,010	70	$267	$18,690	$22,174,700	0.873439	$19,368,242
3	0	$4,431,202	$0	68	$267	$18,156	$18,156	0.816298	$14,821
4	0	$4,431,202	$0	66	$267	$17,622	$17,622	0.762895	$13,444
5	0	$4,431,202	$0	65	$267	$17,355	$17,355	0.712986	$12,374
6	0	$4,431,202	$0	64	$267	$17,088	$17,088	0.666342	$11,386
7	0	$4,431,202	$0	63	$267	$16,821	$16,821	0.62275	$10,475
8	0	$4,431,202	$0	62	$267	$16,554	$16,554	0.582009	$9,635
9	0	$4,431,202	$0	61	$267	$16,287	$16,287	0.543934	$8,859
10	0	$4,431,202	$0	60	$267	$16,020	$16,020	0.508349	$8,144
	Total					$171,948	$62,208,776	7.023582	$56,745,391
	Annualized Net Savings								$8,079,267

V. REGULATORY FLEXIBILITY ANALYSIS

The Regulatory Flexibility Act (RFA) requires regulatory agencies to consider a rule's impact on small entities. Under the RFA, MSHA must use the Small Business Administration's (SBA's) definition of a small entity in determining a rule's economic impact or, after consultation with the SBA Office of Advocacy, establish an alternative definition for a small entity by publishing that definition in the Federal Register for notice and comment. MSHA has not taken this formal action and, hence, is required to use the SBA definition.

For the mining industry SBA defines "small" as a mine with fewer than 500 employees. MSHA has traditionally considered small mines to be those with fewer than 20 employees. However, to ensure that the high-voltage longwall proposed rule conforms with the RFA, MSHA has analyzed the impact of the proposed rule on mines with 500 or fewer employees (as well as one those with fewer than 20 employees). MSHA has determined that the proposed rule would not impose a substantial cost increase on small mines, whether a small mine is defined as one with 500 or fewer miners or one with fewer than 20 miners. The Agency has further determined that the proposed rule would not have a significant economic impact on a substantial number of small entities engaged in the manufacture of high-voltage longwall equipment (which SBA

has defined, for this industry, as those manufacturers with 750 or fewer employees). MSHA has so certified these findings to the Small Business Administration.

Factual Basis for Certification

General approach: The Agency's analysis of impacts on "small entities" and "small mines" begins with a "screening" analysis. The screening compares the estimated compliance costs of the proposed rule for small entities in the affected sector to the estimated revenues for the sector. When estimated compliance costs for small entities in the affected sector are less than 1 percent of estimated revenues, the Agency believes it is generally appropriate to conclude that there is no significant impact on a substantial number of small entities. When estimated compliance costs approach or exceed 1 percent of revenue, it tends to indicate that further analysis may be warranted.

Derivation of costs and revenues: In the case of this proposed rule, because compliance costs would be absorbed by high-voltage longwall mines only, the Agency decided to focus its attention on the relationship between costs and revenues for high-voltage longwall mines. In determining revenue for high-voltage longwall mines, MSHA multiplied high-voltage longwall production data (in tons) for high-voltage longwall mines in specific size categories by $18.50 per ton (the average price of

coal per ton).

Results of the Screening Analysis: Table V-1 shows gross compliance costs (excluding cost savings) as a percentage of revenue for small high-voltage longwall mines using both the traditional Agency definition and SBA's definition of a small mine. The Agency compared the gross costs of the proposed rule for small mines in each sector to the revenue for that sector for both size categories analyzed.

Given that the gross compliance costs for small mines using both definitions is substantially less than 1 percent of revenue and that net costs are negative, MSHA concludes that there is no significant cost impact of the proposed rule on small entities that use high-voltage longwall units.

Other small entities potentially affected by the proposed rule are small manufacturers of high-voltage longwall equipment. These manufacturers are engaged in industrial activities represented by Standard Industrial Classification (SIC) codes 3612 (power, distribution, and specialty transformers); 3613 (switchgear and switchboard apparatus); and 3699 (electrical machinery, equipment, and supplies). For these SIC codes, SBA defines "small" as a business with 750 or fewer employees.

MSHA has identified seven active manufacturers of high-voltage longwall equipment in the United Stated. All but one of these are small entities according to SBA's definition. For the

most part, they obtain various equipment from other manufacturers and redesign, adapt, and assemble the equipment for underground coal mine use. They are required to comply with 30 CFR, Part 18 in submitting equipment design plans to MSHA for approval. Although a proposed revision of Part 18 is included along with proposed Part 75 revisions in this regulatory package, the Part 18 revision does not impose a cost impact relative to the current Part 18 requirements. In fact, the proposed Part 18 revision, by outlining more specific design and approval requirements, lessens the cost burden on the affected manufacturers by giving them advanced notice of specific design requirements and by minimizing trial and error design submissions to MSHA concerning these matters. In addition, even though these manufacturers assemble the longwall equipment, it is usually the mine operator who pays for redesigning the equipment and obtains and pays for the design approval from MSHA. Therefore, MSHA concludes that the proposed rule would not have a significant impact upon a substantial number of small manufacturers of high-voltage longwall equipment.

TABLE V-1
COMPLIANCE COSTS[a] COMPARED TO REVENUES FOR
SMALL HIGH-VOLTAGE LONGWALL MINES

Mine Size	# of Mines	Estimated Costs (dollars)	Estimated Revenues (dollars)	Estimated Costs/Mine (dollars)	Estimated Revenues/Mine (dollars)	Costs as % of Revenues
< 20	$0	$0	$0	-	$0	-
≤ **500**	48[b]	$14,448	$3,046,105,512[c]	$258	$63,460,531.50	0.0005

Source: Based on Tables II-3, II-4, II-5, IV-2, and IV-3.

[a]Compliance costs used for calculation here do not contain the cost savings arising from the proposed rule. As reported in Table IV-3, the net cost savings of the proposed rule (after compliance costs are subtracted out) are $37,288,012.15 the first year, and annualized net cost savings are $8,079,267.11.

[b]Based on 60 longwall mines in Year 1, of which 56 are high-voltage mines (93.3%), and 48 of the high-voltage mines (85.4%) are small mines.

[c]Based on average high-voltage production per mine of 3,430,299 tons, price of coal at $18.50 per ton, and 48 small mines.

VI. OTHER REGULATORY CONSIDERATIONS

Executive Order 12875 and the Unfunded Mandates Reform Act

Executive Order (E.O.) 12875, Enhancing the Intergovernmental Partnership, requires executive agencies and departments to reduce unfunded mandates on State, local, and tribal governments; to consult with these governments prior to promulgation of any unfunded mandate; and to develop a process that permits meaningful and timely input by State, local, and tribal governments in the development of regulatory proposals containing a significant unfunded mandate. E.O. 12875 also requires executive agencies and departments to increase flexibility for State, local, and tribal governments to obtain a waiver from Federal statutory or regulatory requirements.

The Unfunded Mandates Reform Act was enacted in 1995. While much of the Act is designed to assist the Congress in determining whether its actions would impose costly new mandates on State, local, and tribal governments, the Act also includes requirements to assist Federal agencies to make this same determination with respect to regulatory actions.

For purposes of the Unfunded Mandates Reform Act of 1995, as well as E. O. 12875, this proposed rule does not include any Federal mandate that may result in increased expenditures by State, local, or tribal governments in the aggregate of more than

$100 million, or increased expenditures by the private sector of more than $100 million.

Executive Order 13045: Protection of Children from Environmental Health Risks and Safety Risks

In accordance with Executive Order 13045, MSHA has evaluated the environmental, health, and safety effect of the proposed rule on children. The Agency has determined that the proposed rule would have no effect on children.

Executive Order 13084: Consultation and Coordination with Indian Tribal Government

In accordance with Executive Order 13084, MSHA certifies that the high-voltage longwall proposed rule does not impose substantial direct compliance costs on Indian tribal governments. MSHA is not aware of any Indian tribal governments which either owns or operates underground coal mines.

Executive Order 13132: Federalism

MSHA has reviewed this proposed rule in accordance with Executive Order 13132 regarding federalism and has determined that it does not have “federalism implications.” The proposal does not “have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the

various levels of government." There are no underground coal mines owned or operated by any State governments.

Executive Order 12630: Government Actions and Interference with Constitutionally Protected Property Rights

This rule is not subject to Executive Order 12630, Government Actions and Interference with Constitutionally Protected Property Rights, because it does not involve implementation of a policy with takings implications.

Executive Order 12988: Civil Justice Reform

The Agency has reviewed Executive Order 12988, Civil Justice Reform, and determined that this rulemaking would not unduly burden the Federal court system. The proposed rule has been written so as to provide a clear legal standard for affected conduct, and has been reviewed carefully to eliminate drafting errors and ambiguities.

VII. PAPERWORK REDUCTION ACT

The information collection requirements contained in this proposed rule were submitted to the Office of Management and Budget (OMB) for review under the Paperwork Reduction Act of 1995

(PRA 95) and have been approved under OMB Control Number 1219-0116.

The proposed rule contains information collection requirements for high-voltage longwall operators in §75.821(d). The paperwork compliance costs have already been calculated in part IV of this document for §75.821(d), but are repeated here to show their relationship to burden hours.

MSHA assumes in regard to §75.821(d) that it now takes a supervisor (earning $42.00 an hour) 30 minutes to record results of examinations and tests weekly, assuming 50 work weeks a year. Annual burden hours per longwall unit are 25 (0.5 hours x 50 weeks). Thus, existing annual costs per high-voltage longwall unit for recording such information are $1,050 (25 burden hours x $42 per hour). Burden hours for 65 longwall units in Year 1 would be 1625 (65 x 25) and annual paperwork costs would be $68,250 (65 x $1,050).

Under the proposed rule, MSHA estimates that the time it would take a supervisor (earning $42 an hour) to record fire, electrical shock, ignition, or operational hazards would be reduced to 15 minutes. In Year 1, assuming 50 work weeks a year, burden hours per longwall unit are 12.5 (0.25 hours x 50 weeks). Thus, annual costs per longwall unit for recording such information are $525 (12.5 burden hours x $42) and annual paperwork costs would be $34,125 (65 x $525). Burden hours for

the 65 longwall units in Year 1 would be 812.5 (65 x 12.5). This is a savings of 812.5 burden hours (1625 burden hours - 812.5 burden hours) when compared with burden hours before the proposed rule. Net burden hours savings from Year 1 to Year 10 under the proposed rule are given in Table VII-1. The first year reduction in paperwork costs for §75.821(d) would be $34,125 ($68,250 - $34,125), a net savings in paperwork costs. The net paperwork cost savings of the proposed rule from Year 1 to Year 10 are derived in Table VII-2. The present value of net paperwork cost savings and annualized net paperwork cost savings are calculated using a discount rate of 7%. This also follows the convention used in Section IV on compliance costs. The annualized net paperwork cost savings over the 10 year period would be $34,065.

TABLE VII-1
SAVINGS IN NET BURDEN HOURS RESULTING FROM HIGH-VOLTAGE LONGWALL RULE

(1) Period	(2) Burden Hours Current 75.821(d)	(3) Burden Hours Under Rule 75.821(d)	(4) Burden Hours Savings 75.821(d)	(5) Cumulative Burden Hours Savings
1	1625	812.5	812.5	812.5
2	1750	875	875	1687.5
3	1700	850	850	2537.5
4	1650	825	825	3362.5
5	1625	812.5	812.5	4175
6	1600	800	800	4975
7	1575	787.5	787.5	5762.5
8	1550	775	775	6537.5
9	1525	762.5	762.5	7300
10	1500	750	750	8050
	Total		8050	

TABLE VII-2
ANNUALIZED NET PAPERWORK COST SAVINGS FROM HIGH-VOLTAGE LONGWALL RULE

(1) Period	(2) Burden Hours Savings 75.821(d)	(3) Supervisor's Wage/hr	(4) Net Paperwork Costs 75.821(d)	(5) PV Factor	(6) Present Value Net Paperwork Cost Savings
1	812.5	$42	$34,125	0.934579439	$31,893
2	875	$42	$36,750	0.873438728	$32,099
3	850	$42	$35,700	0.816297877	$29,142
4	825	$42	$34,650	0.762895212	$26,434
5	812.5	$42	$34,125	0.712986179	$24,331
6	800	$42	$33,600	0.666342224	$22,389
7	787.5	$42	$33,075	0.622749742	$20,597
8	775	$42	$32,550	0.582009105	$18,944
9	762.5	$42	$32,025	0.543933743	$17,419
10	750	$42	$31,500	0.508349292	$16,013
	Total			7.023581541	$239,262
	Annualized Net Paperwork Savings				$34,065

VIII. REFERENCES

Blakely J. Longwalling in the United States. Coal Mining & Processing. P. 54. December 1976.

Combs T. Longwall Productivity Dips 2% from 1990 Records. Coal. P. 36. February 1993.

Docket No. M-87-300-C. United Mine Workers of America Opposition For Expedited Proceedings For Relief Pending Appeal. P. 3. May 1988.

El-Bassioni S. Safety of Operating High-Voltage Longwall Systems In Coal Mines. MSHA Coal Mine Safety Division. March 22, 1991.

Euler W. How to Keep Your Longwall Working. Coal Age. P. 72. April 1978.

Fiscor, S. The 1997 U.S. Longwall Census. Coal P. 26. February 1997.

Gentry, W. and O'Neal, T. Mine Investment Analysis, AIME, New York, p. 262. 1984.

Green P. Longwalls Inch into High Voltage. Coal Age. Pp. 42-43. December 1985.

McElroy Coal Company (vs.) West Virginia Department of Energy. John Ranson and Barton B. Lay, Jr. Memorandum Opinion. Civil Action No. 90-130-W. P. 17. February 19, 1991.

Merritt P. 1993 U.S. Longwall Census. Coal. P. 26. February 1993.

Merritt P. 1994 U.S. Longwall Census. Coal. P. 26. February 1994.

Merritt P. Longwall Aims for Bigger Slice. Coal Age. P. 58. December 1980.

Merritt P. 1996 U.S. Longwall Census. Coal P. 26. February 1996.

Merritt P. 1995 U.S. Longwall Census. Coal P. 26. February 1995.

Merritt P. As Time Changes So Do Longwalls. Coal. P. 40. February 1991.

Merritt P. Longwalls Having Their Ups and Downs. Coal. P. 26. February 1992.

Nilson D, and Reddy N. Continuous Miners vs. Longwalls. Coal Age. P. 58. March 1983.

Office of the Federal Register, Code of Federal Regulations, 30 CFR Chapter 1, Subpart A, 75.2 Definitions, p. 448. Washington, DC: July 1, 1997,

Organiscak E, et. al. Longwall Shearers Gain in Power and Efficiency. Coal. P. 46. February 1993.

Richardson R, and DuBe, M. Longwalling With 4160 Volts. Coal Mining Technology, Economics and Policy. P. 3. 1986.

Scott F. British Firm Americanizes Longwall. Coal & Mining Processing. P. 68. February 1979.

Sprouls M. Longwall Census. Coal. P. 65. February 1988. P. 33. February 1989. P. 36. February 1990.

U. S. Dept. of Energy/Energy Information Administration (EIA), DOE/EIA-0584(96). Coal Industry Annual 1996. P. 154. November 1997.

U. S. Dept. of Energy/Energy Information Administration (EIA), DOE/EIA-0584(96). Coal Industry Annual 1996. P. 10-11, P. 162. November 1997.

U. S. Dept. of Energy/EIA, Ibid., 1980, p. 58.

U. S. Dept. of Energy/EIA, Ibid., 1985, p. 116.

U. S. Dept. of Energy/EIA, Ibid., 1990.

U. S. Dept. of Energy/EIA, Ibid., 1991, p.14, p. 34.

U. S. Dept. of Energy/EIA, Ibid., 1992. P. 18, p. 35.

U. S. Dept. of Energy/EIA, Ibid., 1993, p. 18, p. 35.

U. S. Dept. of Energy/Energy Information Administration, DOE/EIA-0064(87). Coal Data: A Reference. P. 11. May 1989.

U. S. Dept. of Energy/Energy Information Administration (EIA), DOE/EIA-0118(84). Coal Production 1984. 1984.

U. S. Dept. of Energy/Energy Information Administration (EIA), DOE/EIA-TR-0588(95). Longwall Mining. pp. 10-13. March 1995.

U.S. Department of Labor, Bureau of Labor Statistics. Occupational Compensation Survey. Bulletin 2458. Washington, D.C. P. 13.

U. S. Department of Labor, Mine Safety and Health Administration. Denver Safety and Health Technological Center. Coal 1996 Size-Group Report (Final) - CM441, cycle 96/168. Unpublished data. August 1997.

U.S. Dept. of the Interior, Bureau of Mines. A Demonstration of Longwall Mining. Contract J0333949. OFR86(1)-85. November 1983.

Waitkus D. Meigs Division Shatters Coal Production Marks. Coal Courier. Volume 16-No.2. February 1992.

Western Mine Engineering, Inc. U.S. Coal Mine Salaries, Wages and Benefits. 1996 Survey Results.