Preliminary Regulatory Economic Analysis

For

Proximity Detection Systems for Continuous Mining Machines in Underground Coal Mines

Proposed Rule

(RIN 1219-AB65)

U.S. Department of Labor
Mine Safety and Health Administration
Office of Standards, Regulations, and Variances

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I. EXECUTIVE SUMMARY

INTRODUCTION

The Mine Safety and Health Administration (MSHA) is issuing a proposed rule under section 101(a) of the Federal Mine Safety and Health Act of 1977.

Miners working near place-changing continuous mining machines are exposed to significant hazards that can result in life threatening injuries and death. In this document, all references to continuous mining machines (except full-face continuous mining machines) will be noted as place-changing continuous mining machines. The proposed rule would require underground coal mine operators to install proximity detection systems (PDS) on place-changing continuous mining machines. It would also establish performance and maintenance requirements for proximity detection systems and training requirements for miners. The proposed rule would strengthen the protections for miners by greatly reducing the potential for pinning, crushing, or striking accidents.

BACKGROUND

MSHA's review of the Agency's investigation reports for all powered haulage and machinery accidents that occurred from 1984 through 2010 (27 years) indicated that a total of 30 fatalities and 220 non-fatal injuries involved pinning, crushing, or striking accidents with place-changing continuous mining machines that could have been prevented by PDS. In 2010 alone, two underground coal miners working in close proximity to place-changing continuous mining machines died from pinning, crushing, or striking accidents.

MSHA has determined that a standard for proximity detection systems is necessary to protect miners from accidents in which place-changing continuous mining machines pin, crush, or strike miners in underground coal mines. This determination is based on: (1) investigations of these accidents; (2) evaluation of proximity detection technology; and (3) a review of an evaluation by National Institute for Occupational Safety and Health (NIOSH) researchers, that immediate action is necessary to protect miners.

Proximity detection systems are needed because training and outreach initiatives alone have not prevented these accidents and the systems can provide necessary protections for miners. MSHA has introduced special initiatives to inform underground mine operators and miners about the dangers of pinning, crushing, or striking hazards. MSHA's outreach efforts included webcasts, special alerts, videos, bulletins, and inspector-to-miner instruction. Despite these efforts, pinning, crushing, or striking accidents are still occurring.

This proposed rule provides sufficient time to equip place-changing continuous mining machines with proximity detection systems. The process of equipping machines with proximity detection systems takes time to complete. MSHA provides mine operators sufficient time to equip machines and train miners.

MINING SECTORS COVERED BY THE PROPOSED RULE

The proposed rule would apply to all underground coal mines in the United States. For the 12 months ending January 2010, there were 424 underground coal mines employing

approximately 47,000 miners and contractors (excluding office workers). The U.S. underground coal sector produced an estimated 332 million tons in 2009. The average price of coal in underground mines in 2009 was $55.77 per ton. MSHA estimates that total 2009 underground coal revenue was $18.5 billion.

REQUIREMENTS OF THE PROPOSED RULE

The proposed rule would require underground coal mine operators to install proximity detection systems (PDS) on place-changing continuous mining machines. The PDS must stop the machine no closer than 3 feet from a miner and issue a warning when the machine is 5 feet and closer to a miner, unless the miner is in the on-board operator's compartment or the miner is remotely operating the machine while cutting coal or rock. The PDS must be installed on place-changing continuous mining machines according to the schedule of compliance dates summarized below. The systems shall be installed on certain machines based on the date of manufacture. MSHA considers the date of manufacture as the date identified on the machine or otherwise provided by the manufacturer.

1. Place-changing continuous mining machines manufactured after final rule publication, 3 months after publication.

2. Place-changing continuous mining machines manufactured on or before final rule publication, 18 months after publication.

BENEFITS

The proposed rule would significantly improve safety protections for underground coal miners by reducing their risk of being pinned, crushed, or struck by place-changing continuous mining machines. MSHA reviewed the Agency's investigation reports for all powered haulage and machinery accidents that occurred from 1984 through 2010 (27 years). MSHA determined that the requirements of the proposed rule would have prevented 30 fatalities (1 per year) and 220 non-fatal injuries (8 per year) during this 27-year period. This count of fatalities and injuries from pinning, crushing, or striking accidents excludes fatalities and injuries that would not have been prevented by proximity detection systems on place-changing continuous mining machines, such as when a roof or rib fall pins a miner against a machine or a machine strikes and pushes a stationary machine into a miner.

After 18 months when the requirements of the proposed rule are fully phased in, MSHA estimates that 1 fatality and 8 non-fatal injuries would be prevented each year. MSHA also estimates that approximately two percent of the non-fatal injuries would be permanent partial or total disability injuries.

To estimate the monetary values of the reductions in fatalities and non-fatal injuries, MSHA performed an analysis of the imputed value of injuries and fatalities prevented based on a willingness-to-pay approach. This approach relies on the theory of compensating wage differentials (e.g., the wage premium paid to workers to accept the risk associated with various jobs) in the labor market. MSHA is using the $8.7 million estimate for the value of a death prevented, $3.5 million for a permanent disability, and $62,000 for each other case of a non-fatal

injury. This value of a statistical life (VSL) estimate is within the range of the substantial majority of such estimates in the literature ($1 million to $10 million per statistical life), as discussed in OMB Circular A-4 (OMB, 2003).

Some pinning, crushing, or striking accidents caused permanent disability. Given the significant life-changing consequences of a permanent partial or total disability, MSHA does not believe that using the $62,000 value estimated for lost work-day injuries is appropriate and used an estimated value of $3.5 million for a permanent partial or total disability prevented.

MSHA estimates that the annual benefits from the proposed rule would be $1.6 million in the first year, increase to $10.7 million by the third year, and remain at $10.7 million every year thereafter. MSHA recognizes that monetizing the value of a statistical life is difficult and involves uncertainty and imprecision. See Chapter III of this analysis for a detailed explanation of the benefits of the proposed rule.

TECHNOLOGICAL FEASIBILITY

MSHA has concluded that meeting the standard is technologically feasible. The standard is not technology-forcing and does not involve new scientific or engineering knowledge. The technology necessary to perform the proximity detection function required by the proposed rule already exists and is commercially available for underground coal mines. Multiple mines in the United States and South Africa have equipped place-changing continuous mining machines with proximity detection systems.

Manufacturers have experience developing proximity detection systems for use on continuous mining machines. Based upon conversations with the manufacturers of the three approved proximity detection systems MSHA has determined that there is sufficient capacity in the industry to meet the timeframes in the proposed rule. By phasing in implementation of the standard over an 18-month period, the standard provides coal mine operators sufficient time to install proximity detection systems on all place-changing continuous mining machines and to train personnel in the use and care of the devices.

See Chapter IV of this analysis for the detailed evaluation of the technological feasibility of the proposed rule.

COST SUMMARY

MSHA estimates that the present value of the one-time costs of the proposed rule over the 18 month phase-in period discounted at a 7 percent rate would be $36.3 million. The yearly costs would be $4.1 million in the first year and $8.2 million every year thereafter. Chapter V provides a detailed explanation of the estimated costs of the proposed rule.

ECONOMIC FEASIBILITY

MSHA has traditionally used a revenue screening test—whether the yearly compliance costs of a regulation are less than 1 percent of revenues, or are negative (e.g., provide net cost savings)—to establish presumptively that compliance with the regulation is economically feasible for the mining industry. Based upon this test, MSHA has concluded that the requirements of the

proposed rule are economically feasible. For the purpose of this analysis MSHA analyzed the impact of the costs in the second year, as this year represents the yearly cost after all of the requirements of the proposed rule are in effect.

The yearly compliance cost beginning in the second year of the proposed rule to underground coal mine operators is $8.2 million. This represents approximately 0.04 percent of total annual revenue of $18.5 billion ($8.2 million costs / $18.5 billion revenue) for all underground coal mines. Since the estimated compliance cost is below one percent of estimated annual revenue, MSHA concludes that compliance with the provisions of the proposed rule would be economically feasible for the coal industry.

NET BENEFITS

MSHA is presenting the estimated benefits and costs of the proposed rule for informational purposes only. Under the Mine Act, MSHA is not required to use estimated net benefits as the basis for its decision.

The estimated yearly benefits exceed the estimated yearly costs in every year but the first year. In addition, MSHA anticipates several benefits from the proposed rule which were not quantified due to data limitations. For example, MSHA anticipates that the proposed rule would result in additional savings to mine operators by avoiding the production delays typically associated with mine accidents. Pinning, crushing, or striking accidents can disrupt production at a mine during the time it takes to remove the injured miners, investigate the cause of the accident, and clean up the accident site. Such delays can last for a shift or more. Factors such as lost production, damaged equipment, and other miscellaneous expenses could result in significant costs to operators; however, MSHA has not quantified these savings due to the imprecision of the data.

For a detailed explanation of the net benefits of the proposed rule see Chapter VI of this analysis.

EXECUTIVE ORDER 12866, EXECUTIVE ORDER 13563, AND THE REGULATORY FLEXIBILITY ACT

Executive Orders 13563 and 12866 direct agencies to assess all costs and benefits of available regulatory alternatives and, if regulation is necessary, to select regulatory approaches that maximize net benefits (including potential economic, environmental, public health and safety effects, distributive impacts, and equity). Executive Order 13563 emphasizes the importance of quantifying both costs and benefits, of reducing costs, of harmonizing rules, and of promoting flexibility. MSHA has fulfilled this requirement for the proposed rule and, based on its analysis, MSHA has determined that the proposed rule is a significant regulatory action because it raises novel legal and policy issues.

The Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA), requires regulatory agencies to consider a rule's economic impact on small entities. For rulemaking purposes, the Agency has traditionally defined a small mine to be one employing 1-19 employees and a large mine to be one employing 20 or more employees. However, to comply with the requirements of the SBREFA amendments to the RFA,

MSHA also uses SBA's definition for a small entity when determining a rule's economic impact. For the mining industry, SBA defines a small mine as one with 1-500 employees and a large mine as one with 501+ employees.

For the purpose of this analysis MSHA analyzed the impact of the costs in the second year, as this year represents the yearly cost of the proposed rule after all of the requirements are in effect. The estimated yearly cost of the proposed rule for underground coal mines with 1-19 employees is approximately $0.7 million beginning in the second year, which represents approximately 0.24 percent of annual revenues. MSHA estimates that some mines might experience costs somewhat higher than the average per mine in their size category while others might experience lower costs.

When applying SBA's definition of a small mine, the estimated yearly cost of the proposed rule for underground coal mines with 1-500 employees is approximately $7.5 million beginning in the second year, which represents approximately 0.06 percent of annual revenue.

In accordance with § 605 of the RFA, MSHA certifies that the proposed rule does not have a significant economic impact on a substantial number of small entities. Under the SBREFA amendments to the RFA, MSHA must include in the proposed rule a factual basis for this certification. The analysis that provides the factual basis for this certification is discussed in Chapter VII of this document. MSHA has consulted with the Small Business Administration's (SBA) Office of Advocacy and believes that the analysis provides a reasonable basis for this certification.

II. INDUSTRY PROFILE

INTRODUCTION

This chapter provides information concerning the structure and economic characteristics of the coal mining industry, including the number and type of mines and employees by type and size of mine. This data comes from the U.S. Department of Labor, Mine Safety and Health Administration, Office of Program Evaluation and Information Resources (PEIR), 2009 and 2010 data.

STRUCTURE OF THE MINING INDUSTRY

MSHA divides the mining industry into two major sectors based on commodity: (1) coal mines and (2) metal and nonmetal mines. Each sector is further divided by type of operation (e.g., underground mines or surface mines). The Agency maintains data on the number of mines and on mining employment by mine type and size. MSHA also collects data on the number of independent contractor firms and their employees. Each independent contractor is issued one MSHA contractor identification number but may work at any mine.

STRUCTURE OF THE UNDERGROUND COAL MINING INDUSTRY

The estimated value of U.S. underground coal mining for 2009 was $18.5 billion. The average open market U.S. sales price of underground coal for 2009 was $55.77 per short ton. The average open market U.S. sales price of underground coal for 2009 is from the Department of Energy (DOE), Energy Information Administration (EIA), Annual Coal Report 2009, October 2010, Table 28. In this document, all references to short tons will be noted as tons.

The 12-month average as of January 2010, indicates that there are approximately 424 active underground coal mines. The 424 active underground coal mines have 47,204 employees, excluding office workers, of which 40,334 were underground coal miners. Table II-1 presents the 424 underground coal mines, by employment size.

Table II-1: Underground Coal Mines, Miners and Contractors (Excluding Office Employees), 12-Month Average as of January 2010 By Employment Size

Mine Size	Underground Coal Mines	Underground Coal Miners	Employment at Underground Coal Mines, Excluding Office Employees
1-19 Employees	81	1,061	1,179
20-500 Employees	331	26,489	29,432
501+ Employees	12	8,737	9,708
Contractors	--	4,047	6,885
Total	424	40,334	47,204

The 12-month average as of January 2010 indicates that there are 881 active mechanized mining units (MMUs) in underground coal mines. Table II-2 presents the 881 MMUs by employment size.

Table II-2: MMUs in Underground Coal Mines
12-Month Average as of January 2010
By Employment Size

Mine Size	Non-Longwall MMUs	Longwall MMUs	Total
1-19 Employees	81	0	81
20-500 Employees	686	22	708
501+ Employees	72	20	92
Total	839	42	881

ECONOMIC CHARACTERISTICS OF THE COAL MINING INDUSTRY

MSHA classifies the U.S. coal mining sector into three major commodity groups based on North American Industry Classification System (NAICS) descriptions: bituminous, lignite, and anthracite. Bituminous operations represent approximately 97% of coal mining operations and approximately 99% of coal miners and total coal production. Anthracite operations represent approximately 2% of coal mining operations and less than 1% of coal miners and total coal production. Lignite operations represent less than 1% of coal mining operations, coal miners, and total coal production. Some publications of the U.S. Department of Energy further divide the bituminous group into bituminous coal and sub-bituminous coal.

The U.S. underground coal sector produced an estimated 332 million tons in 2009. The average price of coal in underground mines in 2009 was $55.77 per ton. Table II-4 presents the coal production and revenues for 2009.

Table II-4: Underground Coal Production in Tons and Coal Revenues in 2009

Mine Size	Coal Production (Tons)	Coal Revenue (Millions of Dollars)
1-19 Employees	5,154,740	$287
20-500 Employees	236,644,672	$13,198
500+ Employees	90,256,010	$5,034
Grand Total	332,055,422	$18,519

III. BENEFITS

INTRODUCTION

Working near place-changing continuous mining machines exposes miners to danger from pinning, crushing, or striking hazards. These hazards result from miners working near machines in the confined space of an underground mine. Working conditions in underground mines that contribute to the hazard include: 1) limited visibility; 2) limited space around mobile equipment; and 3) uneven and slippery ground conditions which may contain debris. The proposed rule would strengthen the protections for miners by reducing the likelihood of pinning, crushing, or striking accidents when miners get too close to place-changing continuous mining machines.

The proposed rule would reduce the likelihood of pinning, crushing, or striking accidents by requiring the installation of proximity detection systems (PDS) on place-changing continuous mining machines. The installation and proper operation of proximity detection systems reduces accidents in two ways. First, the PDS improves working practices at underground coal mines by warning miners when they get too close to place-changing continuous mining machines. Second, the PDS improves safety by shutting down machine movement when miners get dangerously close to place-changing continuous mining machines in underground coal mines.

MSHA reviewed the Agency's investigation reports for all powered haulage and machinery accidents that occurred during the 1984 through 2010 (27 years). MSHA's review included analyzing all powered haulage and machinery fatal accident reports and conducting a key word search in the narrative of non-fatal accidents. MSHA determined that 30 fatalities and 220 non-fatal injuries from these accidents during the last 27 years, or 1 fatality and 8 non-fatal injuries per year, would have been prevented by the requirements of the proposed rule. This count of fatalities and injuries from pinning, crushing, or striking accidents excludes fatalities and injuries that could not have been prevented by proximity detection systems on place-changing continuous mining machines, such as when a roof or rib fall pins a miner against a machine or a machine strikes and pushes a stationary machine into a miner.

FATAL ACCIDENTS

MSHA determined that the requirements of the proposed rule would have prevented 30 fatalities in underground coal mines over a 27 year period. These fatalities were related to powered haulage machinery accidents that occurred during the 1984 through 2010 period.

After 18 months when the requirements of the proposed rule are fully phased in, MSHA anticipates that on average 1 fatality (i.e., 30 fatalities over 27 years) would be prevented each year.

NON-FATAL ACCIDENTS

MSHA determined that the proposed rule would have prevented 220 non-fatal injuries related to powered haulage or machinery accidents that occurred in underground coal mines

during the 1984 through 2010 period. Non-fatal injuries range in severity, an injury could be as minor as a small bruise or as severe as a permanent physical disability. MSHA separates non-fatal injuries according to the following criteria:

- No days away from work and no days restricted activity;
- Days restricted activity only;
- Days away from work only;
- Days away from work and restricted activity; and
- Permanent partial or total disability.

Table III-1 summarizes the classification by injury type of the 220 non-fatal injuries that the proposed rule would have prevented. The data on the severity of injuries comes from mine operators' reports to MSHA. MSHA solicits comments on whether the number of fatalities, permanent disability injuries, or other non-fatal injuries from pinning, crushing, or striking accidents may be higher than what MSHA's data suggest.

Table III-1: Number of Underground Coal Mine Preventable Non-Fatal Injuries (1984-2010) by Machine Type and by Type of Injury

Machine Type	Number of Non-Fatal Injuries					
	No Days Away From Work or Restricted Activity	Days Restricted Activity	Days Away from Work	Days Away from Work and Restricted Activity	Permanent Partial or Total Disability	Total Non-Fatal Injuries
PC-CM	14	4	187	11	4	220

After 18 months when the requirements of the proposed rule are fully phased-in, MSHA anticipates that on average 8 non-fatal injuries (220 non-fatal injuries / 27 years) would be prevented each year. Based on MSHA's historical data, MSHA estimates that approximately 1.82 percent of the non-fatal injuries would be partial or total disability injuries.

TIMING OF THE BENEFITS

After 18 months when the requirements of the proposed rule are fully phased in, MSHA estimates that 1 fatality and 8 non-fatal injuries would be prevented each year. MSHA estimates that 30 percent of place-changing continuous mining machines would be equipped with PDS in the first year of the rule and the remaining 70 percent would be equipped in the second year of the rule. The full yearly benefit for this category would occur when all place-changing continuous mining machines are equipped with PDS for a full year. MSHA estimates that 15 percent of the full yearly benefit would occur in the first year of the rule, 80 percent of the full yearly benefit would occur in the second year, and 100 percent of the full yearly benefit would occur in the third and subsequent years of the rule. After 18 months when all place-changing continuous mining machines are equipped with PDS, the proposed rule would prevent 1 fatality and 8 non-fatal injuries per year from accidents involving these machines.

ESTIMATED MONETIZED VALUE OF FATALITIES AND INJURIES PREVENTED

To estimate the monetary values of the reductions in fatalities and non-fatal injuries, MSHA performed an analysis of the imputed value of injuries and fatalities prevented based on a willingness-to-pay approach. This approach relies on the theory of compensating wage differentials (e.g., the wage premium paid to workers to accept the risk associated with various jobs) in the labor market. A number of studies have shown a correlation between higher job risk and higher wages, suggesting that employees demand monetary compensation in return for incurring a greater risk of injury or fatality.

Viscusi & Aldy (2003) conducted an analysis of several studies (e.g., meta-analysis) that use a willingness-to-pay methodology to estimate the imputed value of life-saving programs. This meta-analysis found that each fatality prevented was valued at approximately $7 million and each non-fatal injury was valued at approximately $50,000 in 2000 dollars. Using the GDP Deflator (U.S. Bureau of Economic Analysis, 2010), this yields an estimate in 2009 dollars of $8.7 million for each fatality prevented and $62,000 for each non-fatal injury prevented. MSHA is using the $8.7 million estimate for the value of a fatality prevented and $62,000 for each non-fatal injury (other than permanent disability) prevented. This value of a statistical life (VSL) estimate is within the range of the substantial majority of such estimates in the literature ($1 million to $10 million per statistical life), as discussed in OMB Circular A-4 (OMB, 2003).

Some of the pinning, crushing, or striking accidents caused permanent disability. Given the significant life-changing consequences of a permanent partial or total disability, MSHA does not believe that using the value estimated for a typical non-fatal injury is appropriate. Instead, MSHA based the value of a permanent partial or total disability prevented on the work of Magat, Viscusi & Huber (1996), which estimated values for both a non-fatal lymph cancer prevented and a non-fatal nerve disease prevented. The Occupational Safety and Health Administration (OSHA) used this approach in the Final Economic Analysis (FEA) supporting its hexavalent chromium final rule, and the Environmental Protection Agency (EPA) used this approach in its Stage 2 Disinfectants and Disinfection Byproducts water rule (EPA, 2003).

Although permanent partial or total disabilities are neither non-fatal cancers nor nerve diseases, MSHA believes that they have a similar impact on the quality of life and would thus result in similar valuations. The Magat, Viscusi & Huber (1996) study estimates the value of preventing a non-fatal lymph cancer at 58.3 percent of the value of preventing a fatality. Similarly, they estimate the value of preventing a non-fatal nerve disease at 40.0 percent of the value of preventing a fatality. Of the two diseases valued in this study, MSHA believes that a disability resulting from injury more closely resembles the consequences of a nerve disease than the consequences of a non-fatal cancer. For example, loss of strength, inability to move easily, and constant pain are three main consequences of nerve disease that are similar to major consequences caused by a disability from a pinning, crushing, or striking injury. Accordingly, MSHA estimates the value of preventing a permanent disability as approximately equal to the value of preventing a nerve disease. MSHA estimates the value of a permanent partial or total disability prevented to be $3.5 million ($3.5 million = 40 percent of $8.7 million). MSHA solicits comments on its monetized value for permanent disability injuries.

Although MSHA is using the willingness-to-pay approach as the basis for monetizing the expected benefits of the proposed rule, the Agency does so with several reservations, given the methodological difficulties involved in estimating the compensating wage differentials (see Hintermann, Alberini, and Markandya, 2008). Furthermore, these estimates pooled across different industries may not capture the unique circumstances faced by coal miners. For example, some have suggested that VSL models be disaggregated to account for different levels of risk, as might occur in coal mining (see Sunstein, 2004). In addition, coal miners may have few employment options and in some cases only one local employer. These near-monopsony or monopsony labor market conditions may depress wages below those in a more competitive labor market.

MSHA recognizes that monetizing the value of a statistical life is difficult and involves uncertainty and imprecision. In the future, MSHA plans to work with other agencies to refine the approach taken in this proposed rule.

Table III-2 shows the monetized annual value of fatalities and non-fatal injuries that would be prevented by the requirements of the proposed rule after the 18-month phase-in period. MSHA developed the estimates in Table III-2 by multiplying the number of fatalities and non-fatal injuries that would be prevented by the proposed rule by the monetized value of each adverse effect ($8.7 million for a fatality, $3.5 million for a Permanent Partial or Total Disability injury, and $62,000 for other non-fatal injuries). MSHA estimates that the 8 non-fatal injuries would be further classified as follows:

- 1.82 percent would be permanent partial or total disability injuries; and
- 98.18 percent would be non-fatal injuries other than permanent disability.

MSHA developed these estimates by multiplying the number of fatalities and non-fatal injuries that would be prevented by the proposed rule by the monetized value of each adverse effect, $124,208 for a non-fatal injury (0.0182 x $3,480,000 for permanent partial or total disability + 0.9818 x $62,000 for other non-fatal injuries) and $8.7 million for a fatality.

Table III-2: Monetized Annual Value of Fatalities and Non-Fatal Injuries Prevented by the Proposed Rule (2009 Dollars) After 18 Months *

Machine Type	Benefit From Preventing Non-Fatal Injuries	Benefit From Preventing Fatalities	Total Benefit
PC-CM	$1,012,065	$9,666,667	$10,678,732

* Benefits for PC-CM are based on monetary values shown in above text and on exact computation of average injuries and fatalities per year as follows:
For PC-CM, 220/27 injuries and 30/27 fatalities per year.

MSHA estimates that the annual benefits from the proposed rule would be $1.6 million in the first year, increase to $10.7 million by the third year, and remain at $10.7 million every year thereafter. Table III-3 presents the distribution of monetized benefits by year. Note that the estimated benefits in Years 3 and thereafter from Table III-3 (when the provisions of the proposed rule are fully effective) match the total benefits shown in Table III-2.

Table III-3: Monetized Annual Value of Fatalities and Non-fatal Injuries Prevented by the Proposed Rule (2009 Dollars), By Year*

Year	Benefit From Preventing Non-Fatal Injuries	Benefit From Preventing Fatalities	Total Benefit
Year 1	$151,810	$1,450,000	$1,601,810
Year 2	$809,652	$7,733,333	$8,542,985
Years 3+	$1,012,065	$9,666,667	$10,678,732

* Benefits for each year are computed from Table III-2 as follows:
Year 1 benefit = 15% of PC-CM benefit.
Year 2 benefit = 80% of PC-CM benefit
Years 3+ benefit = PC-CM benefit

NON-QUANTIFIED BENEFITS

In addition to preventing injuries and fatalities, MSHA anticipates that the proposed rule would result in additional savings to mine operators by avoiding some of the production delays typically associated with mine accidents. Pinning, crushing, or striking accidents can disrupt production at a mine during the time it takes to remove the injured miners, investigate the cause of the accident, and clean up the accident site. Such delays can last for a shift or more. Factors such as lost production, damaged equipment, and other miscellaneous expenses could result in significant costs to operators; however, MSHA has not quantified these savings due to the imprecision of the data.

SUMMARY

After 18 months, MSHA projects that 1 fatality and 8 non-fatal injuries per year would be prevented as a result of the requirements of the proposed rule. MSHA estimates that the monetized value of the injuries prevented by the proposed rule after 18 months would be $10.7

million. MSHA calculated benefits in terms of an annual average. MSHA recognizes that the number of injuries varies from year to year, because accidents do not occur on a regular or predictable basis. Also, MSHA's monetized value for the estimated fatalities and non-fatal injuries per year prevented by the proposed rule cannot fully reflect the impact of preventing a given accident, since each accident or injury would be unique in terms of its impacts. MSHA has estimated the benefits of the proposed rule within this context. MSHA requests comments on the Agency's benefit estimates, as well as supporting data.

IV. TECHNOLOGICAL FEASIBILITY

INTRODUCTION

This chapter presents MSHA's assessment of the technological feasibility of meeting the proposed rule. Based upon the analysis presented below, MSHA has concluded that meeting the standard is technologically feasible. The standard is not technology-forcing and does not involve new scientific or engineering knowledge. As is shown below, the technology necessary to perform the proximity detection function required by the proposed rule already exists and is commercially available for underground coal mines. By phasing in implementation of the standard over an 18-month period, the standard provides coal mine operators sufficient time to obtain the necessary approvals and to install proximity detection systems on place-changing continuous mining machines.

FEASIBILITY OF PROXIMITY DETECTION TECHNOLOGY

The National Institute for Occupational Safety and Health (NIOSH) has studied proximity detection / collision warning technology since the early 1990s. In 2001, NIOSH stated:

> NIOSH has created an innovative safety device called HASARD that has the potential to not only warn workers around dangerous machine areas but can also shut down the machine should it pose a danger to the worker. The system has been installed in a very harsh production environment. In that environment the antenna and its protective cover has proven itself to be capable of surviving even when exposed to tremendous forces. HASARD has been tested and compared to other warning systems and has demonstrated its ability to provide a uniform and reliable marker in blind spots around heavy trucks. HASARD has also demonstrated that it can be applied to heavy equipment where a uniform marker and machine shutdown capability is needed to keep workers out of harm's way. NIOSH has demonstrated that HASARD is a rugged and reliable tool that can be adapted to alert workers when they approach hazardous work areas and can also provide remote machine shutdown should the worker be in imminent danger (Schiffbauer 2002).

A 2007 NIOSH report stated "that many types of proximity warning systems are effective in detecting workers, smaller vehicles, other mining equipment, and other large objects in the blind areas of surface mining equipment" (Ruff 2007). Although this report focused on the application of the technology to surface mining equipment, it also demonstrates the widespread availability of the technology and variations that are currently commercially available for and adaptable to underground mining equipment.

A 2009 NIOSH report described the considerations and criteria that should be applied when selecting an appropriate proximity warning system. "A Proximity Warning System (PWS) marker on each worker that is activated as he or she approaches a dangerous area could alert the operator and prevent potential injury or fatality." NIOSH summarized in this paper that they "…compiled a collection of knowledge that provides insight into the proper selection, application, installation, and operation of PWSs on mining equipment. The information, when properly

applied, increases the likelihood that the system will perform as desired and ultimately minimize injuries and fatalities of mine workers" (NIOSH 2009).

MSHA has experience with United States manufacturers who have developed and mine operators who have installed proximity detection systems on continuous mining machines in underground coal mines. MSHA has approved three proximity detection systems under existing regulations for permissibility in 30 CFR part 18 and at least 22 continuous mining machines equipped with proximity detection systems are operating in underground coal mines in the United States. MSHA has tested and observed proximity detection systems providing warning and shutdown activation as expected on continuous mining machines in several underground coal mines. MSHA monitors the installation and development of these systems to maintain up-to-date knowledge on the number of proximity detection systems being used and the capabilities of the various systems.

In 2002, following a series of fatal pinning, crushing, and striking accidents, MSHA decided to work with the coal mining industry to develop a proximity detection system. MSHA evaluated: (1) the Bureau of Mines' Hazardous Area Signaling and Ranging Device (HASARD) system; (2) the Nautilus, International "Buddy System"; and (3) the International Mining Technologies "Mine Mate" system. MSHA selected the Nautilus, International "Buddy System" because it could be adapted to remote controlled continuous mining machines in the least amount of time. MSHA first tested the system in July 2003. MSHA, a mine operator, a machine manufacturer, and Nautilus, International jointly developed performance criteria for field testing the system (MSHA Proximity Protection System Specification, October 4, 2004). MSHA evaluated the system for permissibility under 30 CFR 18.82 and issued an experimental permit on May 30, 2003. After several revisions, the Agency field tested the system in March 2006 and determined that it met the established performance criteria. While MSHA was testing the Nautilus system, another manufacturer developed a similar system, the Geosteering Tramguard™ System, which MSHA tested in June 2005 under an experimental permit on a remote controlled continuous mining machine. In November 2005, MSHA field tested the Geosteering Tramguard™ System in accordance with MSHA established criteria and it performed successfully.

MSHA also evaluated the use of proximity detection systems in mines in the Republic of South Africa (South Africa). MSHA staff traveled to South Africa in April 2010 to observe the performance of several proximity detection systems, including the Strata Safety Products HazardAvert™ System that was developed in the United States. MSHA observed proximity detection systems provide warning and shutdown activation as expected on these machines in several underground coal mines. One of the mines visited began testing the Strata system in 2008 and, at the time of the MSHA visit, had equipped all mobile machines on three complete underground coal mine sections with the system. The mine is using the proximity detection system on remote controlled continuous mining machines, shuttle cars, roof bolting machines, feeder breakers, and load-haul-dump machines (scoops). In addition to the Strata system, MSHA also observed the Booyco Collision Warning System (CWS) and the Becker Collision Avoidance System (CAS) operating in underground mines in South Africa. The mining operations, conditions, and machines in underground coal mines in South Africa are similar to those in underground coal mines in the United States. The South African mines that MSHA visited are

room and pillar operations with approximately 10-foot high and 22-foot wide entries. The systems used in South Africa are similar to those being used in the United States.

FEASIBILITY OF PROPOPOSED RULE TIMELINE

Three manufacturers have obtained MSHA approval for the design of a proximity detection system. The approval is issued under Title 30 Code of Federal Regulations (30 CFR) part 18 and signifies the systems will not introduce an ignition hazard when operated in potentially explosive atmospheres. The MSHA approval does not address the operational capabilities of the system. Machines addressed in this proposed rule must be approved by MSHA as permissible equipment under existing regulations in part 18 before they can be used in underground coal mines. This can be accomplished through one of three options:

1. The manufacturer can submit a new approval request or a revised approval modification program (RAMP) application to the Approval and Certification Center (A&CC) to add the system to their machine approval.
2. The mine operator can submit a field modification to the A&CC to add a proximity detection system to the machine(s) they own.
3. The mine operator can submit a district field change request to the district office to add a proximity detection system to the machine(s) they own.

To date, most proximity detection systems have been added to an approved machine through RAMP applications.

Based upon conversations with the manufacturers of the three approved proximity detection systems, MSHA has determined that there is sufficient capacity in the industry to meet the timeframes in the proposed rule. MSHA estimates that it would take the industry about 3 to 6 months to ramp up production (including obtaining the necessary component parts) to approximately 400 to 600 units per month. Production at these levels would permit proximity detection systems to be installed on 1,150 place-changing continuous mining machines in the 3 to 18 months permitted under the proposed rule.

The Agency has determined that implementing the proposed rule over an 18-month period provides an appropriate amount of time for mine operators to equip place-changing continuous mining machines manufactured after the publication of the final rule with proximity detection systems. Place-changing continuous mining machine manufacturers would likely seek MSHA approval to add proximity detection systems on their machines because mine operators are likely to request machines approved with these systems. However, mine operators can also seek MSHA approval to add a proximity detection system to a machine by requesting a field modification through the A&CC or a district field change through MSHA's district offices.

Implementing the proposed rule over an 18-month time period for place-changing continuous mining machines manufactured before the date of publication allows PDS manufacturers, mobile equipment manufacturers, and mine operators time to further adapt their operations to this technology. This time period is based on the number of place-changing continuous mining machines at underground coal mines and the time MSHA estimates that mine operators would need to equip these machines with proximity detection systems. This

compliance date allows time to adapt proximity detection systems to these machines, to obtain MSHA approval under 30 CFR part 18, and to produce and install proximity detection systems.

CONCLUSION

MSHA has concluded that meeting the standard is technologically feasible. The standard is not technology-forcing and does not involve new scientific or engineering knowledge. Furthermore, proximity detection systems that are MSHA-approved as permissible for use in underground coal mines are commercially available.

By phasing in implementation of the standard over an 18-month period, the standard provides sufficient time for the proximity detection system to be approved for use in underground coal mines and to be installed on place-changing continuous mining machines. Since the use of proximity detection systems is new in most underground coal mines, mine operators may encounter unforeseen complications when implementing these systems. Additionally, there may be other delays in the approval, production, and installation of these systems. MSHA also believes that the proposed phase-in periods for requiring proximity detection systems would allow manufacturers enough time to produce the necessary quantity of proximity detection systems, and mine operators enough time to install the PDS and train necessary personnel in the use and care of the devices.

V. COMPLIANCE COSTS

INTRODUCTION

This Chapter presents MSHA's estimate of the costs for underground coal operators to comply with the proposed rule.

MSHA estimates that the present discounted value of the one-time costs over the 18 month phase-in period of the proposed rule, using a 7 percent discount rate, would be $36.3 million. These one-time costs arise from purchasing and installing proximity detection systems (PDS) on place-changing continuous mining machines and equipping mine employees with related components. Because the one-time costs are phased in over a period of 18 months, these one-time costs do not all occur in a single year. The maximum one-time cost in any one year would be $21.8 million in the second year. Table V-1 presents both the one-time costs and the discounted one-time costs of the proposed rule. The discounted one-time costs are discounted to the first year.

Table V-1: Summary of One-time Costs of the Proposed Rule

Year	One-time Cost of Newly Phased-In PDS	Discount Factor	Discounted One-time Cost of Newly Phased-In PDS*
Year 1	$15,934,628	1.000	$15,934,628
Year 2	$21,793,850	0.935	$20,377,250
Total	$37,728,478		$36,311,878

*Discounted One-time Cost of Newly Phased-in PDS = One-time Cost of Newly Phased-In PDS x Discount Factor

The yearly costs of the proposed rule would gradually increase from $4.1 million in the first year to $8.2 million in the second year and every year thereafter. Table V-2 presents the yearly costs by year. Because the rule is phased in over an 18-month period, MSHA presents the yearly costs for the first three years:

Table V-2: Summary Over Three Years of Phased-In Annualized One-time Cost, Annual Cost, and Yearly Cost of Proposed Rule

Year	One-time Cost of Newly Phased-In PDS	Annualized One-time Cost of Newly Phased-In PDS[a]	Annual Cost of Newly Phased-In PDS	Yearly Cost of Previously Phased-In PDS	Yearly Cost[b]
Year 1	$15,934,628	$2,897,443	$1,228,635	$0	$4,126,078
Year 2	$21,793,850	$3,094,727	$972,001	$4,126,078	$8,192,806
Years 3+	$0	$0	$0	$8,192,806	$8,192,806

[a]Annualized One-time Cost of Newly Phased-In PDS is One-time Cost of Newly Phased-In PDS amortized at a 7 percent discount rate over either 5 or 10 years depending on the useful life of the one-time cost.
[b]Yearly Cost is the sum of Annualized One-time Cost of Newly Phased-In PDS, Annual Cost of Newly Phased-In PDS, and Yearly Cost of Previously Phased-In PDS.

MSHA estimates that the costs of the rule in each year would vary by year, because of the different phase-in periods. MSHA estimates the rule would cost: $17.2 million in the first year, $24 million in the second year, and $2.2 million in the third year. See Table V-3.

Table V-3: Summary Over Three Years of Phased-In One-time Cost, Annual Cost, and Total Cost Within Each Year

Year	One-time Cost of Newly Phased-In PDS	Annual Cost of All Phased-In PDS[a]	Cost Within Year[b]
Year 1	$15,934,628	$1,228,635	$17,163,263
Year 2	$21,793,850	$2,200,636	$23,994,486
Year 3	$0	$2,200,636	$2,200,636

[a]Annual Cost of All Phased-In PDS is the cumulated sum from year 1 through the indicated year of the Annual Cost of Newly Phased-In PDS shown in Table V-2.
[b]Cost Within Year is the sum of One-time Cost of Newly Phased-In PDS and Annual Cost of All Phased-In PDS.

METHODOLOGY

Discounting

MSHA estimates the following costs (or savings) for the proposed rule: (1) one-time or intermittent costs; (2) annual costs; and (3) annualized costs.

One-time costs are those that are incurred once, usually in the first year of compliance. Capital expenditures, such as equipment costs, are an example of one-time or intermittent costs. Annual costs are costs that normally occur every year. Two examples of annual costs are maintenance costs and recordkeeping costs. Annualized costs are one-time or intermittent costs that are amortized over the service life of the equipment using a specified interest (or discount) rate to produce an equivalent constant stream of costs. For this Preliminary Regulatory Economic Analysis (PREA), the Agency used a (real) discount rate of 7 percent, as recommended by the Office of Management and Budget (OMB) in Circular A-94, using the annualization formula:

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

where "a" equals the annualization factor, "i" equals the annual discount rate, and "n" equals the economic life (in years) of the non-annual recurring cost. In this document, MSHA used two annualization factors to amortize the costs over the life of an investment: 0.244 for investments with a five-year life and 0.142 for investments with a ten-year life.

The discounted costs associated with these provisions are discounted using the following formula in order to account for the time value of money:

$$d = 1 /(1 + i)^t,$$

where "d" equals the discount factor, "i" equals the annual discount rate, and "t" equals time in years. In this document, MSHA used the following discount factors to calculate the present value of future costs:

1.000 for costs that occur in the first year after publication of the final rule, and

0.935 for costs that occur in the second year after publication of the final rule.

All of the above discount factors use a 7 percent discount rate.

Yearly costs are computed as follows: Capital costs or other one-time costs are amortized over their expected life (either five years or ten years) by multiplying them by an annualization

factor (either 0.244 or 0.142) to obtain annualized one-time costs. Yearly costs are computed by adding together the annualized one-time costs and one year of annual costs.

Data on Number of Machines and Miners Affected

MSHA estimates that approximately 1,150 machines in underground coal mines would need to be equipped with a proximity detection system under § 75.1732(a) of the proposed rule. MSHA estimated the number of machines that would be equipped with PDS after analyzing MSHA's inventory lists of mobile equipment at underground coal mines. The number of machines currently in use in underground coal mines required to be equipped with a PDS is shown below:

- 1,150 place-changing continuous mining machines (116 at mines with 1-19 employees; 958 at mines with 20-500 employees; and 76 at mines with 501+ employees).

MSHA estimates that 1,913 mine employees would be trained on the proper installation and maintenance of proximity detection systems. Mine employees receiving this training by mine size are shown below:

- 162 mine employees (81 mines x 2 mine employees each) at mines with 1-19 employees;
- 1,655 mine employees (331 mines x 5 mine employees each) at mines with 20-500 employees; and,
- 96 mine employees (12 mines x 8 mine employees each) at mines with 501+ employees.

MSHA estimates that 11,683 mine employees would be issued a miner-wearable component (tag) and would be trained on the proper functioning of a PDS. Mine employees wearing these components and receiving this training are shown below by mine size:

- 567 mine employees (81 continuous mining machine mining sections x 1 production shift x 7 mine employees per section) at mines with 1-19 employees;
- 9,604 mine employees (686 continuous mining machine mining sections x 2 production shifts x 7 mine employees per section) at mines with 20-500 employees; and,
- 1,512 mine employees (72 continuous mining machine mining sections x 3 production shifts x 7 mine employees per section) at mines with 501+ employees.

MSHA estimates that machine operator new task training would be required 4,520 times for mine employees to be trained on the proper operation of a machine equipped with a PDS. Mine employees that receive machine operator new task training would also have to be trained on the proper use of the miner-wearable component and the proper functioning of a PDS, as these two training requirements cover different material. The required number of times mine employees must receive machine operator new task training is shown below by mine size:

- 232 times for mine employees (116 machines x 2 mine employees each) at mines with 1-19 employees;
- 3,832 times for mine employees (958 machines x 4 mine employees each) at mines with 20-500 employees; and,
- 456 times for mine employees (76 machines x 6 mine employees each) at mines with 501+ employees.

COMPLIANCE COSTS RELATED TO SPECIFIC PROVISIONS

PDS Requirements

PDS Miner-Wearable Component (MWC) Cost

Proposed § 75.1732(a) would require place-changing continuous mining machines to be equipped with a proximity detection system. The three MSHA-approved proximity detection systems operate using electro-magnetic technology. In all three systems, the protected individual is equipped with a miner-wearable component (MWC). Because the PDS cannot protect miners who do not wear a MWC, mine operators would have to equip miners at the working section of each continuous mining machine mining section (CM section) with a MWC regardless of the number of PDS-equipped machines in the mine. MSHA estimates that, on average, a working section at a CM section has 7 miners. MSHA estimates that the number of shifts per day is: 1 shift per day in mines with 1-19 employees; 2 shifts per day in mines with 20-500 employees; and 3 shifts per day in mines with 501+ employees.

MSHA assumes that mine operators would issue each miner his/her own MWC, similar to how cap lamps are distributed. MSHA estimates that underground coal mine operators would need to purchase the following number of MWCs:

- 567 MWCs needed in mines with 1-19 employees (81 CM sections x 1 shift per day x 7 MWCs per CM section);
- 9,604 MWCs needed in mines with 20-500 employees (686 CM sections x 2 shifts per day x 7 MWCs per CM section); and,
- 1,512 MWCs needed in mines with 501+ employees (72 CM sections x 3 shifts per day x 7 MWCs per CM section).

MSHA also anticipates that mine operators would purchase additional MWCs to replace broken or lost units and to equip other persons who enter the mine (e.g., contractors, MSHA inspectors, electricians, etc.) visiting underground working sections of a mine. The Agency assumes that these additional units would be purchased during the first year as part of the initial MWC purchase order. The additional MWCs would serve as backup or replacement units for at least 5 years. MSHA estimates that mine operators would purchase the following number of additional MWCs:

- 324 MWCs in mines with 1-19 employees (81 mines x 4 MWCs per mine);
- 3,310 MWCs in mines with 20-500 employees (331 mines x 10 MWCs per mine); and,
- 240 MWCs in mines with 501+ employees (12 mines x 20 MWCs per mine).

MSHA estimates the average cost of each MWC is $400. The service life of a miner-wearable component is expected to be 5 years and it does not require any regular maintenance other than daily charging. MSHA assumes that the MWC would be charged at de minimis cost after each shift in the same manner as cap lamps are charged.

Estimated one-time costs to purchase MWCs would be approximately $6.2 million. Costs for each mine size are shown below:

- $356,400 for mines with 1-19 employees [(567 MWCs + 324 additional MWCs) x $400 dollars per MWC];
- $5,165,600 for mines with 20-500 employees [(9,604 MWCs + 3,310 additional MWCs) x $400 dollars per MWC]; and,
- $700,800 for mines with 501+ employees [(1,512 MWCs + 240 additional MWCs) x $400 dollars per MWC].

One-time costs were amortized over 5 years by multiplying them by an annualization factor of 0.244 based on a 7 percent discount rate to arrive at an annualized cost of approximately $1.5 million for underground coal mine operators.

PDS Installation and Maintenance Training Cost

Proposed § 75.1732(b)(6) would require mine operators to install proximity detection systems that are installed and maintained by personnel trained in the installation and maintenance of the system. It is MSHA's experience that mine operators will generally arrange for PDS manufacturers to provide appropriate training to miners for PDS installation and maintenance; this cost is included in the cost of purchasing and installing PDS discussed in later sections. This installation and maintenance training would be valid for all machines upon which the PDS might be installed, therefore the training would be provided when the first PDS is installed on any machine. The only additional cost for mine operators would be the wages of mine employees attending the installation and maintenance training provided by the PDS manufacturer. Proposed § 75.1732(d)(4) would require that a record be kept of personnel trained in the installation and maintenance of proximity detection systems.

MSHA projects that:

- 2 mine employees per mine at mines with 1-19 employees would be trained in the installation and maintenance of proximity detection systems;
- 5 mine employees per mine at mines with 20-500 employees would be trained in the installation and maintenance of proximity detection systems; and,
- 8 mine employees per mine at mines with 501+ employees would be trained in the installation and maintenance of proximity detection systems.
- The mine employees receiving this training earn a regular miner hourly wage rate of $35.30 (including benefits).

In response to a Request for Information (RFI) published in the *Federal Register* on February 1, 2010 (75 FR 5009), one commenter indicated that maintenance personnel will require training to enable them to quickly interpret the diagnostics to get a machine operational if a system failure occurs. Another commenter stated that training for supervisors and troubleshooters (electricians and technicians) will take approximately 8 hours.

However, based on MSHA's experience with previous machine modifications the Agency estimates that it would take 4 hours to train a mine employee on how to install and maintain a proximity detection system. MSHA anticipates that a clerical employee, earning $26.00 per hour (including benefits), would spend 3 minutes creating a record of all personnel trained at each mine. MSHA estimates the cost of creating a record for all personnel trained to maintain and install a PDS would be $1.30 (0.05 hrs x $26.00 hourly wage) per mine.

MSHA estimates that the one-time costs of training mine employees on the installation and maintenance of proximity detection systems would be approximately $0.27 million. Costs for each mine size are shown below:

- $22,980 for mines with 1-19 employees [81 mines x 2 mine employees x 4 hrs. x $35.30 hourly wage rate (including benefits) + (81 mines x $1.30 per record)];
- $234,116 for mines with 20-500 employees [331 mines x 5 mine employees x 4 hrs. x $35.30 hourly wage rate (including benefits) + (331 mines x $1.30 per record)]; and,
- $13,571 for mines with 501+ employees [12 mines x 8 mine employees x 4 hrs. x $35.30 hourly wage rate (including benefits) + (12 mines x $1.30 per record)].

The one-time costs were amortized over 10 years by multiplying them by an annualization factor of 0.142 based on a 7 percent discount rate to arrive at annualized costs of approximately $38,435 for underground coal mine operators.

In addition to the initial training for PDS installation and maintenance, turnover of personnel would result in new miners who must be trained. Miners who are newly hired or newly assigned to PDS installation and maintenance must be trained under proposed § 75.1732(b)(6) and a record made under proposed § 75.1732(d)(4). There would be occasions when mine employees trained on the installation and maintenance of proximity detection systems would leave the job and have to be replaced.

Miners who received training provided by the manufacturer's representatives would, in most cases, be assigned by the mine operator to provide training for other miners who become newly responsible for installation and maintenance duties at the mine. Based upon a turnover rate of 6 percent, MSHA estimates that an additional 115 mine employees would have to be trained in the installation and maintenance of proximity detection systems each year. The 115 mine employees includes 10 employees in mines with 1-19 employees (162 mine employees x 0.06), 99 employees in mines with 20-500 employees (1,655 mine employees x 0.06), and 6 employees in mines with 501+ employees (96 mine employees x 0.06). MSHA anticipates that a clerical employee, earning $26.00 per hour (including benefits), would spend 1 minute (0.017 hrs) creating a record of each miner trained on the installation and maintenance of PDS. MSHA estimates the cost of creating a record for a miner trained on installing and maintaining a PDS would be $0.44 (0.017 hrs x $26.00 hourly wage) per mine.

This would result in an estimated annual cost of $16,288. Costs for each mine size are shown below:

- $1,416 for mines with 1-19 employees [(10 mine employees x 4 hrs. x $35.30 hourly wage rate (including benefits)) + (10 mine employees x $0.44 recordkeeping cost)];
- $14,022 for mines with 20-500 employees [(99 mine employees x 4 hrs. x $35.30 hourly wage rate (including benefits)) + (99 mine employees x $0.44 recordkeeping cost)]; and,
- $850 for mines with 501+ employees [(6 mine employees x 4 hrs. x $35.30 hourly wage rate (including benefits) + (6 mine employees x $0.44 recordkeeping cost)].

In the cost estimate above, MSHA did not include the wages of the trained mine employee who would be training the newly hired or newly assigned employee on the installation and

maintenance of proximity detection systems because this training would occur at the same time that the employee is installing or maintaining a proximity detection system.

PDS Miner-Wearable Component Pre-Use Check and Charging Cost

Proposed § 75.1732(c)(2) would require that each miner-wearable component (MWC) of the system be checked for proper operation at the beginning of each shift that the component is to be used. Defects must be corrected before the component is used. This provision assures that the miner is protected before getting near a machine. It is important for the miner to know that the miner-wearable component is not damaged and has sufficient power to work for the duration of the shift. MSHA estimates that the number of underground mine employees equipped with a MWC would be:

- 567 persons in mines with 1-19 employees;
- 9,604 persons in mines with 20-500 employees; and,
- 1,512 persons in mines with 501+ employees.

MSHA estimates that, on average, mine employees work 200 days. Based on MSHA's experience with other miner-wearable equipments, the Agency estimates that a mine employee would spend approximately one-half minute (0.008 hrs.) checking the miner-wearable component before it is used and then place it on a power charging station after use. MSHA anticipates that the MWC pre-use check would be conducted by a miner, earning a wage of $35.30 an hour (including benefits). MSHA anticipates that the cost of a MWC Pre-Use Check would be $0.30 (0.008 hrs x $35.30 hourly wage rate).

This would result in an estimated annual cost of $700,980. Costs for each mine size are shown below:

- $34,020 for mines with 1-19 employees (567 miners x 200 days x $0.30 per MWC pre-use check);
- $576,240 for mines with 20-500 employees (9,604 miners x 200 days x $0.30 per MWC pre-use check); and,
- $90,720 for mines with 501+ employees (1,512 miners x 200 days x $0.30 per MWC pre-use check).

Proposed § 75.1732(d)(2) would require that any defects found in the check of the MWC, including any corrective actions and date of the corrective action, must be recorded. MSHA estimates that defects would be found in 10% of the MWCs each year.

Based on the MSHA's experience with MWCs, the Agency estimates an annual cost of 20 percent of capital investment ($80) for any corrective actions (including labor and materials) needed. MSHA anticipates that mine operators would contract PDS manufacturers to perform most corrective actions, but may perform some corrective actions in-house. MSHA does not separately estimate the maintenance cost by who does the maintenance. Recording the defect, the corrective action, and the date of corrective action would require 2 minutes of a miner's time. MSHA anticipates that the cost of recording the corrective action would be $1.16 (0.033 hrs x $35.30 hourly wage rate). MSHA estimates the cost of performing and recording corrective actions for affected MWCs would be $81.16 ($80 to perform corrective action + $1.16 to record corrective action).

This would result in an estimated annual cost of $94,795. Costs for each mine size are shown below:

- $4,626 for mines with 1-19 employees (57 MWCs x $81.16 per MWC corrective action);
- $77,914 for mines with 20-500 employees (960 MWCs x $81.16 per MWC corrective action); and,
- $12,255 for mines with 501+ employees (151 MWCs x $81.16 per MWC corrective action).

PDS Training Plan Cost

Existing § 48.3 requires underground coal mine operators to have an MSHA-approved training plan. When new task training is required mine operators must revise their training plans to include each new task. This revision must include a complete list of task assignments, the titles of personnel conducting the training, the outline of training procedures used, and the evaluation procedures used to determine the effectiveness of the training. Equipping mobile machines with a proximity detection system (PDS) would require two new types of new task training: PDS Miner-Wearable Component New Task Training and PDS Machine Operator New Task Training.

MSHA anticipates that mine operators would make one revision and submission of their training plan to cover both of these new types of tasks. MSHA anticipates that revising a mine training plan would not require significant time or resources, because the Agency usually provides many publications, training modules and video tapes, as well as accident reports and compilations of accident statistics, routinely used in training courses at little or no cost to the industry. These resources are available to the mining industry and are frequently used by industry trainers whether employed by the mine operator directly, machine manufacturers or as contractors. The costs associated with this provision would be underestimated if MSHA does not provide assistance on creating a new training plan to accommodate the use of PDS.

MSHA anticipates that a mine supervisor, earning $84.70 per hour (including benefits), would spend 15 minutes (0.25 hrs.) to revise and submit a mine training plan to MSHA. MSHA estimates the cost of revising and submitting a mine's training plan to MSHA would be $23.20 [(0.25 hrs x $84.70 hourly wage rate (including benefits) + $2 to copy and submit each revised training plan].

MSHA estimates that the cost of revising and submitting training plans to include the new types of task training required as a result of this proposed rule would be approximately $9,836. Costs for each mine size are shown below:

- $1,879 for mines with 1-19 employees (81 mines x $23.20 revision cost);
- $7,679 for mines with 20-500 employees (331 mines x $23.20 revision cost); and,
- $278 for mines with 501+ employees (12 mines x $23.20 revision cost).

The costs were amortized over 10 years by multiplying them by an annualization factor of 0.142 based on a 7 percent discount rate to arrive at annualized costs of approximately $1,397 for underground coal mine operators.

PDS Miner-Wearable Component New Task Training Cost

Miners working near or using new proximity detection systems would have to engage in different and unfamiliar machine operating procedures resulting from new work positions, machine movements, and new visual or auditory signals. Existing § 48.7(a)(3) requires that mine operators provide miners with new task training each time a system is changed in a manner that could affect miner health and safety. Miners working for the first time near machines equipped with a proximity detection system would have new task and equipment training on the proper functioning of the proximity detection systems as required under existing § 48.7(a). This training should involve hands-on training during supervised non-production activities so miners can experience how the systems work and where all of the appropriate work positions around machines are located. MSHA anticipates that miners' new task training would occur at the mine section where they normally work.

It is MSHA's experience that mine operators would generally arrange for PDS manufacturers to provide appropriate task training to miners. The cost of the training provided by the proximity detection system manufacturers is included in the cost of purchasing and installing PDS discussed in later sections. The main additional cost for mine operators would be the wages of mine employees attending the new task training provided by the PDS manufacturer. Part 48 also requires that a record be kept of personnel task trained. At mines with more than one shift, MSHA anticipates that one mine supervisor per additional shift would provide this new task training to the miners of that shift. MSHA estimates that the number of shifts per day is: 1 shift per day in mines with 1-19 employees; 2 shifts per day in mines with 20-500 employees; and 3 shifts per day in mines with 501+ employees.

MSHA projects that:

- 567 mine employees at mines with 1-19 employees would be trained on the proper functioning of proximity detection systems;
- 9,604 mine employees at mines with 20-500 employees would be trained in the proper functioning of proximity detection systems; and,
- 1,512 mine employees at mines with 501+ employees would be trained in the proper functioning of proximity detection systems.
- 15% of mine employees earn a supervisor hourly wage rate of $84.70 and the remaining 85% of mine employees earn a regular miner hourly wage rate of $35.30. Both of these wage rates include benefits.

In response to the Request for Information, one commenter indicated that their PDS does not require a lot of training, but the new system specified by the West Virginia Task Force is a lot more complicated and will require more training. This commenter indicated that the PDS is very simple to use and should require only 1-2 hours of training; miners not fitted with a mine-wearable component will need to know that they will not be detected if they approach a mobile machine fitted with a PDS and will need to be trained to stay a safe distance away at all times. Another commenter indicated that miners working around a vehicle only needed normal awareness training that the mine might have for all persons going to unsafe areas.

MSHA estimates that it would take 10 minutes (0.17 hrs.) to train a mine employee on the proper functioning of a proximity detection system. MSHA's 10-minute training estimate is based on the Agency's experience with proximity detection systems. MSHA anticipates that a

clerical employee, earning $26.00 per hour (including benefits), would spend 15 seconds (0.004 hrs.) per miner recording this new task training in each miner's training record (MSHA Form 5000-23). MSHA estimates the cost of creating a record for all personnel trained on the proper functioning of a PDS would be $0.10 [0.004 hrs x $26.00 hourly wage rate (including benefits)]. MSHA estimates the cost of training for a supervisor would be $14.40 [0.17 hrs x $84.70 hourly wage rate (including benefits)] and $6.00 [0.17 hrs. x $35.30 hourly wage rate (including benefits)] for a regular miner. MSHA estimates the cost of a supervisor training regular miners would be $14.40 [0.17 hrs x $84.70 hourly wage rate (including benefits)].

MSHA estimates that the one-time costs of training mine employees on the proper functioning of proximity detection systems would be approximately $91,104. Costs for each mine size are shown below:

- $4,173 for mines with 1-19 employees [(85 supervisors x $14.40 training cost) + (482 miners x $6.00 training cost) + (567 x $0.10 recordkeeping cost)];
- $75,455 for mines with 20-500 employees [(1,441 supervisors x $14.40 training cost) + (8,163 miners x $6.00 training cost) + (9,604 x $0.10 recordkeeping cost) + (331 supervisors (1 per mine) x $14.40 training cost)]; and,
- $11,476 for mines with 501+ employees [(227 supervisors x $14.40 training cost) + (1,285 miners x $6.00 training cost) + (1,512 x $0.10 recordkeeping cost) + (24 supervisors (2 per mine) x $14.40 training cost)].

The one-time costs were amortized over 10 years by multiplying them by an annualization factor of 0.142 based on a 7 percent discount rate to arrive at annualized costs of approximately $12,937 for underground coal mine operators.

PC-CM Requirements

The proposed rule requires that all place-changing continuous mining machines be equipped with a proximity detection system. This requirement would be phased in as follows:

- Place-changing continuous mining machines manufactured after final rule publication, 3 months after publication.
- Place-changing continuous mining machines manufactured on or before final rule publication, 18 months after publication.

PC-CM costs are the costs of equipping place-changing continuous mining machines with a proximity detection system in accordance with proposed § 75.1732(a), along with all related costs. Due to differences in timing for when these machines must be equipped with PDS, MSHA estimates that 30 percent of these costs would begin in the first year of the rule and the remaining 70 percent would begin in the second year of the rule.

Many of the costs in the proposed rule rise in proportion to the number of machines equipped with a PDS. This section estimates the costs related to equipping place-changing continuous mining machines with a PDS. Installing a PDS on particular machines results in the following costs:

- Approval Process for Proximity Detection Systems on Machines
- Cost of purchasing and installing a PDS
- PDS Machine Operator New Task Training

- PDS Annual Maintenance
- PDS Pre-Shift Check
- PDS Examination At Least Every Seven Days

Approval Process for Proximity Detection Systems on Place-Changing Continuous Mining Machines

As stated earlier, three manufacturers have developed approved proximity detection systems (PDS) for use on continuous mining machines. These approvals are issued under Title 30 Code of Federal Regulations (30 CFR) part 18 and signify that the product is safe to use in underground coal mines. The MSHA approval does not address the operational capabilities of the system.

In addition to the approvals of the PDS design, place-changing continuous mining machines equipped with PDS are modified machines that must be separately approved by MSHA as permissible equipment under existing regulations in part 18 before they can be used in underground coal mines. MSHA's approval can be obtained by either the machine manufacturer or by the mine operator. Manufacturers with MSHA mining machine approvals may submit an application to MSHA's Approval and Certification Center (A&CC) to add the proximity detection system to their MSHA approval. MSHA projects that place-changing continuous mining machine manufacturers would submit applications to allow all of their new and many of their older models to be equipped with proximity detection systems. In instances where the machine manufacturer is no longer in business or chooses not to seek approval, the mine operator has the option to apply for a field modification or a district field change so that a specific machine can be equipped with a proximity detection system. A mine operator may request a field modification through the A&CC or a district field change through MSHA's district offices.

MSHA anticipates that machine manufacturers would seek approvals for most place-changing continuous mining machines that would be equipped with proximity detection systems. MSHA assumes all approval costs incurred by the machine manufacturers would be passed on to mine operators through product or installation costs. This has been MSHA's experience with the PDS that have been installed to date. MSHA's estimates of product costs for proximity detection systems are discussed later in this document.

MSHA anticipates that in some cases (e.g., the machine manufacturer is no longer in business or chooses not to seek approvals on older machines) mine operators would need to apply for a field modification or district field change in order to equip an electrical machine with a proximity detection system. MSHA anticipates that mine operators would choose to apply for a district field change because this is the more convenient and cost-effective of the two options. Mine operators would prefer to seek approval through a district field change because it allows the change to be made without sending an application letter to the A&CC, without processing a written field change report and acceptance letter, and without a visual inspection at the time of installation. However, mine operators would be required to notify MSHA's district office in writing when changes have been or would be made in accordance with 30 CFR part 18. MSHA would also perform an inspection of such changes within one month after receipt of the notification.

MSHA estimates that it would take a supervisor, earning $84.70 an hour, 21 minutes (0.35 hours) to draft a letter informing MSHA's district office when a mine would be equipping a machine/system with a PDS and mail the letter to MSHA's district office and keep one copy on file. It would also cost $0.30 to print two copies of the letter and $1.00 in postage costs. MSHA estimates that the cost to complete a district field change to allow a machine/system to be equipped with a PDS would be $31 [($84.70 hourly wage x 0.35 hrs.) + $1.30 for copying and postage].

MSHA would then perform an inspection of the changes outlined in the district field change request within one month after receipt of the request. This inspection is performed at no cost to the mine operator. MSHA estimates that a mine employee, earning $35.30 an hour (including benefits), would spend 30 minutes preparing the machine for the inspection and observing as MSHA personnel conduct the inspection. MSHA estimates that the cost of preparing and observing the inspection would be $18. In some instances, the mine operator would then be required to perform some corrective actions before MSHA approves the district field change request. MSHA estimates that corrective actions would be needed after 5 percent of the inspections. These corrective actions would be performed by a mine employee, earning $35.30 an hour (including benefits), and on average would take 30 minutes. MSHA estimates that the cost of performing corrective actions after a district field change request inspection would be $18.

The majority of the district field change requests discussed in this section would be made by small mine operators (1-19 employees). This is because small mine operators own the majority of the older machines, for which the manufacturer might not submit approvals for proximity detection systems.

Estimated Costs for Approval Process of Proximity Detection Systems on Place-Changing Continuous Mining Machines

MSHA estimates that approximately 1,150 PC-CMs in underground coal mines would need to be equipped with a proximity detection system under § 75.1732(a) of the proposed rule. All 1,150 PC-CMs are electrical machines. MSHA expects that 1,035 PC-CMs would be equipped with a PDS through PC-CM manufacturers' approvals and 115 PC-CMs would be equipped through mine operators through the use of district field changes.

MSHA anticipates it would receive 45 district field change requests (35 at mines with 1-19 employees and 10 at mines with 20-500 employees) related to equipping place-changing continuous mining machines with a proximity detection system. The estimate of district field change requests is based on the number of PC-CMs and MSHA's experience with previous approvals (e.g. – methane monitors). As noted above, MSHA estimates that the cost to complete a district field change to allow a machine/system to be equipped with a PDS would be $49 ($31 to draft a district field change request + $18 to prepare and observe the inspection). MSHA estimates that the one-time cost to complete 45 district field change requests would be $2,205; $1,715 for mines with 1-19 employees (35 requests x $49) and $490 for mines with 20-500 employees (10 requests x $49).

In addition, MSHA estimates that corrective actions would have to be performed after 5 percent of all inspections after district field change requests, a total of approximately 3 corrective actions (35 requests at mines with 1-19 employees x 5 percent + 10 requests at mines with 20-500 employees x 5 percent) resulting in a cost of $54 ($18 per corrective action x 3; $36 for mines with 1-19 employees and $18 for mines with 20-500 employees).

The one-time costs were amortized over 10 years by multiplying by an annualization factor of 0.142 based on a 7 percent discount rate to arrive at annualized cost of approximately $321 for underground coal mine operators.

Purchasing and Installing Proximity Detection Systems on Place-Changing Continuous Mining Machines

The proposed rule would require that place-changing continuous mining machines be equipped with a proximity detection system (PDS).

MSHA estimates that the cost of purchasing a PDS would be $27,000 for place-changing continuous mining machines. The costs mentioned above would include product, installation, and training costs associated with the proximity detection system. The PDS installation cost would also include prevention of interference with or from other electrical systems in the mine. These costs are estimated based on current prices of approved PDS. The costs of the miner-wearable components are estimated separately under the general requirements of the PDS.

In response to the Request for Information, one commenter indicated they were designing their PDS to be usable the entire time between rebuilds, and that survival of the electronic components appears to be the limiting factor. Another commenter indicated that the expected useful life of their PDS should be at least 10 years and that some of their radio control systems which are more than 20 years old are still used in daily operation. Another commenter indicated that they have had systems running for over 12 years. This commenter said that the useful life of a PDS depends on the requirements and maintenance budget of the user and that some systems are very simple with only one technology, while others have multiple technologies to ensure a safe working system. One commenter with PDS that have run for a year and a half expects a life of around 10 years which is “very long for electronic equipment.” Another commenter indicated a PDS should be expected to have a useful life that is as long as the life of the equipment upon which it is installed.

MSHA estimates a useful life of 10 years for all machine-mounted components of the PDS.

Estimated Costs of Purchasing and Installing Proximity Detection Systems on Place-Changing Continuous Mining Machines

As noted above, MSHA estimates that 1,150 PC-CMs would need to be equipped with a proximity detection system under the proposed rule. All 1,150 PC-CMs are electrical machines. As noted above, MSHA estimates that a proximity detection system for a place-changing continuous mining machine costs $27,000. The $27,000 cost includes the machine-mounted components of the PDS, installation of the PDS, and some of the initial training associated with the proximity detection system.

MSHA estimates that mine operators would purchase and install a proximity detection system on 1,150 place-changing continuous mining machines (116 PC-CMs at mines with 1-19 employees, 958 PC-CMs at mines with 20-500 employees and 76 PC-CMs at mines with 501+ employees). MSHA anticipates that the one-time cost to equip 1,150 place-continuous mining machines with proximity detection systems would be $31,050,000. Costs by mine size are shown below:

- $3,132,000 for mines with 1-19 employees (116 PC-CMs x $27,000);
- $25,866,000 for mines with 20-500 employees (958 PC-CMs x $27,000); and,
- $2,052,000 for mines with 501+ employees (76 PC-CMs x $27,000).

One-time costs were amortized over 10 years by multiplying by an annualization factor of 0.142 based on a 7 percent discount rate to arrive at annualized cost of approximately $4.4 million for underground coal mine operators.

PDS Machine Operator New Task Training

Existing § 48.7(a)(3) requires that mine operators provide miners with new task training each time a system is changed in a manner that could affect miner health and safety. Miners operating machines equipped with a proximity detection system would have new task and equipment training on the proper functioning of the proximity detection systems as required under existing § 48.7(a). This training should involve hands-on training during supervised non-production activities so miners can experience how the systems work and where all of the appropriate work positions around machines are located. MSHA anticipates that machine operator new task training would occur at the mine section where they normally work. Task training for the PDS miner-wearable component is discussed in a separate section.

It is MSHA's experience that mine operators would generally arrange for PDS manufacturers to provide appropriate task training to miners. The cost of the training provided by PDS manufacturers is included in the cost of purchasing and installing PDS discussed in later sections. The only additional cost for mine operators would be the wages of mine employees attending the new task training provided by the PDS manufacturer. Part 48 also requires that a record be kept of task-trained personnel.

MSHA projects that:

- 2 mine employees per PDS equipped machine in mines with 1-19 employees would be trained on the proper operation of a PDS equipped machine;
- 4 mine employees per PDS equipped machine in mines with 20-500 employees would be trained on the proper operation of a PDS equipped machine; and,
- 6 mine employees per PDS equipped machine in mines with 501+ employees would be trained on the proper operation of a PDS equipped machine.

In response to the Request for Information, one commenter indicated that operators and other miners will need training to enable them to understand what they need to do when the PDS disables the machine due to someone entering the red zone. This commenter stated that machine operators need to be trained to not rely on the PDS to provide protection for themselves or other miners; the PDS should be thought of as an Operator Training Aid and a supplement to their

observation and knowledge of what is going on around the machine and other equipment around them. Another commenter indicated that operators and helpers will need about 4-6 hours to make sure they fully understand all aspects of the system. Another commenter indicated that no specific knowledge or skill is required for an operator to safely operate equipment with a PDS; only proper training with a daily checklist before any work can start, which falls in place with what many mines currently do. Another commenter indicated that a few hours of class room instruction and approximately 1 hour of underground training for operators has proven to be adequate; the exact amount depends on the situation.

MSHA estimates that it would take 30 minutes (0.50 hrs) per machine operator to learn the additional or modified procedures on the proper operation of a PDS equipped machine. This estimate is based on the Agency's experience with PDS and previous machine additions to mobile mining machines. MSHA believes 30 minutes is sufficient to explain the operation of the proximity detection system, to explain how the miner-worn component interacts with the system, to explain how to check that the miner-wearable component is functioning properly, and to emphasize that the miner must continue to adhere to normal safe practices when working on or near mobile machines.

MSHA estimates that it would take 30 minutes (0.50 hrs.) to train a mine employee on the proper operation of a PDS equipped machine. MSHA anticipates that a clerical employee, earning $26.00 per hour (including benefits), would spend 15 seconds (0.004 hrs.) per miner recording this new task training in each miner's training record (MSHA Form 5000-23). MSHA estimates the cost of creating a record for all personnel trained to maintain and install a PDS would be $0.10 (0.004 hrs x $26.00 hourly wage). MSHA estimates the cost of training for a miner would be $18.00 (0.50 hrs. x $35.30 hourly wage rate (including benefits)).

PDS Machine Operator New Task Training Cost

MSHA anticipates that the one-time cost of PDS Machine Operator New Task Training for place-changing continuous mining machines would be $81,812. As noted above, the PDS Machine Operator New Task Training would cost $18 per machine/system operator and the recordkeeping of the training would cost $0.10. Costs by mine size are shown below:

- $4,199 [116 PC-CMs x 2 mine employees x ($18.00 training cost + $0.10 recordkeeping cost)] at mines with 1-19 employees;
- $69,359 [958 PC-CMs x 4 mine employees x ($18.00 training cost + $0.10 recordkeeping cost)] at mines with 20-500 employees; and,
- $8,254 [76 PC-CMs x 6 mine employees x ($18.00 training cost + $0.10 recordkeeping cost)] at mines with 501+ employees.

The one-time costs were amortized over 10 years by multiplying by an annualization factor of 0.142 based on a 7 percent discount rate to arrive at annualized cost of approximately $11,617 for underground coal mine operators.

PDS Annual Maintenance

MSHA's experience with proximity detection systems in South Africa and the United States suggest that the systems are durable and require no regular maintenance. However, as

these devices are deployed in the mining environment they could be damaged and replacement parts would be needed.

In response to the Request for Information, one commenter indicated that maintenance is limited to inspecting the Magnetic Field Radiator Protection Units after a roof-fall occurs to see if any serious damage has been done; their dealer has added two 2" thick steel plates to each Protection Unit to reinforce the two existing 1" thick steel plates. Another commenter indicated that maintenance of the PDS could fall in with the machine maintenance and not cause additional standing time. This commenter did not go into cost details, but did say that the running cost per annum for a PDS is probably around 5% of the capital cost depending on mining conditions and protection of the devices.

Based on the MSHA's experience with proximity detection systems the Agency estimates an annual cost of 2.5 percent of capital investment ($675) for repair costs (including labor and materials). MSHA anticipates that mine operators would provide most maintenance on-site, though some maintenance may be performed by the PDS manufacturer. MSHA does not separately estimate the maintenance cost by who does the maintenance. Also, as PDS manufacturers and mine operators gain more experience using PDS MSHA anticipates they would be able reduce maintenance repair costs. In addition to the repair costs, MSHA estimates annual costs of $120 to $630 (0.4% to 2.3 %) for PDS pre-shift checks and $177 (0.7%) for PDS examination at least every seven days. MSHA's estimate for the total annual maintenance and operating cost for a PDS would be between $972 to $1,482 (3.6% to 5.5%). These additional costs are described below.

PDS Annual Maintenance Cost

MSHA anticipates that the annual cost of replacement parts and labor to repair PDS on place-changing continuous mining machines would be $776,250. As noted above, MSHA projects an average annual cost of $675 for replacement parts and labor to repair each PDS. Costs by mine size are shown below:

- $78,300 (116 PC-CMs x $675 dollars) at mines with 1-19 employees;
- $646,650 (958 PC-CMs x $675 dollars) at mines with 20-500 employees; and,
- $51,300 (76 PC-CMs x 675) at mines with 501+ employees.

PDS Pre-Shift Check

Proposed § 75.1732(c)(1) would require that a person designated by the mine operator must check machine-mounted components of a proximity detection system to verify that components are intact and the system is functioning properly: (i) at the beginning of each shift when the machine is to be used; or (ii) immediately prior to the time the machine is to be operated when not in use at the start of a shift; or (iii) within one hour of the shift change when the shift change is accomplished without an interruption in production on a section.

Proposed § 75.1732(d)(1) would require that at the completion of the check required under proposed § 75.1732 (c)(1), the certified person specified in existing § 75.100 must certify by initials, date, and time that the check has been conducted. This certification is necessary to assure compliance with proposed § 75.1732(c)(1). This certification would in most cases be done by the same person doing the certification required under existing § 75.362(g)(2). Proposed

§ 75.1732(d)(1) would also require that any defects found as a result of this check, including corrective actions and date of corrective action, must be recorded.

In response to the Request for Information, NIOSH commented that the machine operator should have a set of procedures to briefly assess the system at the start of each shift. Another commenter indicated that the PDS should be regularly inspected for damage.

MSHA estimates that this requirement would increase the amount of time that a designated person takes on the pre-shift check of the machines by 1 minute (0.017 hrs.) for each affected machine. Included in this 1 minute is the time (approximately 10 seconds) the designated person would spend certifying by initials, date and time that the pre-shift check has been conducted. Pre-shift checks would be conducted by a designated person, earning a non-supervisory wage of $35.30 an hour (including benefits). MSHA anticipates that the cost of a PDS pre-shift check would be $0.60 (0.017 hrs x $35.30 hourly wage rate).

MSHA estimates that the number of shifts per day is: 1 shift per day in mines with 1-19 employees; 2 shifts per day in mines with 20-500 employees; and 3 shifts per day in mines with 501+ employees. MSHA estimates that, on average, the number of workdays per year is: 200 days for mines with 1-19 employees (4 days per week x 50 weeks); 300 days for mines with 20-500 employees (6 days per week x 50 weeks); and 350 days for mines with 501+ employees (7 days per week x 50 weeks). MSHA estimates that the annual cost of performing PDS pre-shift checks for a PDS equipped machine would be:

- $120 at mines with 1-19 employees (200 checks x $0.60 per check);
- $360 at mines with 20-500 employees (600 checks x $0.60 per check); and,
- $630 at mines with 501+ employees (1,050 checks x $0.60 per check).

MSHA estimates that approximately once a year, a corrective action would be needed on a PDS-equipped machine as a result of the pre-shift check. Recording and certifying this corrective action would require an additional 2 minutes (0.033 hrs.). MSHA anticipates that the cost of a PDS pre-shift corrective action would be $1.16 (0.033 hrs x $35.30 hourly wage rate).

PDS Pre-Shift Check Cost

MSHA anticipates that the annual cost of conducting PDS Pre-Shift Checks under proposed § 75.1732(c)(1) on place-changing continuous mining machines would be $406,680. As noted above, MSHA anticipates that the cost of a PDS Pre-Shift Check would be $0.60. Costs by mine size are shown below:

- $13,920 (116 PC-CMs x 200 checks x $0.60 per check) at mines with 1-19 employees;
- $344,880 (958 PC-CMs x 600 checks x $0.60 per check) at mines with 20-500 employees; and,
- $47,880 (76 PC-CMs x 1,050 checks x $0.60 per check) at mines with 501+ employees.

As a result of the pre-shift checks, MSHA estimates that, on average, one corrective action per year per PDS-equipped machine would be needed. As noted above, MSHA anticipates that the cost of recording a PDS corrective action would be $1.16. MSHA anticipates the cost of recording these corrective actions would be $1,334. Costs by mine size are shown below:

- $135 (116 PC-CMs x $1.16 per corrective action) at mines with 1-19 employees;

- $1,111 (958 PC-CMs x $1.16 per corrective action) at mines with 20-500 employees; and,
- $88 (76 PC-CMs x $1.16 per corrective action) at mines with 501+ employees.

PDS Examination At Least Every Seven Days

Proposed § 75.1732(c)(3) would require that a qualified person as provided in existing § 75.153 examine the proximity detection system in accordance with the requirements in proposed §§ 75.1732(b)(1)-(5) of this section at least every seven days. Defects in the proximity detection system must be corrected before the machine is returned to service. The examinations required by this section are more comprehensive than the checks required in proposed §§ 75.1732(c)(1) and (c)(2). MSHA anticipates that the examination of machines with a proximity detection system would be performed in conjunction with the examination requirements under existing § 75.512 Electric equipment; examination, testing and maintenance.

In response to the Request for Information, one commenter indicated that frequent calibration is unnecessary. Another commenter did weekly checks on components and monthly inspections on flameproof equipment to find possible friction or damage and to perform reliability centered maintenance; critical checks performed on a weekly basis included zone size checks, system communication checks, and warning checks; these tests of the basic functionality of the system take about 15 minutes to perform on each machine; the data gathered is signed off by the person doing the checks and filed for reference.

MSHA estimates that the time needed for a qualified person to conduct the examination of PDS at least every seven days would be approximately 5 minutes (0.083 hrs.) per machine. The examination is expected to consist of checks for proper operation and a check of machine-mounted components to verify no damage has been incurred. The check for proper operation would consist of ensuring the warning signal activates and machine movement is stopped when the appropriate settings are breached.

Proposed § 75.1732(d)(3) would require that at the completion of the examination required under proposed § 75.1732(c)(3), the qualified person conducting the examination must record and certify by signature and date that the examination has been conducted. Any unsafe conditions observed, and any corrections made during the examination, must be recorded. MSHA estimates that a qualified person would spend approximately 1 minute (0.017 hrs.) recording and certifying that the examination occurred.

These examinations would be conducted by a qualified person, earning a non-supervisory wage of $35.30 an hour (including benefits). MSHA estimates the cost of this examination plus recording and certifying would be $3.53 [0.10 hrs (6 minutes) per exam x $35.30 hourly wage rate]. MSHA estimates that the annual cost of performing the examinations at least every seven days for a PDS equipped machine would be $177 per machine (50 weeks x $3.53 per exam)

Proposed § 75.1732(d)(3) would also require that any defects found as a result of this examination, including corrective actions and date of corrective action, must be recorded. MSHA estimates that approximately once a year, a corrective action would be needed on a PDS-equipped machine as a result of the examination every seven days. Recording and certifying this corrective

action would require an additional 2 minutes (0.033 hrs.). MSHA anticipates that the cost of a PDS corrective action would be $1.16 (0.033 hrs x $35.30 hourly wage rate).

Cost of PDS Examination At Least Every Seven Days

MSHA anticipates that the annual cost of conducting PDS examinations on place-changing continuous mining machines in order to comply with the requirements of proposed § 75.1732(c)(3) would be $202,975. As noted above, MSHA estimates the cost of this examination would be $3.53. Costs by mine size are shown below:

- $20,474 (116 PC-CMs x 50 weeks x $3.53 per exam) at mines with 1-19 employees;
- $169,087 (958 PC-CMs x 50 weeks x $3.53 per exam) at mines with 20-500 employees; and
- $13,414 (76 PC-CMs x 50 weeks x $3.53 per exam) at mines with 501+ employees.

As a result of the examinations every seven days, MSHA estimates that, on average, one corrective action per year per PDS-equipped machine would be needed. As noted above, MSHA anticipates that the cost of recording a PDS corrective action would be $1.16. MSHA anticipates the cost of recording these corrective actions would be $1,334. Costs by mine size are shown below:

- $135 (116 PC-CMs x $1.16 per corrective action) at mines with 1-19 employees;
- $1,111 (958 PC-CMs x $1.16 per corrective action) at mines with 20-500 employees; and,
- $88 (76 PC-CMs x $1.16 per corrective action) at mines with 501+ employees.

Summary of Proposed Rule Costs

MSHA estimates the total cost of the proposed rule would be $37.7 million in one-time cost and $2.2 million in annual cost. Table V-4 summarizes the details of the cost estimate, including subtotals for both the PDS costs and the PC-CM costs. As noted above, 100 percent of the PDS costs and 30 percent of PC-CM costs are included in year 1 and 70 percent of the PC-CM costs are included in year 2 of the costs for newly phased-in PDS shown in Tables V-1 and V-2.

Table V-4: Summary of the Costs of the Proposed Rule

Provision	One-time Cost	Annualized One-time Cost	Annual Cost	Yearly Cost*
MWC Cost	$6,222,800	$1,518,363	$0	$1,518,363
PDS Installation & Maintenance Training Cost	$270,667	$38,435	$16,288	$54,723
MWC Pre-Use Check and Charging Cost	$0	$0	$795,775	$795,775
PDS Training Plan Cost	$9,836	$1,397	$0	$1,397
PDS New Task Training Cost	$91,104	$12,937	$0	$12,937
Subtotal, PDS Costs	**$6,594,407**	**$1,571,132**	**$812,063**	**$2,383,195**
PDS Approval Cost	$2,259	$321	$0	$321
PDS Cost	$31,050,000	$4,409,100	$0	$4,409,100
PDS Machine Operator New Task Training Cost	$81,812	$11,617	$0	$11,617
PDS Annual Maintenance Cost	$0	$0	$776,250	$776,250

PDS Pre-Shift Exam Cost	$0	$0	$408,014	$408,014
PDS Weekly Test & Examination Cost	$0	$0	$204,309	$204,309
Subtotal, PC-CM Costs	**$31,134,071**	**$4,421,038**	**$1,388,573**	**$5,809,611**
Total Costs of Rule	**$37,728,478**	**$5,992,170**	**$2,200,636**	**$8,192,806**

*Yearly Cost = Annualized One-time Cost + Annual Cost

ECONOMIC FEASIBILITY

MSHA has traditionally used a revenue screening test—whether the yearly compliance costs of a regulation are less than 1 percent of revenues, or are negative (e.g., provide net cost savings)—to establish presumptively that compliance with the regulation is economically feasible for the mining industry. Based upon this test, MSHA has concluded that the requirements of the proposed rule are economically feasible. For the purpose of this analysis MSHA analyzed the impact of the costs in the second year, as this year represents the yearly cost after all of the requirements of the proposed rule are in effect.

The yearly compliance cost beginning in the second year of the proposed rule to underground coal mine operators is $8.2 million. This represents approximately 0.04 percent of total annual revenue of $18.5 billion ($8.2 million costs / $18.5 billion revenue) for all underground coal mines. Since the estimated compliance cost is below one percent of estimated annual revenue, MSHA concludes that compliance with the provisions of the proposed rule would be economically feasible for the coal industry.

VI. SUMMARY OF ESTIMATED BENEFITS AND COSTS

This section presents a summary of estimated benefits and costs of the proposed rule for informational purposes only. Under the Mine Act, MSHA is not required to use estimated net benefits as the basis for its decision. The estimated yearly costs would exceed the estimated yearly benefits in the first year, but in the second and subsequent years the expected benefits would exceed the expected cost. However, MSHA does not believe that this presents a complete indication of the net benefits of the proposed rule. See Table VI-1.

The Agency anticipates several benefits from the proposed rule which were not quantified due to data limitations. For example, MSHA anticipates that the proposed rule would result in additional savings to mine operators by avoiding the production delays typically associated with mine accidents. Pinning, crushing, or striking accidents can disrupt production at a mine during the time it takes to remove the injured miners, investigate the cause of the accident, and clean up the accident site. Such delays can last for a shift or more. Factors such as lost wages, lost production, damaged equipment, and other miscellaneous expenses could result in significant costs to operators; however, MSHA has not quantified these savings due to the imprecision of the data.

Table VI-1: Cumulated Benefits, Costs, and Net Benefits (Net Costs) By Year (2009 Dollars)

Year	Yearly Benefits	Yearly Costs	Net Benefits (Net Costs)
Year 1	$1,601,810	$4,126,078	($2,524,269)
Year 2	$8,542,985	$8,192,806	$350,179
Years 3+	$10,678,732	$8,192,806	$2,485,926

VII. REGULATORY FLEXIBILITY CERTIFICATION

INTRODUCTION

Under the Regulatory Flexibility Act (RFA) of 1980, as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA), MSHA has analyzed the impact of the proposed rule on small entities. Based on that analysis, MSHA certifies that the proposed rule would not have a significant economic impact on a substantial number of small entities. The factual basis for this certification is presented below.

DEFINITION OF A SMALL MINE

Under the RFA, in analyzing the impact of a rule on small entities, MSHA must use the Small Business Administration's (SBA's) definition for a small entity or, after consultation with the SBA Office of Advocacy, establish an alternative definition for the mining industry by publishing that definition in the Federal Register for notice and comment. Because the Agency has not established an alternative definition, MSHA is required to use SBA's definition. The SBA defines a small entity in the mining industry as an establishment with 500 or fewer employees.

MSHA has also examined the impact of the proposed rule on mines with fewer than 20 employees, which MSHA and the mining community have traditionally referred to as "small mines." These small mines differ from larger mines not only in the number of employees, but also in economies of scale in material produced, in the type and amount of production equipment, and in supply inventory. Therefore, their costs of complying with MSHA's rules and the impact of the Agency's rules on them would also tend to be different. This analysis complies with the requirements of the RFA for an analysis of the impact on "small entities" while continuing MSHA's traditional definition of "small mines."

FACTUAL BASIS FOR CERTIFICATION

General Approach

MSHA's analysis of the economic impact on small entities begins with a "screening" analysis. The screening analysis compares the estimated yearly cost of the proposed rule for small entities to their estimated annual revenue. When the estimated cost is less than one percent of the estimated revenue for small entities, MSHA believes it is generally appropriate to conclude that the proposed rule would not have a significant economic impact on a substantial number of small entities. If the estimated cost is equal to or exceeds one percent of revenue, MSHA would investigate whether further analysis is required.

Derivation of Costs and Revenues for Mines

The compliance costs noted in this chapter were previously presented in Chapter V of this document along with an explanation of how they were derived and the cost impact on mines, by size. Revenue for underground coal mines is derived from data on coal prices and tonnage. The average open market U.S. sales price of underground coal for 2009 was $55.77 per ton. The average open market U.S. sales price of underground coal for 2009 is from the Department of

Energy (DOE), Energy Information Administration (EIA), *Annual Coal Report 2009*, October 2010, Table 28.

For mines with 1-19 employees, 2009 underground coal revenue was $287 million (5.2 million tons x $55.77 per ton). For mines with 1-500 employees, 2009 underground coal revenue was $13.5 billion (242 million tons x $55.77 per ton). Total 2009 underground coal revenue was $18.5 billion.

Screening Analysis for Underground Coal Mines

For the purpose of this analysis MSHA analyzed the impact of the costs in the fourth year, as this year represents the yearly cost of the proposed rule after all of the requirements are in effect. The estimated yearly cost of the proposed rule for underground coal mines with 1-19 employees is approximately $0.7 million beginning in the second year, which represents approximately 0.24 percent of annual revenues.

When applying SBA's definition of a small mine, the estimated yearly cost of the proposed rule for underground coal mines with 1-500 employees is approximately $7.5 million beginning in the second year, which represents approximately 0.06 percent of annual revenue.

Table VII-1 below shows MSHA's estimate of the cost of the proposed rule compared to mine revenue, by mine size. The Agency has provided in Chapter V of the PREA a discussion of the costs of the proposed rule for each size category of mines. MSHA estimates that some mines might experience costs somewhat higher than the average per mine in their size category while others might experience lower costs.

Table VII-1: Cost of Proposed Rule Compared to Mine Revenues, by Mine Size for Underground Coal Mines (Undiscounted)

Mine Size	No. of Mines	Yearly Cost of Proposed Rule (in Millions)	Revenues (in Millions)	Estimated Cost per Mine	Cost of Proposed Rule as Percent of Revenues
1-19	81	$0.7	$287	$8,515	0.24%
1-500	412	$7.5	$13,485	$18,226	0.06%
All Mines	424	$8.2	$18,519	$19,323	0.04%

Based on this analysis, MSHA has determined that the proposed rule would not have a significant economic impact on a substantial number of small underground coal mine operators with 500 or fewer employees.

VIII. OTHER REGULATORY CONSIDERATIONS

THE UNFUNDED MANDATES REFORM ACT

MSHA has reviewed the proposed rule under the Unfunded Mandates Reform Act of 1995 (2 U.S.C. § 1501 et seq.). MSHA has determined that this proposed rule does not include any federal mandate that may result in increased expenditures by State, local, or tribal governments; nor would it increase private sector expenditures by more than $100 million in any one year or significantly or uniquely affect small governments. Accordingly, the Unfunded Mandates Reform Act of 1995 requires no further Agency action or analysis.

MSHA estimates that the costs of the rule would vary by year, because of the different phase-in periods. MSHA estimates the rule would cost approximately: $17.2 million in the first year, $24 million in the second year, and $2.2 million in each subsequent year. Since the proposed rule does not cost over $100 million in any one year, the proposed rule is not a major rule under the Unfunded Mandates Reform Act of 1995.

THE TREASURY AND GENERAL GOVERNMENT APPROPRIATIONS ACT OF 1999: ASSESSMENT OF FEDERAL REGULATIONS AND POLICIES ON FAMILIES

Section 654 of the Treasury and General Government Appropriations Act of 1999 (5 U.S.C. § 601) requires agencies to assess the impact of Agency action on family well-being. MSHA has determined that the proposed rule would have no effect on family stability or safety, marital commitment, parental rights and authority, or income or poverty of families and children. Accordingly, MSHA certifies that the proposed rule would not impact family well-being.

EXECUTIVE ORDER 12630: GOVERNMENT ACTIONS AND INTERFERENCE WITH CONSTITUTIONALLY PROTECTED PROPERTY RIGHTS

This proposed rule does not implement a policy with takings implications. Accordingly, under E.O. 12630, no further Agency action or analysis is required.

EXECUTIVE ORDER 12988: CIVIL JUSTICE REFORM

The proposed rule was written to provide a clear legal standard for affected conduct and was carefully reviewed to eliminate drafting errors and ambiguities, so as to minimize litigation and undue burden on the Federal court system. Accordingly, the proposed rule would meet the applicable standards provided in § 3 of E.O. 12988, Civil Justice Reform.

EXECUTIVE ORDER 13045: PROTECTION OF CHILDREN FROM ENVIRONMENTAL HEALTH RISKS AND SAFETY RISKS

The proposed rule would have no adverse impact on children. Accordingly, under E.O. 13045, no further Agency action or analysis is required.

EXECUTIVE ORDER 13132: FEDERALISM

The proposed rule does not have “federalism implications” because it would 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." Accordingly, under E.O. 13132, no further Agency action or analysis is required.

EXECUTIVE ORDER 13175: CONSULTATION AND COORDINATION WITH INDIAN TRIBAL GOVERNMENTS

The proposed rule does not have "tribal implications" because it would not "have substantial direct effects on one or more Indian tribes, on the relationship between the Federal government and Indian tribes, or on the distribution of power and responsibilities between the Federal government and Indian tribes." Accordingly, under E.O. 13175, no further Agency action or analysis is required.

EXECUTIVE ORDER 13211: ACTIONS CONCERNING REGULATIONS THAT SIGNIFICANTLY AFFECT ENERGY SUPPLY, DISTRIBUTION, OR USE

Executive Order 13211 requires agencies to publish a statement of energy effects when a rule has a significant energy action that adversely affects energy supply, distribution or use. The proposed rule has been reviewed for its impact on the supply, distribution, and use of energy because it applies to the coal mining industry. Insofar as the proposed rule would result in yearly compliance costs of $8.2 million for the underground coal industry relative to annual revenues of $18.5 billion in 2009, it is not a "significant energy action" because it is not "likely to have a significant adverse effect on the supply, distribution, or use of energy… (including a shortfall in supply, price increases, and increased use of foreign supplies)." Accordingly, Executive Order 13211 requires no further Agency action or analysis.

EXECUTIVE ORDER 13272: PROPER CONSIDERATION OF SMALL ENTITIES IN AGENCY RULEMAKING

MSHA has thoroughly reviewed the proposed rule to assess and take appropriate account of its potential impact on small businesses, small governmental jurisdictions, and small organizations. MSHA has determined and certified that the proposed rule does not have a significant economic impact on a substantial number of small entities.

IX. PAPERWORK REDUCTION ACT OF 1995

INTRODUCTION

This section shows the estimated paperwork burden hours and related burden costs to underground mine operators, PDS manufacturers, and mobile machine manufacturers under the proposed rule. The burden hour and cost estimates presented in this chapter are based upon the detailed analysis presented in Chapter V and some additional analysis in this chapter. A significant difference between the estimates presented in Chapter V and those presented is this section is that separate estimates are presented for each of the first 3 years of the proposed rule in Chapter V, while this section presents the burden hours and costs averaged over the first 3 years.

SUMMARY OF PAPERWORK BURDEN HOURS AND RELATED COSTS

Table IX-1 shows that, in the first three years the proposed rule is in effect, the mining community would incur 2,582 annual burden hours with related costs of approximately $99,460.

Table IX-1: Summary of Annual Burden Hours and Costs for Years 1 through 3

Provision	Burden Hours	Burden Cost
§ 75.1732(a)	170	$14,400
§ 75.1732(d)(1)	1,586	$55,986
§ 75.1732(d)(2)	39	$1,377
§ 75.1732(d)(3)	778	$27,463
§ 75.1732(d)(4)	9	$234
Total	2,582	$99,460

DESCRIPTION OF PAPERWORK PROVISIONS

A. Proposed § 75.1732(a)

Proposed § 75.1732(a) would require underground coal mine operators to equip place-changing continuous mining machines with a proximity detections system.

First, the proximity detection systems need to be approved under 30 CFR part 18. This MSHA approval signifies that the product is safe to use in a potentially gassy or dusty environment; this approval does not address the operational capabilities of the system. Second, place-changing continuous mining machines would be required to have MSHA approval to add the proximity detection systems to the machines. This can be accomplished through one of several options:

1. The machine manufacturer can submit a new approval request or a revised approval modification program (RAMP) application to add the system to their machine approval.

2. The mine operator can submit a field modification to the Approval and Certification Center to add a proximity detection system to the machine(s) they own.
3. The mine operator can submit a district field change request to the district office to add a proximity detection system to the machine(s) they own.

The different burdens for the options discussed above are explained below.

PDS Manufacturers' Approval Burden

PDS manufacturers would seek to have their PDS approved as permissible equipment under 30 CFR part 18.

MSHA estimates that it would take a company engineer, earning $84.70 an hour (including benefits), 65 hours to draft an acceptance application to the Approval and Certification Center (A&CC). MSHA's estimates of burden hours and related burden costs to PDS manufacturers are presented below.

Yearly Average for Years 1 through 3

Responses

- Total responses= 1 acceptance application (1 application in year one, 1 application in year two, and 1 applications in year three).

Burden Hours

1 application x 65 hrs to draft the application = 65 hrs.

Burden Costs

- 65 hrs. x $84.70 wage rate = $5,506.

Machine Manufacturers' Approval Burden for Equipping PDS on Electric Machines

In order for a mine operator to use a proximity detection system on a place-changing continuous mining machines taken into or used inby the last open crosscut of an entry or room of any coal mine, MSHA must approve the system on the machine under 30 CFR part 18. MSHA anticipates that machine manufacturers would submit applications to allow all of their new and many of their older models to be equipped with proximity detection systems by applying to the A&CC via a RAMP request to add one or more proximity detection systems to their approval.

MSHA estimates that it would take a company engineer, earning $84.70 an hour (including benefits), 20 hours to complete a RAMP request and submit it to the A&CC. MSHA's estimates of the burden hours and related burden costs to machine manufacturers are presented below.

Yearly Average for Years 1 through 3

Responses

- Total responses= 5 RAMP requests (10 requests in year one, 2 requests in year two, and 2 requests in year three).
- Burden Hours
- 5 RAMP requests x 20 hrs to complete the RAMP request = 100 hrs.

Burden Costs

- 100 hrs. x $84.70 wage rate = $8,470.

Mine Operators' PDS Approval Burden for Equipping Electric Machines with PDS

Machines equipped with proximity detection systems (PDS) must be approved by MSHA as permissible equipment. MSHA's approval can be obtained by either the machine manufacturer or the mine operator. MSHA anticipates that machine manufacturers would submit applications to allow all of their new and many of their older models to be equipped with proximity detection systems. In instances where the machine manufacturer is no longer in business or chooses not to seek approval, the mine operator has the option to apply for a field modification or a district field change to allow a specific electric machine to be equipped with a proximity detection system.

In these cases, MSHA anticipates that mine operators would apply for a district field change in order to equip electrical machines with a proximity detection system. MSHA anticipates that mine operators would choose to apply for a district field change because this is the more convenient and cost effective of the two options. Mine operators would be required to notify MSHA's district office in writing when changes have been or would be made in accordance with 30 CFR part 18. A copy of all notifications shall be maintained in the appropriate mine file

MSHA estimates that it would take a supervisor, earning $84.70 an hour, 21 minutes (0.35 hours) to draft a letter informing MSHA's district office when a mine would be equipping a machine/system with a PDS and mail the letter to MSHA's district office and keep one copy on file.

Yearly Average for Years 1 through 3

Responses

- Total responses= 15 district field change requests (no requests in year one, 45 requests in year two, and no requests in year three).

Burden Hours

- 15 requests x 0.35 hrs to draft the request = 5 hrs.

Burden Costs

- 5 hrs x $84.70 wage rate = $424.

PDS Training Plan Burden

Existing § 48.3 requires underground coal mine operators to have an MSHA approved training plan. When new task training is required mine operators must revise their training plan to include each new task. This revision must include a complete list of task assignments, the titles of personnel conducting the training, the outline of training procedures used, and the evaluation procedures used to determine the effectiveness of the training. Equipping mobile machines with a proximity detection system (PDS) would require two types of new task training: PDS Miner-Wearable Component New Task Training and PDS Machine Operator New Task Training.

MSHA anticipates that mine operators would make one revision and submission of their training plan that covers both types of new task training mentioned above. MSHA anticipates that revising a mine training plan would not require significant time or resources, because the Agency usually provides many publications, training modules, video tapes, accident reports, and compilations of accident statistics that are routinely used in training courses at little or no cost to the industry. These resources are available to the mining industry and are frequently used by industry trainers, who may be employed by the mine operator directly, by machine manufacturers, or as contractors.

MSHA does not include the estimated burden hours and cost of this provision because this burden is already counted under OMB Control No. 1219-0009.

PDS Miner-Wearable Component New Task Training Burden

The proposed rule would require that mine employees receive new task training in relation to machines being equipped with a proximity detection system. This task training is required by existing § 48.7(a)(3). Existing § 48.9 requires that upon a miner's completion of each MSHA-approved training program, the operator shall record and certify on MSHA form 5000-23 that the miner has received the specified training. MSHA does not include the estimated burden hours and cost of this provision because this burden is already counted under OMB Control No. 1219-0009.

PDS Machine Operator New Task Training Burden

The proposed rule would require that machine/system operators receive new task training in relation to machines being equipped with a proximity detection system. This task training is required by existing § 48.7(a)(3). Existing § 48.9 requires that upon a miner's completion of each MSHA-approved training program, the operator shall record and certify on MSHA form 5000-23 that the miner has received the specified training. MSHA does not include the estimated burden hours and cost of this provision because this burden is already counted under OMB Control No. 1219-0009.

B. Proposed § 75.1732(d)(1)

PDS Pre-Shift Check Burden

Proposed § 75.1732(d)(1) would require that at the completion of the check required under proposed § 75.1732 (c)(1), the certified person specified in existing § 75.100 must certify by initials, date, and time that the check has been conducted. MSHA estimates that it takes a certified person earning $35.30 an hour (including benefits) 0.003 hours (10 seconds) to certify by initials, date, and time that the check has been conducted. Proposed § 75.1732(d)(1) would also require that any defects found as a result of this check, including corrective actions and date of corrective action, must be recorded. MSHA estimates that once a year, a corrective action would be needed. Recording and certifying this corrective action would require an additional 2 minutes (0.033 hrs.).

MSHA estimates the number of checks per machine per year is: 200 checks at mines with 1-19 employees (200 workdays x 1 shift per workday); 600 checks at mines with 20-500

employees (300 workdays x 2 shifts per workday); and 1,050 checks at mines with 501+ employees (350 workdays x 3 shifts per workday).

MSHA's estimates of the annual burden hours and related burden costs to underground coal operators are presented below.

Yearly Average for Years 1 through 3

PDS Equipped Machines

- 89 PDS equipped machines at mines with 1-19 employees (35 machines in year one, 116 machines in year two, and 116 machines in year three).
- 734 PDS equipped machines at mines with 20-500 employees (287 machines in year one, 958 machines in year two, and 958 machines in year three).
- 58 PDS equipped machines at mines with 501+ employees (23 machines in year one, 76 machines in year two, and 76 machines in year three).
- 881 total PDS equipped machines.

Responses

- 17,800 checks (89 PDS equipped machines x 200 checks).
- 440,400 checks (734 PDS equipped machines x 600 checks).
- 60,900 checks (58 PDS equipped machines x 1,050 checks).
- 881 corrective actions (881 PDS equipped machines x 1 corrective action)

Total responses= 519,981.

Burden Hours

- 519,100 checks x 0.003 hrs per check = 1,557 hrs.
- 881 corrective actions x 0.033 hrs per corrective action = 29 hrs.
- Total burden hours= 1,586 hrs.

Burden Costs

- 1,586 hrs. x $35.30 hourly wage rate = $55,986.

C. Proposed § 75.1732(d)(2)

Burden for Recording Corrective Actions on Miner-Wearable Components of PDS

Proposed § 75.1732(d)(2) would require recording of defects found as a result of the check in proposed § 75.1732(c)(3) of the miner-wearable component. These defects, including corrective actions and date of corrective action, must be recorded. Recording and certifying this corrective action would require 2 minutes (0.033 hrs.) of a miner's time at a non-supervisory wage of $35.30 an hour (including benefits). MSHA estimates that 11,683 miner-wearable components would be in use and that 10% (1,168) of these components would require a corrective action each year.

MSHA's estimates of the annual burden hours and costs to underground coal operators are presented below.

Miner Wearable Components

- 11,683 miner-wearable components.

Responses

- 1,168 records of corrective actions (11,683 components x 10%).

Burden Hours

- 1,168 corrective actions x 0.033 hrs per corrective action = 39 hrs.

Burden Costs

- 39 hrs. x $35.30 hourly wage rate = $1,377.

D. Proposed § 75.1732(d)(3)

Burden for PDS Examination At Least Every Seven Days

Proposed § 75.1732(d)(3) would require that at the completion of the examination required under proposed § 75.1732(c)(3), the qualified person conducting the examination must record and certify by signature and date that the examination has been conducted. Defects, including corrective actions and date of corrective action, must be recorded. MSHA estimates that a qualified person would spend approximately 1 minute (0.017 hrs.) recording and certifying that the examination occurred. MSHA estimates that once a year, a corrective action would be needed. Recording and certifying this corrective action would require an additional 2 minutes (0.033 hrs.) The examination would be conducted by a qualified person, earning a non-supervisory wage of $35.30 an hour (including benefits).

MSHA's estimates of the annual burden hours and costs to underground coal operators are presented below.

Yearly Average for Years 1 through 3

PDS Equipped Machines

- 881 PDS equipped machines (345 machines in year one, 1,150 machines in year two, and 1,150 machines in year three).

Responses

- 44,050 records of exams (881 PDS equipped machines x 50 Exams).
- 881 records of corrective actions.
- Total responses= 44,931.

Burden Hours

- 44,050 exams x 0.017 hrs per exam = 749 hrs.
- 881 corrective actions x 0.033 hrs per corrective action = 29 hrs.
- Total burden hours= 778 hrs.

Burden Costs

- 778 hrs. x $35.30 hourly wage rate = $27,463.

E. Proposed § 75.1732(d)(4)

PDS Installation and Maintenance Training Burden

Proposed § 75.1732(d)(4) would require that a record be kept of personnel trained in the installation and maintenance of proximity detection systems. MSHA anticipates that a clerical employee, earning $26.00 per hour (including benefits), would spend 3 minutes (0.05 hrs.) creating a record of all personnel trained at each mine. Based upon a turnover rate of 6 percent, MSHA estimates that an additional 115 mine employees would have to be trained in the installation and maintenance of proximity detection systems each year. MSHA anticipates that a clerical employee, earning $26.00 per hour (including benefits), would spend 1 minute (0.017 hrs) creating a record of each miner trained on the installation and maintenance of PDS. MSHA's estimates of the burden hours and related burden costs to underground coal operators are presented below.

Yearly Average for Years 1 through 3

Responses

- 141 mine records (424 mine records in year one divided by three years).
- 115 mine employee records (115 mine records in years one, two and three).

Total responses= 256 records.

Burden Hours

- 141 mine records x 0.05 hrs to make the record = 7 hrs.
- 115 mine employee records x 0.017 hrs to make the record = 2 hrs.

Total burden hours= 9 hrs.

Burden Costs

- 9 hrs. x $26.00 hourly wage rate = $234.

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