PRELIMINARY REGULATORY ECONOMIC ANALYSIS

FOR

SAFETY STANDARDS FOR UNDERGROUND COAL MINE VENTILATION - BELT ENTRY USED AS AN INTAKE AIR COURSE TO VENTILATE WORKING SECTIONS AND AREAS WHEW MECHANIZED MINING EQUIPMENT IS BEING INSTALLED OR REMOVED

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

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I. EXECUTIVE SUMMARY

INTRODUCTION

This Preliminary Regulatory Economic Analysis (PREA) addresses the benefits and compliance costs associated with MSHA's proposed rule to allow use of belt air to ventilate the working places of underground coal mines. This proposed rule would allow the use of air from the belt entry air course ("belt air") to ventilate working sections and areas where mechanized equipment is being installed or removed ("working places"). For mines that choose to use belt air, the primary requirement of the proposed rule is the installation and use of an Atmospheric Monitoring System (AMS) to provide for early detection of fires.

Since the early 1970's, mine operators have used *AMSs* to monitor certain aspects of the mine atmosphere. These systems typically can measure environmental parameters related to mine ventilation, air quality, and fire detection. An *AMS*, equipped with the proper sensors, can measure concentrations of combustible and toxic gases, oxygen levels, air velocity, and products of combustion, such as carbon monoxide (CO) or smoke. This technology allows close monitoring of the mine atmosphere when belt air is coursed to working places. As *AMSs* have become more sophisticated, they have employed computer technology to transmit environmental measurements from remote locations to attended mine locations. These systems generate alarms, store and catalog data, and provide reports.

During the last 15 years, MSHA has evaluated, through the petition process, the safe use of belt air as intake air to ventilate the working places. MSHA has granted approximately 90 petitions for modification to use belt air to ventilate the working place. MSHA grants a petition for modification when it determines that a mine operator has an alternative method which provides the same measure of safety protection as the existing standard, or when the existing standard would result in diminished safety protection to miners.

Only after a thorough on-site investigation verifying that the use uf belt air is at least as safe as the existing safety standard does the Agency grant each petition. In the Agency's evaluation of the use of belt air, MSHA concluded that belt air can be safely used, provided that certain conditions are met. Specifically, the Agency found that the safety concerns associated with belt air use are sufficiently addressed by the proper installation, operation, examination, and maintenance of *AMSs* as part of a comprehensive safety program that contains other requirements. Petitions for modification of 30 CFR § 75.350 contain the requirement that a mine operator install an AMS to monitor the mine atmosphere.

MINING SECTORS AFFECTED

The proposed rule applies to all underground coal mines. However, the substantive changes of the proposed rule relative to the existing rule apply only to three-or-more entry mines that voluntarily choose to use belt air to ventilate the working places of the coal mine or that voluntarily choose to point feed the belt air. For all other underground mines, there is a rearrangement of some of the wording in Part 75, but this rearrangement of words produces no substantive change in regulatory requirements. For example, § 75.352 in the current rule, which forbids belts in the return, has been moved to § 75.350(a) in the proposed rule.

The proposed rule would apply to three-or-more-entry mines that voluntarily choose to use belt air as intake air to ventilate the working places of the coal mine. Mines that choose to ventilate the working places with bell air are required to use an atmospheric monitoring system (AMS) and adopt other measures to assure worker safety. The proposed rule also applies to mines that voluntarily choose to point feed the belt air course. The rule does not impact two-entry mines, which must still petition MSHA.

Mines that do not choose to use belt air at the working places and that do not point feed the belt air are unaffected by the proposed rule. For mines that choose to adopt either or both of these practices, the proposed rule provides a compliance alternative. Since there is no technological or economic imperative that requires an underground coal mine to adopt either practice, adoption of either practice is voluntary. Accordingly, in its economic analysis, MSHA presumes that any coal mine that adopts either practice intends or expects to achieve cost savings as a result.

POPULATION-AT-RISK

MSHA estimates that this rulemaking would initially affect approximately 11,313 miners at 88 underground three-or-more-entry coal mines which choose to use belt air at the working places during the first year of the proposed rule. MSHA also estimates that this rulemaking would additionally affect approximately 2,358 miners at 30 underground three-or-more-entry coal mines which choose to point feed the belt air, but do not use belt air at the working places, during the first year of the proposed rule. Accordingly, MSHA estimates that this rulemaking would affect a total of approximately 13,671 miners at 118 underground coal mines during the first year of the proposed rule. These numbers include mines that have already petitioned to use belt air, because the rule making would supercede the requirements set forth in current belt-air petitions.

BENEFITS

The Mine Safety and Health Administration has qualitatively determined that the proposed rule, to permit use of belt air at the working places, yields net health and safety benefits relative to the existing rule, which does not permit use of belt air at the working places. The proposed rule provides the same degree of health and safety protection as existing petitions that currently permit use of belt air at the working places.

The main requirement of the proposed rule is that the mine operator who chooses to use belt air must install an atmospheric monitoring system (AMS) in the belt entry for fire detection. The AMS provides early warning fire detection that is beneficial to both workers and the mine owner.

The AMS is beneficial to workers, because the early warning of fire from an AMS permits more time for miners to escape. Early warning from the AMS also gives the firefighting crew more time to fight or extinguish a fire before it creates a serious mine fire accident or disaster. The AMS is beneficial to the mine operator because early warning of a mine fire provides maximal opportunity for extinguishing the fire. An uncontrolled mine fire can damage or destroy a coal mine and can delay or prevent future mining of coal in the affected mine.

The proposed rule utilizes the common incentive of both workers and mine owners to avoid mine fires, and particularly to avoid fires that may result in a serious mine fire accident. By eliminating the cost and delay of filing a petition in order to use belt air at the working places, the proposed rule provides additional encouragement for mine operators to install an AMS. The installation of AMS in additional mines will reduce the risk of mine fire accidents that may injure or kill miners or severely damage mine property.

In addition, MSHA's experience with belt air petitions indicates that, with proper precautions, allowing belt air to ventilate working places can achieve net safety benefits. Belt air usage can result in an increase in the quantity of air in the belt entry and other common entries (belt air course). This provides increased protection to miners against hazards created by elevated levels of methane, other harmful gases, and respirable dust.

Prevention of mine fires can also benefit local communities. In the event a mine fire is uncontrolled, persons living in the area of the mine may need to be evacuated for several days due to the smoke and toxic gases escaping to the surface from a mine fire. In addition, there can be long-term adverse economic impacts on a community, if miners lose employment because a mine fire has shut down a coal mine.

COMPLIANCE COSTS

The proposed rule would allow mines voluntarily to choose to use belt air as intake air to ventilate the working places of the coal mine. Mines that choose to ventilate the working places with belt air would be required to use an atmospheric monitoring system (AMS) to assure worker safety. The proposed rule would also allow mines voluntarily to choose to point feed the belt air course.

Mines that do not choose to use belt air or to point feed the belt air would not incur any costs or cost savings as a result of the proposed rule.

Because all changes impact only mines that voluntarily undertake certain actions, there are only cost savings from the proposed rule. This is because MSHA presumes that no mine operator would install and use an AMS in order to use belt air, unless the mine operator anticipated cost savings as a result.

The primary cost savings from the proposed rule accrue to underground coal mines that choose to use belt air at the working places. Cost savings from this source are estimated at $654 thousand per year.

Secondary cost savings of the proposed rule accrue to mines that choose to point feed the belt air, but do not use belt air at the working places. For mines that choose not to use belt air at the working places, these cost savings from point feeding are estimated at $31 thousand per year.

In total, the cost savings from the proposed rule are $685 thousand per year. Chapter IV describes in more detail these cost and cost saving estimates, and the methodology for deriving these estimates.

EXECUTIVE ORDER 12866 AND REGULATORY FLEXIBILITY ACT

Executive Order (E.O.) 12866 requires that regulatory agencies assess both the costs and benefits of intended regulations. We have fulfilled this requirement for the proposed rule. Based upon its analysis of compliance costs, MSHA has determined that these standards will not have an annual effect of $100 million or more on the economy. Therefore, the proposed rule is not an economically significant regulatory action pursuant to § 3(f)(1) of Executive Order (E.O.) 12866. However, we have determined that this proposed rule is significant under § 3(f)(4) of E.O. 12866, which defines a significant regulatory action as one that may "...raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order."

The Regulatory Flexibility Act (RFA) requires regulatory agencies to consider a rule's impact on small entities. The Small Business Administration (SBA) provides criteria to define a small business entity. Under the RFA, MSHA must use SBA's criterion for a small entity in determining a rule's economic impact unless, after consultation with SBA and an opportunity for public comment, MSHA establishes an alternative definition for a small mine and publishes that definition in the Federal Register. For the mining industry, SBA defines "small" as a mine with 500 or fewer employees. MSHA traditionally has considered small mines to be those with fewer than 20 employees.

To ensure that the proposed rule conforms with the RFA, MSHA has analyzed the impact of the rule on mines with 500 or fewer employees (as well as on mines with fewer than 20 employees). MSHA has determined that the rule will not impose a substantial cost increase on small mines, whether a small mine is defined as one with 500 or fewer miners or one with fewer than 20 miners. Based upon this analysis, the Agency has preliminarily determined that the rule will not have a significant economic impact on a substantial number of small underground coal mine operators. The factual basis for this preliminary determination is discussed in Chapter V of this PREA.

II. INDUSTRY PROFILE

INTRODUCTION

This industry profile provides information concerning the structure and economic characteristics of the mining industry and includes data about the number of mines and miners by type and size of mine. A detailed economic picture of the coal and metal and nonmetal (M/NM) mining industry is difficult to develop because most mines are either privately held corporations, sole proprietorships, or subsidiaries of publicly owned companies. Privately held corporations and sole proprietorships are not required to make their financial data available to the public. Further, parent companies are not required to separate financial data for subsidiaries in their reports to the Securities and Exchange Commission. As a result, financial data are available for only a few coal and M/NM companies. Such data are not representative of the entire mining industry.

The value of the U.S. mining industry's 2000 coal and metal and nonmetal (M/NM) production was estimated to be about $57.9 billion, or 0.6 percent of 2000 Gross Domestic Product (GDP). Coal mining contributed about $17.7 billion to the GDP,[1] while the M/NM mining sector contributed about $40.2 billion.[2]

STRUCTURE OF THE MINING INDUSTRY

MSHA divides the mining industry into 2 major sectors, which are coal mines and M/NM mines. These 2 sectors are further divided by operation type (e.g., underground mines or surface mines). The Agency maintains its own data on the number of mines and on mining employment by mine type and size. Also MSHA collects data on the number of independent contractors and contractor employees by mining sector.

MSHA categorizes mines by size based on employment. For the past 20 years, for rulemaking purposes, the Agency has consistently defined a small mine to be one employing fewer than 20 employees and a large mine to be one employing 20 or more employees. However, to comply with the requirements of the Small Business Regulatory Enforcement Fairness Act (SBREFA) amendments to the Regulatory Flexibility Act (RFA), MSHA must use the Small Business Administration's (SBA's) criteria for a small entity when determining a rule's economic impact. For the mining industry, SBA defines a small entity as one employing 500 or fewer employees.

Table II-1 presents the number of small and large coal mines and their employment, excluding contractors, during calendar year 2000. These mines reported production during some portion of the calendar year 2000. Table II-1 uses 3 mine size categories based on employment: (1) fewer than 20 employees (MSHA's traditional small mine definition); (2) 20 to 500 employees; and (3) more than 500 employees. Table II-1 shows that, of all coal

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[1] Coal production data from U.S. Department of Labor Mine Safety and Health Administration, Office of Program Evaluation and Information Resources, 2000 data. Average U.S. coal price from Department of Energy, Energy Information Administration, *Coal Industry Annual 2000,* January *2002,* Table 80, page 206.

[2] U.S. Department of the Interior, U.S. Geological Survey, *Mineral Commodities Summaries 2001,* January 2001, pp. 6, 7.

mines, about 35 percent are underground mines employing about 53 percent of miners, while 65 percent are surface mines employing 47 percent of miners.

Table II-1: Distribution of Coal Operations and Employment (Excluding Contractors) by Mine Type and Size, 2000

Mine Type	Size of Coal Mine *									All Coal Mines		
	< 20 Employees			20 to 500 Employees			> 500 Employees					
	Mines	Miners	Office Emp.	Mines	Miners	Office Emp.	Mines	Miners	Office Emp.	Mines	Miners	Office Emp.
Underg.	268	2,586	95	393	31,896	895	3	1,651	59	664	36,133	1,049
Surface	835	5,191	432	398	25,375	1,833	3	1,661	71	1,236	32,227	2,336
Total	1,103	7,777	527	791	57,271	2,728	6	3,312	130	1,900	68,360	3,385

*Based on MSHA's traditional definition, small mines are those in the <20 employees category. Based on SBA's definition, **small** mines are those in the <20 employees and **20** to 500 employees categories.

Source: U.S. Department of Labor Mine Safety and Health Administration, Office of Program Evaluation and Information Resources, **2000** data.

Table 11-2 presents corresponding data on the number of independent coal contractors and their employment for calendar year 2000. Table 11-2 shows that, of all coal contractor firms, about **3** 1 percent operate in underground mines and employ about 29 percent of contractor employees (excluding office employment), while 69 percent operate at surface mines employing 7 1 percent of contractor employees (excluding office employment).

Table 11-2: Distribution of Coal Contractors and Contractor Employment by Size of Operation, 2000

Contr. Type	Size of Coal Contractor *									All Coal Contractors		
	< 20 Employees			20 to 500 Employees			> 500 Employees					
	Firms	Emp.	Office Emp.	Firms	Emp.	Office Emp.	Firms	Emp.	Office Emp.	Firms	Emp.	Office Emp.
Underg.	771	3,183	243	102	5,220	357	0	0	0	875	8531	652
Surface	1,715	7,443	568	247	12,707	870	2	1,025	221	1,962	21,047	1,607
Total	2,486	10,626	811	349	17,927	1,227	2	1,025	221	2,837	29,578	2,259

* Based on MSHA's traditional definition, small contractors are those in the **<20** employees category. Based on **SBA's** definition. small contractors are those in the **<20** employees and **20** to 500 employees categories.

Source: **U.S.** Department of Labor Mine Safety and Health Administration, Office of Program Evaluation and Information Resources, **2000** data, and **U.S.** Department of Labor, Mine Safety and Health Administration, **2000** Final Data, **CT441 Report, cycle 2000/207**

STRUCTURE OF THE COAL MINING INDUSTRY

Agency data in Table 11-1 indicate that there were 1,900 coal mines that reported production during some portion of calendar year 2000. When applying MSHA's small mine definition (fewer than **20** workers), **1,103** (about ***58*** percent) **were** small mines and 797 (about 42 percent) were large mines. Using SBA's small mine definition, 6 mines *(0.3* percent) were large mines and the rest were small mines.

Coal mine employment in 2000 was 71,745, of which 68,360 were miners and 3,385 were office workers. Based on MSHA's small mine definition, 7,777 coal miners in 2000 (11 percent) worked at small mines and 60,583 miners (89 percent) worked at large mines. Using SBA's small mine definition, 65,048 coal miners (95 percent) worked at small mines and 3,312 coal miners (5 percent) worked at large mines. Based on the Agency's small mine definition, on average, each small coal mine employs 7 miners and each large coal mine employs 76 miners. Using SBA's small mine definition, on average, each small coal mine employs 34 miners and each large coal mine employs 552 miners.

ECONOMIC CHARACTERISTICS OF THE COAL MINING INDUSTRY

Coal mining in the U.S. can be classified into two major commodity groups: bituminous and anthracite. About 91 percent of total coal production is bituminous. The remaining 9 percent of production is lignite and anthracite mines.[3]

Mines east of the Mississippi River accounted for about 47 percent of coal production in 2000. For the period 1949 through 1998, coal production east of the Mississippi fluctuated relatively little, from a low of 395 million tons in 1954 to a high of 630 million tons in 1990; 2000 production was estimated at 509 million tons. During this same period, however, coal production west of the Mississippi increased each year from a low of 20 million tons in 1959 to a record high of 571 million tons in 1999; 2000 production was estimated at 566 million tons.[4] Growth in western coal mines, in part, is due to environmental concerns that increase demand for low-sulfur coal, which is in abundance in the West. In addition, surface mining, with its higher average productivity, is much more prevalent in the West.

The U.S. coal sector produced approximately 1.053 billion short tons of coal in 2000, at an average price of $16.78 per ton, for a total production value of $17.7 billion.[5] Based on MSHA's definition, small mines produced about 32 million tons, or 3 percent of domestic coal production valued at $532 million; and large mines produced about 1.004 billion tons, or 97 percent of domestic coal production valued at $17.16 billion.[6]

Average domestic coal prices (nominal and real prices) for the period 1950-1999 are presented in Table 11-3. The nominal price is the price not adjusted for inflation. The real price is the price of coal after it has been adjusted for inflation by using constant dollars from a particular year (in Table 11-3, the real price is in terms of 1996 dollars). During this period the inflation-adjusted, real price of coal has generally declined. The one exception was a spike in coal prices during the OPEC petroleum price increases in the 1970s. The real price of coal per ton was approximately 46 percent lower in 1999 than in 1950. The real price of

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[3] U.S. Department of Energy, Energy Information Administration, ***Annual Energy Review 2000,*** August 2001, Table 7.2, page 201.

[4] U.S. Department of Energy, Energy Information Administration, ***Annual Energy Review 2000,*** August 2001, Table 7.2, page 201.

[5] Coal production data are from the U.S. Department of Labor, Mine Safety and Health Administration, Office of Program Evaluation and Information Resources, 2000 data. Average U.S. coal price is from the Department of Energy, Energy Information Administration, ***Coal Industry Annual 2000,*** January 2002, Table 80, page 206.

[6] ***Ibid.***

coal per Btu was approximately 36 percent lower in 1999 than in 1950, which has caused coal to become the least expensive of the major fossil fuels in terms of dollars per Btu.[7]

Table 11-3: Coal Prices 1950-1999
(Dollars per Short Ton)

Year	Nominal Price ($ per Short Ton)	Real Price (1996 $ per Short Ton)	Nominal Price ($ per Million BTU)	Real Price (1996 $ per Million Btu)
1950	5.19	29.74	0.21	1.19
1955	4.69	23.71	0.19	0.94
1960	4.83	21.77	0.19	0.87
1965	4.55	19.13	0.18	0.77
1970	6.34	21.82	0.27	0.92
1975	19.35	48.34	0.84	2.11
1980	24.65	43.22	1.10	1.93
1985	25.20	34.20	1.15	1.56
1990	21.76	25.15	1.00	1.15
1991	21.49	23.97	0.99	1.10
1992	21.03	22.90	0.97	1.06
1993	19.85	21.11	0.93	0.99
1994	19.41	20.22	0.91	0.94
1995	18.83	19.19	0.88	0.90
1996	18.50	18.50	0.87	0.87
1997	18.14	17.79	0.85	0.84
1998	17.67	17.12	0.82	0.80
1999*	16.63	15.87	0.80	0.76
2000*	16.78	15.69	0.80	0.74

Source: US Department of Energy, Energy Information Administration, ***Annual Energy Review 2000,*** August 2001, p. 213, Table 7.8; p. 67, Table 3.1.
*Prices per short ton come from US Department of Energy, Energy Information Administration, ***Coal Industry Annual 2000,*** January 2002, Tables 80-81, pp. 206-207.

MINING INDUSTRY OUTLOOK

The U.S. coal industry enjoys a fairly constant domestic demand. Over 90 percent of U.S. coal demand was accounted for by electric utilities in 1999.[8] Domestic coal demand is projected to increase because of growth in coal use for electricity generation. Coal consumption for electricity generation is projected to increase as the utilization of existing coal-fired generation capacity increases and as new capacity is added. The average utilization rate is projected to increase from 68 percent in 1999 to 83 percent in 2020.[9] The amount of U.S coal exported in 1999 was 58 million tons (about 5 percent of production).

[7] US Department nf Energy, Energy Information Administration, *Annual Energy Review 2000.* August 2001, p. 67, Table 3.1. Coal energy (per Btu) was more expensive than natural gas energy in 1950, but was less expensive in 1999. Both coal and natural gas energy were less expensive than crude oil energy, in both 1950 and 1999.

[8] U.S. Department of Energy, Energy Information Administration, *Annual Energy Review 2000,* August 2001, Table 7.3, p. 203.

[9] U.S. Department of Energy, Energy Information Administration, *Annual Energy Outlook 2001,* December 2000, p. 95.

These exports are projected to remain relatively stable in the future, until settling at 56 million tons by 2020.[10]

USAGE OF BELT AIR AT THE WORKING PLACES IN THE UNDERGROUND COAL MINING INDUSTRY

Under current rules, coal mines may not use belt air to ventilate the working places of the mine. The proposed rule would permit such use of belt air, provided certain conditions are met to assure the safety of the coal miners. Over the past two decades numerous underground coal mines have petitioned MSHA for modifications that would permit the use of belt air at the working places. Many of these petitions were granted, subject to various conditions designed to ensure worker safety. Typically, these granted petitions required the use of an atmospheric monitoring system (AMS).

MSHA grants a petition for modification under either of two criteria. First, a petition may be granted when MSHA determines that a mine operator has an alternative method that provides the same measure of safety protection as the existing standard. Petitions to use belt-air in three-or-more-entry mines are typically granted under this first criterion. The proposed rule would obviate the need for dozens of three-or-more-entry mines to file petitions in order to use belt air. Second, a petition may be granted when MSHA determines that enforcement of the existing standard would result in diminished safety protection to miners. Petitions for two-entry mines are only granted if they meet this second criterion. Two-entry mines are not affected by the proposed rule.

Table 11-4 provides information on the number of granted petitions for belt air (not counting two-entry mines) that were still in effect as of December 31, 2000. It may readily be seen from the table that granted petitions to use belt-air at the working places are most commonly held by the larger mines, which employ 100 or more workers. Approximately 42% of these larger mines have been granted petitions to use belt air at the working places.[11]

Of the 69 granted belt-air petitions, 19 of the petitions were in mines that had no employees, and 5 of the petitions were for non-producing mines that had fewer than 20 employees. Hence, not more than 45 mines with granted petitions to use belt air at the working places were producing coal in the year 2000. If the mine is not producing coal, the working places are not being worked, and it is (normally) not necessary for the mine operator to undertake the expense of moving belt air (or any air) onto the working places of the mine. Hence, these non-producing mines are presumably not using belt air at the working places, even though the granted petitions for modification allow them to do so.

Of the 45 producing mines with belt-air petitions, 31 mines had 100 or more employees, while only 14 mines had fewer than 100 employees. It should be noted that mines do tend to vary in employment from year to year. Hence, many of the producing

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[10] U.S. Department of Energy, Energy Information Administration, *Annual Energy Outlook 2001*, December 2000, p. 96.

[11] Of the 76 underground coal mines with 100 or more employees, 3 are two-entry mines. 31 of the remaining 73 mines with more than two entries have belt-air petitions. We can then calculate, 30/73=42%. If we include two entry mines in the denominator, the percentage is 30/76=41%.

Number of Employees	Number of All Mines	Number ot Non-Two-Entry Mines'	Number of Petitions	Producing Coal?	Percentage of All Mines[2]
None	N/A	N/A	19	No	N/A
1-19	268	267	5	No	1.9%
20-99	320	317	14	Yes	4.4%
100-500	73	70	28	Yes	38.4%
Over 500	3	3	3	Yes	100.0%
Total	664	657	69	N/A	10.4%

Sources: U.S. Department of Labor, Mine Safety and Health Administration, Office of Program Evaluation and Information Resources and Office of Coal Mine Safety and Health.

'(Column 1) - (Table 11-5, Column 3).

[2](Column 4) / (Column 2).

mines with fewer than 100 employees in year 2000 may have more than 100 employees in either prior or subsequent years.

There were 14 mines with belt-air petitions that employed fewer than 100 workers in the year 2000. Four of these 14 mines had employment of 100 or more workers in at least one prior year. Based on a statistical analysis of MSHA's mine employment data, MSHA projects that approximately 5.6 of the remaining 10 mines will have employment of at least 100 workers in at least one subsequent year. This leaves only about 4.4 producing mines with belt-air petitions in the year 2000 that MSHA expects will have fewer than 100 employees during all years of mining operations.

The use of belt air at the working places is largely confined to mines with more than 100 employees. This is so for two reasons. First, it requires some investment to install and operate an AMS, which is required as a safety measure when using belt intake air at the working places. Second, the techniques used in a small underground coal mine do not normally require the use of belt air at the working places.

Not all the producing mines (in 2000) with belt-air petitions were necessarily using belt air at the working places, although most probably were. There are three main reasons why a producing mine with a belt-air petition might choose not to use belt air at the working places. First, it may be difficult for the mine to maintain air speed of 50 feet per minute, as required by the petitions. Second, it may not be cost effective for the mine to use belt air at the working places. Third, it may not be possible in a particular mine set-up to prevent rock dust from blowing onto workers. All these circumstances may prevent a mine from using belt air, even when permitted by a granted petition.

In the larger mines with multiple working places, a mine may be using belt air at some working places but not others, or in some months but not others. The proper ventilation of a mine is a complex engineering matter. Mine ventilation conditions often change, as new areas open up, old areas are shut down, lengths and areas of various parts of the mine are extended or contracted, and the resulting air flow patterns shift over time. Hence, the use of belt air may be economical at one working place of a mine, but not another working place of the same mine. The use of belt air may be economical at a given working place for one time period, but not economical for the same working place in a different time period.

TWO-ENTRY MINES

Under current rules, two-entry mines are not permitted, because two-entry systems require placing belts in the return, in violation of existing 30 CFR § 75.352. Mine operators who intend to construct two-entry systems must first obtain MSHA's approval through a petition for modification. For two-entry mines, these petitions require proof that compliance with §75.352 would result in a diminution of worker safety. This requires a showing that the construction of three entries would diminish worker safety, perhaps because the mining area is geologically unstable and subject to frequent roof falls or frequent liberation of explosive methane gas.

The proposed rule does not alter the requirement that belts must be separated from the return. However, the proposed rule does alter the location where this requirement may be found. This requirement for separation is contained under proposed §75.350(a)(2). Since the

proposed rule does not alter the substance of existing §75.352, but simply moves its location, two-entry mines would still be required to petition for a modification in order to operate. Huwever, future petitions would **be** filed under the proposed $75.350, rather than existing §75.352.

Table **II-5** shows the number of two-entry mines. Most or all mines with two-entry systems use belt air at the working places during retreat mining. Currently, all such mines are located in Utah. It is possible, in the future, that one or more Colorado mines may choose to construct two-entry systems. For geological reasons, **it is** highly unlikely that two-entry coal mines would ever be constructed or permitted in additional states.

PROJECTED NUMBER OF NEW UNDERGROUND COAL MINES

It is anticipated that this rule will have different cost saving impacts on new mines than on existing mines. Prior to construction of a new mine, **a** mine operator who knows that belt air will be permitted at the working places, under certain specified conditions, can design and plan the mine layout and construction to take maximum advantage of potential cost savings. **These** cost savings include possible reductions in both ventilation costs and shaft sinking costs. Existing mines, which have already constructed the mine layout, have less flexibility in retrofitting their mine operations.

Accordingly, for purposes of evaluating the cost impacts of the proposed rule, it is necessary to project the likely number of new underground coal mines. Table 11-6 provides recent historical data on the number of new underground coal mines. For total mines, the reported number is determined by the first year in which a particular mine reported employment. For mines in the category, "100 or More Employees," the reported number is determined by the first year in which a particular mine reported 100 or more employees. The category "Under 100 Employees" is simply a subtraction of the "100 or More Employees" figure from the "Total" figure. Reported numbers for 2001 are estimates derived from preliminary 2001 data.

The bottom row of Table 11-6 contains MSHA's projections of the annual rate for new underground coal mines. For new mines in the category, "100 or More Employees," a ten-year average of the data for 1991-2000 is used, This average is a projection of the number of new mines that will eventually have 100 or more employees. Typically, **a** new mine of this larger size will have **less** than 100 employees during the first year. or first few years, before increasing employment to 100 or more workers. This figure is based on the average number of mines per year that newly achieve, for the first time, employment of 100 or more workers.

For new mines in the Total column, a significant downward trend was noted. Accordingly, a five-year average of the data for 1996-2000 is used. The projection for "Under 100 Employees" is simply a subtraction of the "100 or More Employees" projection from the "Total" projection. For purposes of the analysis in Chapter IV of this PREA, we are

Table II-5.
Number of Granted Petitions for Two-Entry Underground Coal Mines, by Mine Size, as of December 31, 2000.

Number of Employees	Number of All Mines	Number of Two-Entry Mines	Number of Petitions	Producing Coal?	Percentage of All Mines'
None	N/A	N/A	1	No	N/A
1-19	268	1	1	Yes	0.4%
20-99	320	3	3	Yes	0.9%
100-500	73	3	3	Yes	4.1%
Over 500	3	0	0	N/A	0.0%
Total	664	7	8	N/A	1.2%

Sources: U.S. Department of Labor, Mine Safety and Health Administration, Office of Program Evaluation and Information Resources and Office of Coal Mine Safety and Health.

[1](Column 4) / (Column 2).

Table 11-6.
Number of New Underground Coal Mines,
by Mine Size, 1990-2001.

	Number of New Underground Coal Mines		
Year	Under 100 Employees	100 or More Employees	Total
1990	263	6	269
1991	159	6	165
1992	171	9	180
1993	125	8	133
1994	152	6	158
1995	107	7	114
1996	107	9	116
1997	125	9	134
1998	104	5	109
1999	63	5	68
2000	81	6	87
2001	99	10	109
Projected Annual Rate	96	7	103

Source: U.S. Department of Labor, Mine Safety and Health Administration, Office of Program Evaluation and Information Resources.

assuming that the number of new mines each year, both with under 100 employees and with 100 or more employees, is in a "steady state" and will not vary further over time."

Table II-7 summarizes, for each mine size, the expected number of existing and new mines during the first year of the proposed rule. These numbers are used in Chapter IV and V to compute the costs and cost savings of the proposed rule. The numbers in Table II-7 are based on the numbers for all mines in Tables **11-4** and II-5. The numbers for new mines per year are based on Table II-6. A steady state is assumed, whereby the total number of mines in each category remains the same. Hence, the number of existing mines that close each year equals the number of new mines that open each year.

MINES USING DIESEL EQUIPMENT

The proposed rule is likely to have a somewhat different effect on mines using diesel equipment compared with mines that do not use diesel equipment. Mines using diesel equipment are more likely to want to point feed the belt air, more likely to experience non-fire alerts and alarms from an *AMS*, and more likely to seek time delays or other methods for reducing non-fire **alerts** and alarms. Although these cost impacts are minor, they are analyzed in the appropriate places in this PREA.

Table **II-8** provides the number and percentage of underground coal mines in each employment size category that use diesel equipment. **MSHA** observes no correlation between the usage of diesel equipment and the usage of belt air at the working places, after controlling for mine size. Accordingly, the observed percentages of diesel usage in all underground coal mines is assumed to apply, without further adjustment (except for mine size), to the subset of coal mines that would use belt air at the working places.

[12] These projections are in no way a commentary on the future state of the coal industry. The projections of new coal mines are based solely on recently observed historical averages, and are being used here solely for the purpose of assessing cost impacts of the proposed rule. The projections are not adjusted up or down to account for possible trends or developments in the coal mining industry, which may or may not occur in the future, Readers who wish to see or construct possible forecasts of the energy industry in general, or the coal mining industry in particular, are invited to contact the Department of Energy, Energy Information Administration, for information or resources.

Number of Employees	Number of All Mines	Existing Mines Percentage[1]	New Mines Percentage[2]	Number ot Existing Mines[3]	Number ot New Mines[4]
1-19	268	83.7%	16.3%	224.2	43.8
20-99	320	83.7%	16.3%	267.8	52.2
100-500	73	90.8%	9.2%	66.3	6.7
Over 500	3	90.8%	9.2%	2.7	0.3
Total	664	84.5%	15.5%	561.0	103.0

Source: U.S. Department of I ahnr, Mine Safety and Health Administration, Office of Program Evaluation and Information Resources.

[1](100%) - (Column 4).

[2](New Mines in Category) / (All Mines in Category), where categories are 1-99 employees and 100 or more employees. For 1-99 employees, New Mines = 96 from Table 11-6, and All Mines = 268 + 320 = 588. (96/ 588) = 16.3%. For 100 or more employees, New Mines = 7 from Table 11-6, and All Mines = 73 + 3 = 76. (7/ 76) = 9.2%.

[3](Column 2) x (Column 3).

[4](Column 2) x (Column 4).

Number of Employees	Number of All Mines	Number of Mines Using Diesel Equipment	Percentage of Mines Using Diesel Equipment[1]
None	N/A	25	N/A
1-19	268	15	5.6%
20-99	320	82	25.8%
100-500	73	48	65.8%
Over 500	3	3	100.0%
Total	664	173	26.1%

Sources: U.S. Department of Labor, Mine Safety and Health Administration, Office of Program Evaluation and Information Resources and Office of Coal Mine Safety and Health.

[1](Column 3) / (Column 2).

111. BENEFITS

INTRODUCTION

The Mine Safety and Health Administration has qualitatively determined that the proposed rule, to permit use of belt air at the working places, yields net health and safety benefits, relative to the existing rule, which does not permit use of belt air at the working places. The proposed rule provides the same degree of health and safety protection as existing petitions that currently permit use of belt air at the working places.

The requirements of the proposed rule are voluntary, in that no mine operator is required to use belt air at the working places in order to mine coal underground. The requirements of the rule apply only to three-or-more-entry mines that voluntarily choose to use belt air at the working places. The main requirement is that the mine operator must install an atmospheric monitoring system (AMS) in the belt entry for fire detection. The AMS provides early warning fire detection that is beneficial to both workers and the mine owner.

The AMS is beneficial to workers, because the early warning of fire from an AMS permits more time for miners to escape. Early warning from the AMS also gives the firefighting crew more time to fight or extinguish a fire before it creates a serious mine fire accident or disaster. The AMS is beneficial to the mine operator because early warning of a mine fire provides maximal opportunity for extinguishing the fire. An uncontrolled mine fire can damage or destroy a coal mine and can delay or prevent future mining of coal in the affected mine.

The proposed rule utilizes the common incentive of both workers and mine owners to avoid mine fires, and particularly to avoid fires that may result in a serious mine fire accident. By eliminating petition costs and petition delays to the use of belt air at the working places, the proposed rule provides additional encouragement for mine operators to install an AMS. The inntallatinn nf AMS in additional mines will reduce the risk of mine fire accidents that may injure or kill miners or severely damage mine property. The expected reduction in the size and duration of mine fires will reduce fatalities and injuries, and provide monetary savings from reduced costs of fire fighting, production losses, and job losses.

NUMBER OF REPORTABLE MINE FIRES IN THE BELT ENTRY

MSHA requires mine operators to report mine fires that last more than 30 minutes or involve an injury or fatality. Table 111-1 provides data for the years 1970 through 2002. During this 33-year time period, 75 fires in the belt cntrics of underground coal mines were reported to and investigated by MSHA. The table reports the number of belt-entry fires by eleven 3-year time intervals and by three 11-year time intervals. On average, we would expect 25 belt-entry fires during each of the three 11-year time intervals. A casual inspection of the data suggests that the first period (1970-1980) with 23 belt-entry fires was about average; the second period (1981-1991) with 37 belt-entry fires was about 50% above average; and the third period (1992-2002) with only 15 belt-entry fires was about 40% below average.

Table 111-1.
Number of **Reportable** Belt-Entry Fires,
1970-2002[1], by 3-Year and 11-Year Intervals

Range of Years	Number of Fires
By 3-Ye:	Intervals
1970-1972	**7**
1973-1975	4
1976-1978	6
1979-1981	9
1982-1984	11
1985-1987	13
1988-1990	10
1991-1993	5
1994-1996	3
1997-1999	4
2000-2002[1]	3
By 11-Year Intervals	
1970-1980	23
1981-1991	37
1992-2002'	15
Total Fires in 33 Years	
1970-2002'	75

'Year 2002 data is incomplete.

These differences in the number of belt-entry fires for the three periods appear to have only borderline statistical significance. The increase in the number of belt fires in the late 1970s and early 1980s is probably due to the increase in belt haulage and longwall mining. However, the historical data set does not contain enough belt-entry mine fires to allow for a confident statistical analysis of possible systematic trends in the number of reportable belt-entry fires.

In developing this proposed rule, MSHA reviewed the history of reportable belt entry fires to evaluate the effectiveness of various types of detection methods and the causes of these fires. Section 50.2(h)(6) of 30 CFR requires that mine operators report mine fires that are not extinguished within 30 minutes of their discovery. We are aware that fires of less than 30 minutes in duration occur. Often slightly different circumstances in these short duration fires would have resulted in a reportable fire.

Since 1970, 75 reportable mine fires have occurred in belt entries.[13] Of these, 16 occurred in belt entries equipped with an *AMS*, while 43 occurred in entries equipped with point-type heat sensors (PTHS). Historical records do not specifically state what type of detection system was used in the remaining mines. However, based on the date of the fires, PTHS was probably used in the 18 remaining mines with unspecified detection systems.

The first reportable belt entry fire in a mine equipped with an *AMS* occurred in 1983 at the Jim Walters No. 7 Mine. From 1983 to date, we have investigated a total of 16 reportable belt entry fires in *AMS* equipped mines (10 in mines that used air in the belt air course to ventilate working places and 6 in mines that did not). Two of these mines had both *AMS* and PTHS installed in the belt entry. Of the 16 fires occurring in belt entries equipped with an *AMS*, the AMS detected all of the fires. Instances occurred when the AMS was not properly utilized or responded to by mine personnel (e.g., alarms were disconnected or were ignored). Sometimes, although the *AMS* functioned as intended and provided notification of a fire, the fire was detected by sight or smell before detection by the *AMS*.

The first reportable belt entry fire detected with a PTHS system occurred in 1980 at the Peabody No. 10 Mine. From 1970 to date, 43 fires occurred in belt entries of mines equipped with PTHS. This includes the two mines with both *AMS* and PTHS. Of the 43 fires occurring in belt entries equipped with PTHS, the PTHS reportedly detected only six fires.

Both the historical statistical data and the scientific evidence suggest that *AMS* is better at detecting fires than PTHS. Allowing for the possibility that an *AMS* might not detect some future fire, we can statistically estimate that *AMS* will detect 94% of reportable belt-entry fires.[14] A similar statistical calculation yields the estimate that PTHS will detect

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[13] Of these 75 reportable fires, 17 occurred in mines where belt air ventilated working places, while 58 occurred in mines where belt air did not ventilate working places. A reportable fire is any mine fire lasting 30 minutes or longer.

[14] Assuming a uniform prior distribution of possible detection probabilities between 0% and 100%, the observation that 16 of 16 fires were detected implies a 94% detection probability. This is computed according to the formula $(D + 1) / (F + 2) = (16 + 1) / (16 + 2) = (17 / 18) = 94.44\%$, where D = Number of Detected Fires and F = Total Number of Fires. This formula is derived from a beta distribution, where $\alpha=1$ and $\beta=1$. See Morris H. DeGroot, *Probability and Statistics* (Reading, Massachusetts: Addison-Wesley Publishing Company), 1975, Sections 5.9 and 6.3, pages 242-244, 266-268.

only 16% of reportable belt-entry fires.[15] Based on this historical, statistical evidence, an AMS can be expected to detect six times more reportable fires than a PTHS system.[16]

The superiority of AMS over PTHS is also buttressed by scientific knowledge of how and when fires emit heat and chemical byproducts. Overheated material often gives off CO before it bursts into flame, while the heat remains insufficient to activate **PTHS** until after the flames have erupted and the fire has become large. **As** Donald Mitchell, a noted mining consultant, explains:

> *Belt Entry.* Most fires in belt entries result from:
>
> 1. Excessive accumulations of loose coal and coal dust, particularly around the tailpiece, the take-up, and the drive.. .. Unfortunately, before flames erupt temperatures in the surrounding air will be too low to activate heat-sensitive detectors. Fortunately, before flames erupt oxides **of** carbon (CO_2 **and** ***CO)*** will bc flowing out **from** the accumulations.. .
> 2. Careless welding or cutting.. .. Like excessive accumulations of coal, the generation of enough heat to activate heat-sensitive detectors will likely come too late to provide early-enough warning; however, the incipient fire gives off CO_2 and CO.. .
> 3. Wood posts, cribs, and sideboards being rubbed or cut into by the moving belt. This.. . causes flames to erupt long before heat-sensitive detectors activate. Fortunately, the rubbing-cutting action produces enough heat within the wood to liberate CO_2 and ***CO,*** actually more than twice the quantities that could come from coals.[17]

Moreover, when a fire is not directly underneath a heat sensor, the fire must be quite large to activate the heat detector. Donald Mitchell explains the largeness of the fire in terms of the equivalent number of furnaces in a typical-Appalachian 8-room house. To be detected by a heat sensor downwind from the fire, **the** fire would need to have a site equal to **10, *SO***, or 80 such furnaces. Mitchell concludes, "Fire in a belt-entry obviously is not small when the point-type detector activates the alarm--unless, of course, the fire begins under the detector."[18]

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[15] Assuming a uniform prior distribution of possible detection probabilities between 0% and 100%, the observation that 6 of 43 fires were detected implies a 16% detection probability. This is computed according to the formula (D + 1)/ (F + 2) = (6 + 1)/ (43 + 2) = (7/ 45) = 15.56%, where D = Number of Detected Fires and F = Total Number of Fires. This formula is derived from a beta distribution, where α=1 and β=1. See Morris H. DeGroot, ***Probability and Statistics*** (Reading, Massachusetts: Addison-Wesley Publishing Company), 1975, Sections 5.9 and 6.3, pages 242-244,266-268.

[16] Calculated as 94.44% / 15.56% = 6.07. This calculation. which is based on reportable fires only, is an underestimate of the greater effectiveness of an AMS in detecting fires. Because the AMS provides earlier warning than PTHS, some fires that last 30 or more minutes because the **PTHS** fails to detect them in time might last less than 30 minutes if an AMS detects them early enough to allow them to be extinguished rapidly. Hence, there are likely to be more reportable fires with PTHS than with ***AMS.***

[17] Donald W. Mitchell, ***Mine Fires,*** Third Edition (Chicago, IL: Intertec Publishing), 1996, page 163.

[18] Donald W. Mitchell, ***Mine Fires,*** Third Edition (Chicago, IL: Intertec Publishing), 1996, pages 159-160.

The historical experience of direct competition between AMS (CO sensors) and PTHS reflects this scientific understanding of how fires develop, and when they are likely to bc dctcctcd. MSHA is aware of five fires (2 reportable and 3 nonreportable) in mines equipped with both AMS and PTHS. AMS detected four of the fires, but PTHS detected only one of the fires.[19] In the one fire detected by PTHS, the AMS detected the fire first. AMSs detect more fires, and detect the fires sooner, than does PTHS.

WORKER BENEFITS RELATIVE TO CURRENT RULE

Reduced Fire Danger When Using AMS

Since 1970, two heart attacks (one fatal) have occurred to miners who were fighting fires in the belt entry. In another belt-entry fire, miners suffered smoke inhalation. In a third fire, another five miners were treated for smoke inhalation. Belt-entry fires represent a potential for disaster with large loss of life. Some belt-entry fires in **U.S.** mines have come perilously close to claiming the lives of entire sections of miners. The Marianna mine fire in 1988, discussed below, came close to causing major fatalities. The Dilworth mine fire in 1992 reportedly could have been a disaster, if there had not been detection by the **CO** sensors of the AMS.

The early warning of fire from an AMS permits more time for miners to escape. Early warning from the AMS also gives the firefighting crew more time to fight or extinguish a fire before it creates a serious mine fire accident or disaster. By eliminating petition costs and petition delays to the use of belt air at the working places, the proposed rule pi-ovides additional encouragement for mine operators to install an AMS. The installation of AMS in additional mines will reduce the risk of mine fire accidents that may injure or kill miners.

Improved Air Quality from Increased Air Volume

MSHA's experience with belt air petitions indicates that, with proper precautions, allowing belt air to ventilate working places can achieve net safety benefits. Belt air usage can result in an increase in the quantity of air in the belt entry and other common entries (belt air course). This provides increased protection to miners against hazards created by elevated levels of methane, other harmful gases, and respirable dust.

Significantly, this method of ventilation can help to balance pressures between air courses in the system. Present § 75.350 (identical to former § 75.326) requires that the mine operator "limit the velocity of the air coursed through belt haulage entries to the amount necessary to provide an adequate supply of oxygen in such entries and to insure that the air therein shall contain less than 1.0 volume per centum of methane." In the past, mine operators regulated the air flowing through the belt air course such that most of the air flowing toward the working sections flowed in the intake air course. This action commonly caused the belt air course to be at a higher pressure than the primary intake air course. In the event of fire, this can cause leakage of combustion products from the belt entry into other parts of the mine, including thc primary cscapcway, putting miners at risk.

[19] The one fire not detected by AMS was nonreportable (lasting less than 30 minutes). A second nonreportable fire was first detected by sight or smell, and then detected by the AMS.

Balancing the air volume in the primary intake air course with the air volume in the belt air course generally provides less pressure differential between the primary escapeway intake air course and the belt air course. Pressure-balanced ventilation systems reduce the likelihood that air will leak from the belt air course into adjoining intake air courses, including the primary escapeway. Should a fire develop in the belt entry or other common entries, the products of combustion would likely stay in the belt air course. This would enhance escape through the primary escapeway by keeping the parallel primary escapeway free of smoke.

WORKER BENEFITS RELATIVE TO CURRENT PETITION PRACTICE

Current petition practice permits the use of belt air at the working places, provided an ***AMS*** is installed and certain other safety conditions are met. The proposed rule likewise permits the use of belt air at the working places, provided an ***AMS*** is installed and certain other safety conditions are met. The proposed rule would completely replace all existing petitions for three-or-more-entrymines that permit use of belt air at the working places. Although the technical details of the proposed rule differ somewhat from current petition practice, these differences in the proposed rule would not reduce worker health or safety relative to current petition practice. Specifically, worker health and safety under the proposed rule would not be reduced relative to current petition practice with respect to fire hazards, explosion hazards, or dust exposure. Accordingly, the proposed rule provides the same degree of health and safety protection as existing petitions that currently permit use of belt air at the working places.

THE MINE OPERATOR'S CHOICE

The mine operator currently has two choices: 1) whether or not to use belt air at the working places, and **2)** whether or not to install an ***AMS.*** Under existing regulation, the first choice is precluded by regulation (§ 75.350). unless the mine operator seeks a petition of modification for § 75.350. Under current petition practice, **use** of belt air at the working places is permitted, provided the mine installs an ***AMS*** and complies with other safety conditions.

Benefit to Mine Operator of Using Belt Air at the Working Places

MSHA has identified two possible benefits, or cost savings, to the mine operator from using belt air at the working places. These cost savings are reduced ventilation cost and reduced shaft sinking cost. The estimated dollar values of these cost savings are reported in Chapter IV of this PREA.

MSHA has also estimated the cost of installing and using an ***AMS.*** These dollar costs are likewise reported in **Chapter** IV. Under both the **proposed** rule and existing petition practice, installation of an ***AMS*** is a precondition for use of belt air at the working places.

MSHA has determined that the cost savings from reduced ventilation cost and reduced shaft sinking cost of using belt air at the working places are substantially less than the cost of installing, operating, and maintaining an ***AMS.*** In other words, it costs a mine operator substantially more to install an ***AMS*** than the typical mine operator can expect to recover in cost savings by using belt air at the working places. Accordingly, **MSHA** is of the

opinion that a profit maximizing mine owner would not install an AMS for the sole purpose of being allowed to use belt air at the working places.

Nevertheless, MSHA has observed that many mine operators are willing to install an AMS in order to use belt air at the working places. MSHA has also observed the voluntary installation of AMSs by mine operators who are not using belt air at the working places. Accordingly, use of an AMS must have substantial value to a mine operator. This substantial value is independent of, and in addition to, the potential value of an AMS in aiding a mine operator to obtain permission from MSHA to use belt air at the working places.

Benefit to Mine Operator of Using an AMS

The primary economic benefit to the mine operator of using an AMS is to reduce the risk of liability from fire and to prevent fire damage to mine property. Small mine fires that are not spotted, prevented, or extinguished in time can grow into larger fires and can also set off explosions in a coal mine. Coal mine fires can be disastrous, both for personnel and for property. An uncontrolled mine fire can shut down a coal mine for several months or years, or even permanently. Unless extinguished, a coal mine fire can burn underground for years. The cost of extinguishing an uncontrolled fire and recovering a coal mine for further mining activity is considerable, and is sometimes not economically feasible.

Early warning of a mine fire is crucial. As Donald Mitchell succinctly summarizes:

> Time is not your friend. Regardless of whether it was in the East, Midwest, or West, a coal mine fire not controlled within the fist 2 to 4 hours generally was sealed or cost many hundreds of thousands of dollars a day for 1 to 2 weeks. An average of one fire a year, in the 1980's, has cost multi-millions of dollars.[20]

An AMS with CO monitors provides superior early warning of a fire compared to the currently mandated point-type heat sensors (PTHS). Accordingly. many mine operators have already installed an AMS to reduce the risk of not detecting a mine fire early enough to save mine personnel and the mine itself. By reducing the risk of a disastrous fire or explosion, the mine operator may be able to reduce insurance rates. A safer mine is also helpful in recruiting and retaining workers. In any event, by installing an AMS, the mine operator reduces the likelihood of lost property and lost profit due to a mine fire accident.

For purposes of this PREA, these safety benefits to the mine operator are characterized as cost savings for the mine operator, and are analyzed in Chapter IV as part of the analysis of costs.

Examples of Specific Fires

Beatrice Mine Fire

On November 25,1981, a conveyor belt caught fire on the longwall panel in Beatrice Mine, Buchanan County, Virginia. MSHA investigators assumed that the fire originated at the dolly car, a part of the belt take-up that serves as a belt storage system. A small flame

[20] Donald W. Mitchell, Mine Fires, Third Edition (Chicago, IL: Intertec Publishing), 1996, page 1.

ignited combustible material that, in turn, ignited the belt, and about 2,000 feet of belt burned. The fire became so intense that rubber gaskets at the joints of the high-pressure water line along the conveyor belt melted, causing a lack of water pressure and preventing the use of water to fight the fire. The use of chemical fire extinguishers and rock dust proved ineffective in preventing the spread of the fire, and the mine had to be sealed.

Sealing operations included covering the intake shafts with plywood, plastic, and concrete over steel rails. The return shafts were sealed with plywood and rigid foam. Later, two vertical holes (2,300 feet deep and cased with steel pipes) were drilled into the fire area to insert liquid nitrogen. Over a period of a month, 18.6 million cubic feet of nitrogen was pumped into the fire area to starve the fire of oxygen.

After it was shown that the fire was out and the underground atmosphere had begun to stabilize, plans were made to reopen the mine. The seals were removed, fans were started, and the mine atmosphere was monitored until it was determined that it was safe for mine rescue teams to examine the mine. Rehabilitation work consisting of pumping, rock dusting, timbering, and checking for methane was then conducted. On March 29, 1982, coal production resumed on a limited basis.

The mine was closed for 124 days. At the time of the fire, Beatrice Mine produced 3,500 tons of coal per day and, based on a five-day week, lost production during the fire was about 315,000 tons of coal. At the 1981 price of $26 per ton of coal, this mine lost about $8.2 million in revenue.

In addition to the lost revenue, the owners incurred substantial expenses as a result of the fire. These expenses included the cost of materials and labor to seal the mine; the cost of drilling holes into the fire area and injecting nitrogen into those holes; the cost of preparing the mine for reopening, such as removing the seals and clearing the mine of dangerous gases; and the cost to rehabilitate, where possible, the areas damaged in the fire. The 380 underground miners were assigned to other mines that the company owned during the time the mine was closed.

MSHA also incurred costs in investigating the fire and providing assistance to the mine. Several MSHA personnel were present at various times throughout the 124 days the mine was closed. The cost to MSHA of direct logistics support services was $64,000.

Florence No. 1 Mine Fire

On November 27, 1986, at about 2:00 a.m., a conveyor belt caught fire at the Florence No. 1 Mine, Indiana County, Pennsylvania. A defective bottom roller on the tight side of the belt entry, combined with an accumulation of coal dust, caused the fire.

Due to the Thanksgiving holiday, the mine was idle that day, and only two section foremen and one pumpman were present at the mine. The twn fnremcn discovered the fire One foreman advanced inby while spraying water on the fire. The other foreman and the pumpman built a check curtain to reduce the air velocity in the belt entry. After fighting the fire for some time, the two section foremen left the mine and were taken to a hospital where they were treated for smoke inhalation.

The pumpman returned to the fire with the mine foreman and a general assistant who had arrived at the mine. During the firefighting activities, the mine foreman suffered a fatal

heart attack and was removed from the mine. For more than an hour, no one was in the mine to fight the fire.

The belt continued to burn until the fire reached the belt drive, a distance of about 1,200 feet. The fire suppression system at the belt drive activated automatically and was instrumental in stopping the fire. By 10:30 p.m. the same day, the fire had been extinguished.

The fire occurred in a sandstone fault area of the mine. Although there was coal dust at the point of origin of the fire, the entry was mostly noncombustible sandstone. After the fire started, the belt was the sole source for propagating the flame. Had the fire occurred in a coal seam rather than in a fault area, the fire would have been more severe.

The mine stopped producing for about a week. Miners went underground during that time to perform maintenance, install new belt, and rehabilitate damaged areas. Florence No. 1, Robinson Portal mine was producing 3,200 tons per day and employed 317 miners who worked underground at the time of the fire. At a 1986 price of $24 per ton of coal, about $384,000 in revenue was lost. Blacklick Mine, which is connected to Florence No. 1, also lost production during that time, but MSHA does not have an estimate of this loss.

Marianna Mine Fire

On March 7, 1988, a fire started at a belt drive in the Marianna Mine, Washington County, Pennsylvania. The MSHA report of the fire indicated that loose coal probably spilled onto the lower belt and accumulated in the drive rollers, where it was ground into coal dust. This, in turn, caused belt slippage and frictional heating that ignited the coal and the belt. The fire quickly propagated down the belt, ignited other combustibles, and totally engulfed parts of the belt entry. Eventually it burned over the top of a stopping to the track entry, where it ignited roof coal, cribs, and guard boards.

Miners at the five working sections of the mine were evacuated within 90 minutes of the discovery of the fire, but three of these sections were inby the fire and miners had to evacuate through heavy smoke. One entire crew of miners was in grave danger when they became disoriented in the smoke and traveled farther into the mine before finding their way out. Five of the miners were sent to a hospital for treatment of smoke inhalation.

Firefighting activities continued after the evacuation of the sections. Foam, water, and rock dust were used, but the belt fire continued to spread. Levels of combustible gases reached 10 percent in one of the returns. About 23 hours after the fire was discovered, all personnel were withdrawn from underground, and plans were made to flood the area of the mine where the fire was located.

Several boreholes were drilled from the surface into the fire area. Water was pumped into one borehole and limestone, cement, and polyurethane were pumped into others to serve as dams to contain the water. When this proved unsuccessful, a second plan was formulated to use the dams as air seals. This plan also proved unsuccessful.

A month after the fire began, mine rescue teams entered the mine to examine the seals. Smoke, roof and rib sloughage, water, and several roof falls were encountered. The mine was then sealed and remains sealed today. MSHA knows of no plans to try to reopen

the mine. Of the 327 employees at the Marianna mine site, only a few are still employed in mining.

At the time of the fire, Marianna Mine had been producing 4,159 tons of coal per day on two coal-producing shifts, five days per week. At the 1988 price of $22 per ton of coal, the annual lost revenue would be about $23.8 million. Revenue will continue to be lost, as the mine remains closed, up to the productive capacity of the mine.

Mine Property at Risk from Fire

A summary of the costs of belt-entry fires in terms of lost production is presented in Table 111-2. This table presents the revenue losses incurred during the nonproduction period associated with three mine fires since 1980. These data reflect only revenue losses from coal nonproduction evaluated at the 2000 price of coal of nearly $17 per ton. The data do not encompass other costs or financial losses incurred by the mine operator or employees.

The effect and impact of the Marianna Mine fire is an example of the expenses that are incurred in fighting a belt-entry fire. Personnel and equipment from nearby mines were brought to the mine to fight the fire. Food, lodging, and wages were provided for these personnel by the mine operator. When the rescue teams were withdrawn, all equipment was left in the mine, and mines that loaned the equipment were reimbursed. More than 30 boreholes were drilled in an attempt to form underground seals for controlling the fire by using materials pumped from the surface. This effort required sophisticated high-speed drilling equipment to operate 24 hours a day in normally inaccessible areas. Access rights were purchased from landowners, and roadways were cleared and built so that drilling equipment could be installed. When a borehole was drilled errant to its intended location (e.g., an intersection), as many as four boreholes had to be drilled before a suitable borehole was obtained at the intended location.

Material was pumped into the mine through the boreholes in an attempt to create underground seals. When this attempt to extinguish the fire failed, the entire mine was sealed. During the 30 days between the discovery of the fire and sealing of the mine, the direct cost of the fire fighting efforts was reported to have been between $5 and ***$6*** million.

Following this effort, the land was reclaimed to its original state, and the mine operator paid reimbursement for inconvenience and damage to the landowner.

Other direct costs, not included in this $5 to $6 million amount, would significantly increase the total cost of the Marianna Mine fire. Miners were paid to fight the fire. In addition, miner benefits were maintained for a time following the mine shutdown. Underground mining supplies, equipment, and firefighting equipment owned by the mine operator were left underground when personnel were withdrawn. The cost of this abandoned mining equipment alone is in the millions of dollars.

Thus, the costs associated with the occurrence of a belt-entry fire include the costs of personnel, equipment, and materials for fighting the fire, loss or damage of mining supplies and equipment underground, repair to fire-damaged areas, and future revenue losses due to the loss of minable coal reserves caused by the fire.

For a mine operator, the benefit of using an AMS is a reduction in the risk of liability and property damage from a disastrous mine fire. These safety benefits to the mine operator

Table 111-2.
Lost Production Resulting from Belt-Entry Fires, Selected Fires

Name of Mine	Year of Fire	Number of Weeks Mine Shut Down	Tons of Coal Produced Per Week	Total Tons of Lost Production[1]	2000 Price of Coal[2]	Total Value of Lost Production[3]
Beatrice	1981	18	17,500	315,000	$16.78	$5,285,700
Florence #1[4]	1986	1	16.000	16,000	$16.78	$268,480
Marianna[5]	1988	500	20,795	10,397,500	$16.78	$174,470,050

[1](Column 3) x (Column 4)

[2]MSHA uses the 2000 price of coal to estimate what the value of lost production would be today. The 2000 price of coal per short ton comes from U.S. Department of Energy, Energy Information Administration, *Coal Industry Annual* 2000, January 2002, Tables 80-81, pp. 206-207.

[3](Column 5) x (Column 6)

[4]Figures for Florence #1 do not reflect losses incurred at Blacklick Mine, which was idled for the same time period.

[5]The Marianna mine was sealed on March 7, 1988. MSHA estimates that the mine lost 10 years of productive life because of the fire.

may also be characterized as cost savings for the mine operator. Chapter IV explains in more detail the methodology for calculating this implied cost saving for the mine operator.

OTHER BENEFITS OF PROPOSED RULE

A mine fire can affect not only the mine operators and miners, but also the entire local community. Persons living in the area of the mine may have to be evacuated due to the smoke and toxic gases escaping to the surface from a mine fire. The evacuated persons may be kept from returning to their homes or place of work for several days until officials consider it safe to return.

The Marianna Water Company's pump plant was shut down for three days because of its proximity to a mine supply shaft and the danger of combustible gases being present from the Marianna Mine fire. The use of water in the Marianna community was restricted for about a week as a result of the shutdown of this pump plant. The loss continues to affect the people in Marianna and the surrounding community. As part of the revenue loss caused by the fire, the closing of the mine has cost the Marianna borough and surrounding township almost half of its water revenues and thousands of dollars yearly in wage taxes.

Frequently, fire-fighting duties must be shared by others in addition to a mine's rescue team. Rescue teams from other area mines and local fire departments are often called upon to contribute to the fire-fighting effort and, thus, are exposed to the mine fire hazards. Other rescue teams and fire departments must provide backup coverage for the units responding to the mine fire. Also, drilling crews may be needed to drill boreholes from the surface into the underground mine passageways to monitor a fire and to attempt to extinguish or seal a fire by injection of fire-fighting materials. Drilling crews, used to deliver fire-fighting agents (such as liquified carbon dioxide or nitrogen) and instruments through boreholes, can also be exposed to the hazards of smoke and toxic gases migrating from a fire in the mine to the surface. The use of such agents in an attempt to control a fire requires application over at least several days and can cost over $20,000 a day.

The impact of the loss of production at one mine, by shutdown or loss of minable reserves, on the workers and community is reflected by information presented in the Pennsylvania Coal Data Book (1990), distributed by the Pennsylvania Coal Association. This publication describes the value of one million tons of coal to Pennsylvania. This tonnage represents the annual output of a medium-sized mine producing approximately 5,000 tons of coal per day. Annually, the mining of this coal, valued at $26,780,000, generates 200 direct jobs with a $6,900,000 payroll and 208 indirect jobs with a $4,800,000 payroll. Pennsylvania collects about $250.400 in personal income taxes from these employees. plus business taxes on the operator's profits. About 340 employees lost their employment as a result of the Marianna Mine conveyor belt fire. The effects of this fire included reduced tax revenue for the state, the local community, and county. While the data are specific to Pennsylvania, it is representative of locations throughout the nation.

IV. COST OF COMPLIANCE

SUMMARY

The proposed rule revises various sections of Part 75, which regulates underground coal mines. These revised sections include §75.301 Definitions, § 75.350 Air courses and belt haulage entries (title revised to Belt air course ventilation), § 75.351 Atmospheric monitoring systems, § 75.352 Return air courses (title revised to Actions in response to AMS alert and alarm signals or malfunctions), § 75.371 Mine ventilation plan, § 75.372 Mine ventilation map, and § 75.380(g) Escapeway; bituminous and lignite mines.

The main substantive changes of the proposed rule are for three-or-more-entry mines that voluntarily choose to use belt air as intake air to ventilate the working places of the coal mine. Three-or-more-entry mines that choose to ventilate the working places with belt air are required to use an atmospheric monitoring system (AMS) to assure worker safety. A secondary substantive change applies to three-or-more entry mines that voluntarily choose to point feed the belt air course.

Mines that choose not to use belt air at the working places or to point feed the belt air would not be affected by the proposed rule. Two-entry mines are also not impacted by the proposed rule. Because all changes impact only mines that voluntarily undertake certain actions, there are only cost savings from the proposed rule.

The primary cost savings from the proposed rule are for three-or-more-entry underground coal mines that would choose to use belt air at the working places. Cost savings from this source are estimated at $654 thousand per year.

Secondary cost savings of the proposed rule are for three-or-more-entry mines that would choose to point feed the belt air, but would not use belt air at the working places. For mines that choose not to use belt air at the working places, these cost savings from point feeding are estimated at $31 thousand per year.

In total, the net cost savings from the proposed rule are $685 thousand per year. Table IV-1 provides summary figures for the cost savings. Table IV-1 is based on Table IV-23 for mines that would use belt air at the working places, and Table IV-31 for mines that would point feed the belt air, but not use belt air at the working places.

Table IV-2 provides the gross costs, gross cost savings, and net cost savings. The net cost saving of $685 thousand per year results from a gross cost of $1.392 million per year and a gross cost saving of $2.077 million per year. The gross costs are derived from Tables IV-21 and IV-29. The gross cost savings are derived from Tables IV-22 and IV-30. The net cost savings are derived from Tables IV-23 and IV-31.

These cost and cost saving estimates and the methodology for deriving these estimates are described in more detail below.

METHODOLOGY

For this proposed rule, MSHA estimated the following costs or cost savings, as appropriate, for both existing and new mines: (1) one-time or intermittent costs or cost savings; (2) annual costs or cost savings; and (3) the present value of annual costs or cost

Table IV-1.
Total Yearly Costs and *Cost* Savings for All Mines
As a Result of Proposed Rule, By Category of Affected Mine

Mine Size (Number of Employees)	Total Yearly Costs (Cost Savings) for All Mines That Choose to Use Belt Air at the Face[1]	Total Yearly Costs (Cost Savings) for All Mines That Choose to Point Feed, But Not Use Belt Air at the Face[2]	Total Yearly Costs (Cost Savings) for All Mines Affected By the Proposed Rule[3]
1-19	($18,651)	($4,428)	($23,080)
20-99	($81,442)	($20,727)	($102,170)
100-500	($496,320)	($6,198)	($502,518)
Over 500	($57,264)	$0	($57,264)
Total	($653,678)	($31,354)	($685,031)

'Source: Table **IV-23.**

[2]**Source: Table IV-31.**

[3]**Sum of** Columns 2 and **3.**

Table IV-2.
Total Yearly Costs and Cost Savings for All Mines
As a Result of Proposed Rule, By Gross Costs and Gross Cost Savings

Mine Size (Number of Employees)	Total Yearly Gross Costs for All Mines Affected By the Proposed Rule'	Total Yearly (Gross Cost Savings) for All Mines Affected By the Proposed Rule[2]	Total Yearly Net Costs (Net Cost Savings) for All Mines Affected By the Proposed Rule[3]
1-19	$163,013	($186,093)	($23,080)
20-99	$626,537	($728,706)	($102,170)
100-500	$602,125	($1,104,643)	($502,518)
Over 500	$0	($57,264)	($57,264)
Total	$1,391,675	($2,076,707)	($685,0312

'Source: Sum of Tables IV-21 and IV-29.

[2]Source: Sum of Tables IV-22 and IV-30.

[3]Source: Sum of Tables IV-23 and IV-31; or Sum of Columns 2 and 3.

savings. One-time costs are those that are incurred once (usually in the year before the rule change) and do not recur annually. Intermittent costs are those that may recur from time to time, but not annually. Capital expenditures, such as the cost of purchasing compliance equipment, are an example of one-time or intermittent costs. Annual costs are costs that normally occur every year. Some examples of annual costs are maintenance costs and recordkeeping costs.

For the purposes of this PREA, the present value of annual costs or cost savings for both existing and new mines were calculated using a (real) discount rate of 7%, as required by the U. S. Office of Management and Budget (OMB), using the formula:

$$PV = A(s) / (1 + i - s), \qquad (1)$$

Where

PV = present value of annual cost or cost saving,

A = annual cost or cost saving,

i = annual discount rate, and

s = annual survival probability of a mine.

The annual survival probability is the percentage of mines that survive to the next year. Under the steady state assumption, the number of mines that fail to survive equals the number of new mines. Table **II-7** provides the numbers for all mines, existing mines, and new mines for the first year of the proposed rule. These numbers may be used to compute the present values.

Table **IV-3** displays the present value calculations computed according to equation (1) above. For the smaller mines (fewer than 100 employees) the annual survival rate is assumed to be (588-96)/588 = **83.7%.** For the larger mines (100 or more employees) the annual survival rate is assumed to be (76-7)/76 = **90.8%.** Under the assumption of a discount rate of 7%, an annual cost of $1 converts to **$3.59** of present value for a smaller mine (fewer than 100 employees) and $5.60 of present value for a larger mine (100 or more employees).

Computing the present value of annual costs or cost savings allows them to be compared with initial costs or cost savings. For existing mines, all present values and initial costs or cost savings are computed as of the year before implementation of the proposed rule. For new mines, all present values and initial costs or cost savings are computed as of the year before the first year of operation of the new mine.

Costs, and especially cost savings, from the proposed rule for new mines versus existing mines are anticipated to differ considerably. For ease and consistency of analysis, we have summarized these costs using a single set of annualized values that are a weighted average of all future years.

Since new mines are assumed to open up at the same rate each year, the yearly cost for new mines is simply the computed present values and initial costs of new mines that open up each year. Table 11-7 provides the number of new mines per year in each employment size category. For each size category, the total yearly cost or cost saving is computed as the sum of the cost or cost saving for each mine in that category. For example, in a category with **10**

Mine Size (Number of Employees)	Annual Survival Rate of Old Mines[1]	Annual Arrival Rate of New Mines[2]	Annual Discount Rate	Present Value Multiplier Relative to Annual Cost[3]
11-19	83.7%	16.3%	7.0%	3.59
20-99	83.7%	16.3%	7.0%	3.59
100-500	90.8%	9.2%	7.0%	5.60
Over 500	90.8%	9.2%	7.0%	5.60
All Mines	84.5%	15.5%	7.0%	3.75

[1]Source: Table 11-7, Column 3.

[2]Source: Table 11-7, Column 4.

[3](Column 2) / (1 + Column 4 - Column 2).

mines, if 5 mines have a cost saving of $200 each, 3 mines have a cost saving of $100 each, and 2 mines have no cost or cost saving, then the total cost saving for that category is $1,300.

During the first year of the rule, it is assumed that new mines would open up at the average annual rate and that the same number of the previous year's mines would shut down. Hence, the number of existing mines operating in the first year equals the total number of mines minus the number of new mines. Table 11-7 shows the estimated number of existing mines and new mines for each size category during the first year of the rule.

In order to provide equivalent yearly estimates for the existing mines, we must convert (or "annualize") the present values and initial costs and cost savings of the existing mines. The formula for converting the initial costs or cost savings into a perpetual stream of equal yearly values is:

$$Y = (I + PV)\ (i), \qquad (2)$$

Where

Y = yearly cost or cost saving,

I = initial cost or cost saving,

PV = present value of annual cost or cost saving, and

i = annual discount rate.

Under the assumed 7% discount rate, $100 of initial cost or cost saving (I + PV) converts to a perpetual yearly stream of $7.00 per year in cost or cost saving.

MSHA used hourly compensation rates of $19.58 for a clerical worker, $28.07 for a miner working in a coal mine, and $54.92 for a supervisor working in a coal mine.[21] These miners' wages and all other costs and cost savings associated with the proposed rule are reported in 2001 dollars. These figures include benefits (which include social security, unemployment insurance, and workers' compensation), but they do not reflect shift differentials or overtime pay. For convenience, MSHA will refer to miner "compensation" in this PREA as "wages," where that term is understood to include benefits.

SCOPE

The proposed rule applies to all underground coal mines. However, the substantive changes of the proposed rule relative to the existing rule apply only to mines that voluntarily choose to use belt air to ventilate the working places of the coal mine or that voluntarily choose to point feed the belt air. For all other underground mines, there is a rearrangement of some of the wording in Part 75, but this rearrangement of words produces no substantive change in regulatory requirements. For example, § 75.352 in the current rule, which forbids belts in the return. has been moved to § 75.350(a) in the proposed rule.

The proposed rule would apply to three-or-more-entry mines that voluntarily choose to use belt air as intake air to ventilate the working places of the coal mine. Mines that choose to ventilate the working places with belt air are required to use an atmospheric

[21] Data derived from Jennifer B. Leinart, compiler, *U.S. Coal Mine Salaries, Wages, and Benefits: 2001* Survey Results, Spokane, Washington: Western Mine Engineering, Inc., 2001.

monitoring system *(AMS)* and adopt other measures to assure worker safety. The proposed rule also applies to mines that voluntarily choose to point feed the belt air course. The rule does not impact two-entry mines, which must still petition MSHA.

Mines that do not choose to use belt air at the working places and that do not point feed the belt air are unaffected by the proposed rule. For mines that choose to adopt either or both of these practices, the proposed rule provides a compliance alternative. Since there is no technological or economic imperative that requires an underground coal mine to adopt either practice, adoption of either practice is voluntary. Accordingly, in its economic analysis, MSHA presumes that any coal mine that adopts either practice intends or expects to achieve cost savings as a result. MSHA's role is to mandate safety regulations that apply to either practice.

The use of belt air at the working places is primarily, though not exclusively, confined to larger mines which employ 100 or more workers. Based on MSHA's records of granted belt-air petitions (not counting petitions for two-entry mines), MSHA estimates that 38% of mines with 100-500 employees currently use belt air at the working places. In the event that the proposed rule is adopted, MSHA anticipates that 55% of existing mines with 100-500 employees, and 75% of new mines in this category, will choose to use belt air at the working places. MSHA also anticipates that 30% of existing mines with 100-500 employees, and 16% of new mines in this category, will choose to point feed the belt air, but not use belt *air* at the working places. Fewer than 45% of mines with less than 100 employees are expected to point feed the belt air or to use belt air at the working places. Estimated percentages are shown in Tables IV-15 and **IV-25.**

Only three-or-more-entry mines that choose to use belt air at the working places, or to point feed the belt air, are subject to the substantive changes of the proposed rule.

SECTION-BY-SECTION DISCUSSION

§ 75.301 Definitions

The addition of six new definitions to this section does not add or reduce any obligations. Accordingly, there are no cost changes associated with this section.

§ 75.350 Belt Air Course Ventilation

This section contains three paragraphs. Paragraph (a) applies to all mines that do not use belt air at the working places and that do not point feed the belt air. Paragraph (b) applies to all three-or-more-entrymines that choose to use belt air at the working places. Mines that choose to undertake operations under paragraph (b) are required to use an AMS system. Paragraph (c) applies to all three-or-more-entry mines that choose to use point-feed regulators to provide additional intake air to the belt air courses.

Paragraph (a) Mines That Do Not Use Belt Air

Mines that do not use belt air at the working places, and that do not point feed the belt air, experience no change from the current rules. Section 75.350(a) requires that belt air courses be separated from both the intake air and the return air. In the current rule, mines that opened prior to March 31, 1970 were potentially exempt from this requirement.

However, none of the mines in this category that remain open are actually exempt from this requirement. Accordingly, mines that do not choose to use belt air at the working places, and that do not choose to point feed the belt air, experience no increase in costs and no cost savings.

Paragraph (b) Mines That Choose to Use Belt Air

Three-or-more-entry mines that choose to use belt air at the working places are required to install an *AMS* and must adhere to other requirements. These mines experience both costs and cost savings, but are presumed to have cost savings on net.

costs

Under § 75.350(b)(1) there are costs of installing, operating, examining, and maintaining an *AMS*, as well as other costs detailed later.

MSHA is aware that many mines not using belt air at the working places have nevertheless installed the major elements of an *AMS* for reasons of fire detection and/or production efficiency. These systems include Programmable Logic Controllers (PLC) and many also include carbon monoxide (CO) sensors. More mines have installed these systems than have petitions to use belt air at the working places. Because a PLC has additional important uses, MSHA regards it as unlikely that a mine would install a PLC for the sole purpose of using belt air at the working places. However, the opportunity to use belt air at the working places increases the likelihood that a mine will choose to install an *AMS*, or to upgrade existing PLC and/or CO systems.

Accordingly, for many mines a better measure of the cost of the proposed rule is the incremental cost of an *AMS*. MSHA believes that a typical mine contemplating an AMS, already has (or plans to have) a PLC and is simply concerned with the cost of adding CO sensors and related components to its pre-existing (or already planned) PLC. Tables IV-4, IV-5, and IV-6 estimate the incremental costs for this typical situation. These three tables portray the incremental costs associated with installing and using an *AMS* and related components, for the purpose of monitoring the belt air going to the working places.

Table IV-4 estimates the initial cost of installing an AMS and related components. The initial cost of installing an AMS (second column) is an estimate of the cost to purchase and install an *AMS*, based on system size and the number of CO sensors in mines of each size. The initial cost of point feeds (third column) is based on Table IV-24. The fourth column, which displays the sum of various initial documentation costs, is based on Tables IV-33, IV-34, IV-47, and IV-48. The initial cost of a second communication system (fifth column) is based on Table IV-44.

Table IV-5 estimates the annual cost of using an AMS and related components. The annual cost of operating the AMS (second column,) is based on Table IV-32. The annual cost of examining, testing, and calibrating the AMS (third column) is based on Table IV-7.

The fourth column of Table IV-5, the annual cost of "other maintaining," is computed as the sum of two items. The first item is an estimate of the maintenance costs not already included in the third column. It is an industry rule of thumb that annual maintenance costs are approximately 10% of initial costs. The third column is already about 10% of initial

Table IV-4.
Incremental Initial Cost Per Mine of Installing
an Atmospheric Monitoring System **(AMS)** & Related Components
to Monitor Belt Air Going to the Working Places

Mine Size (Number of Employees)	Initial Cost of Installing AMS	Initial Cost of Point Feeds'	Documentation Requirements*	Initial Cost of Second Communication System[3]	Total Installation Cost[4]
1-19	$58,300	$400	$239	$64	$59,003
20-99	$71,800	$800	$275	$96	$72,971
100-500	$157,600	$1,600	$348	$288	$159,836
Over 500	$193,600	$3,200	**$410**	$384	**$1**97,594

Mine Size (Number of Employees)	Annual Cost of Operating[1]	Annual Cost of Examining, Testing, and Calibrating[2]	Annual Cost of Other Maintaining[3]	Annual Cost of Responding to and Recording AMS Signals[4]	Annual Training Cost[5]	Annual Cost of Point Feeding[6]	Total Annual Costs[7]
1-19	$1,684	$1,884	$1,198	$137	$401	$40	$5,344
20-99	$5,053	$6,002	$1,533	$408	$513	$80	$13,588
100-500	$10,105	$15,715	$3,416	$1,193	$625	$160	$31,214
Over 500	$15,158	$25,432	$4,318	$2,207	$737	$320	$48,172

[1]Source: Table IV-32.

[2]Source: Table IV-7.

[3]Source: (Table IV-4, last column) x (2%) + Table IV-41.

[4]Source: Table IV-38 + Table IV-46.

[5]Source: Table IV-43.

[6]Source: Table IV-24, Column 5.

[7]Sum of Columns 2-7.

Table IV-6.
Present Value of Incremental Costs Per Mine of Installing & Using an Atmospheric Monitoring System **(AMS)** & Related Components to Monitor Belt Air Going to the Working Places

Mine Size (Number of Employees)	Initial Installation Cost[1]	Total Annual Costs[2]	Present Value of Annual Costs[3]	Present Value of All Costs[4]
1-19	$59,003	$5,344	$19,168	$78,171
20-99	$72,971	$13,588	$48,739	$121,710
100-500	$159,836	$31,214	$174,820	$334,656
Over 500	$197,594	$48,172	$269,796	$467,391

'Source: Table IV-4.

[2]Source: Table **IV-5.**

[3]Source: (Table IV-3) **x** (Column 3).

[4]Sum of Column 2 and Column **4.**

costs. **MSHA** estimates that the third column contains most, but not all, the maintenance costs of an AMS. Accordingly, **MSHA** estimates only **2%** of initial costs for other annual **maintenance. The second item is the cost** of **maintenance records. This second item is** derived in Table IV-41.

The fifth column of Table **IV-5,** the annual cost of responding to and recording AMS signals, is the sum of quantities from Tables **IV-38** and **IV-46.** The annual training cost (sixth column) is based on Table **IV-43.** The annual cost of point feeding (seventh column) is obtained from Table **IV-24.**

Table **IV-6** computes the present value of AMS costs by using the information on installation costs from Table **IV-4** and the information from annual costs from Table **IV-5.**

Table **IV-7** provides the annual cost per mine of examining, testing, and calibrating an AMS. The annual cost of creating records of hazards spotted during the on-shift **examination** of **the** *AMS* **(second column) is based on Table IV-35. The annual cost of the** weekly testing of alerts and alarms of the AMS (third column) is obtained from Table **IV-36.** The annual cost of creating records of the weekly testing of the ***AMS*** (fourth column) is **based on Table** IV-39. **Thc annual cost** of **thc monthly calibration of the** *AMS* **(fifth column)** is obtained from Table **IV-37.** The annual cost of creating records of the monthly calibration of the AMS (sixth column) is based on Table **IV-40.**

Cost Savings - Direct

Cost savings from the proposed rule for three-or-more-entry mines that choose to **use** belt air at the working places are of four general types. Three of these sources of cost saving are rather direct. They result from savings in ventilation cost, savings in shaft sinking cost, and savings in petition cost. The fourth source of cost saving is implied, and results from the improved fire safety provided by an *AMS*.

The first general type of cost saving is from improved mine design or reduced ventilation cost. **MSHA** expects that new mines would derive more cost savings from this source than would existing mines. This is because mines that are not yet constructed can be redesigned at little cost, but already constructed mines are not easily retrofitted.

Existing mines may be able to reduce ventilation cost if permitted to use belt air at the working places. Table **IV-8** estimates the ventilation cost savings per mine for existing mines that choose tu use boll air. **MSHA** estimates that some existing mines (with 100-500 employees) may be able to save **20** air horsepower in ventilation requirements and obtain an annual energy savings of $5,225. **MSHA** estimates different energy cost savings for different mine sizes. **MSHA** does not believe that use of belt air at the working places can achieve cost savings in every coal mine, because only some mines and mine designs can benefit from such ventilation. Energy cost savings are estimated only for those mines that can benefit, not for mines that cannot benefit.

New mines can be designed to reduce ventilation cost still further. **MSHA** estimates **that many new mincs (with 100-500 cmployees) will be able save 80 air horsepower in** ventilation requirements and obtain an annual energy savings of **$20,900.** Table **IV-9** estimates the ventilation cost savings per mine for new mines that choose to use belt air.

Mine Size (Number of Employees)	On-Shift Examination Records[1]	Weekly Testing[2]	Weekly Testing Records[3]	Monthly Calibration[4]	Monthly Calibration Records[5]	Annual Cost Per Mine[6]
1-19	$4	$714	$48	$1,064	$55	$1,884
20-99	$4	$1,428	$95	$4,255	$220	$6,002
100-500	$6	$2,142	$143	$12,766	$659	$15,715
Over 500	$11	$2,856	$190	$21,276	$1,098	$25,432

[1]Source: Table IV-35.

[2]Source: Table IV-36.

[3]Source: Table IV-39.

[4]Source: Table IV-37.

[5]Source: Table IV-40.

[6]Sum of Columns 2-6.

Table IV-8.
Ventilation Cost Savings Per Mine
for Existing Mines That Choose to Use Belt Air

Mine Size (Number of Employees)	Annual Cost (Cost Saving)	Present Value of Cost (Cost Saving)'
1-19	($1,045)	($3,748)
20-99	($3,135)	($11,245)
100-500	($5,225)	($29,263)
Over 500	($6,270)	($35,1161))

'Source: (Table IV-3) x (Column 2).

Table IV-9.
Ventilation Cost Savings Per Mine
for New Mines That Choose to Use Belt Air

Mine Size (Number of Employees)	Annual Cost (Cost Saving)	Present Value of Cost (Cost Saving)'
1-19	($5,225)	($18,742)
	($10,450)	($37,485)
	($20,900)	($117,054)
Over 500	($52,250)	($292,634)

'Source: (Table IV-3) x (Column 2).

The second general type of cost saving is a reduction in the cost of sinking shafts for underground coal mines. Mines may be able to reduce the number and sizes of shafts, and thereby reduce shaft sinking costs. Particularly for larger mines, shafts may be needed to provide additional ventilation in places where air flow is very low because entries have become very long. An alternative to sinking another shaft is to use belt air as additional intake air to provide the needed ventilation. Using belt air as an alternative source of ventilation may permit the mine operator to postpone sinking an additional shaft.

This source of cost savings is confined to larger mines that use shafts. Smaller mines generally use horizontal openings ("drifts") or diagonal openings ("slopes") rather than vertical openings ("shafts"). Shafts, drifts, or other openings are needed to provide air to the mine. Smaller mines are likely to use no shafts, and smaller mines that do use shafts are likely to use only one shaft. Consequently, smaller mines do not have the option of saving money by postponing the construction of shafts.

MSHA estimates the reduced shaft sinking costs under the assumption that a larger mine using belt air at the working places can delay the sinking of some shafts for three years. The postponement of a capital expenditure for three years has value, because capital can be invested elsewhere for a period of time and earn a return. The value of postponing the capital expenditure is computed at the real rate of return of 7% per year.

For mines having 100-500 employees, it is assumed that 2-3 shafts can be postponed for 3 years each over a 30-year period, for a frequency of 0.083 shaft postponed per year. For mines having over 500 employees, it is assumed that 3-4 shafts can be postponed for 3 years each over a 30-year period, for a frequency of 0.117 shaft postponed per year. The value to a mine from postponing a shaft sinking is the difference between the cost of shaft sinking now, and the discounted present value of the cost of a shaft sinking later on. Table IV-10 displays these estimates of the reduced shaft sinking cost per mine for new mines that choose to use belt air.

The third general type of cost saving is the elimination of the need to file a petition for modification in order to obtain approval to use belt air at the working places. These petition cost savings result from (a) not having to incur the direct cost of filing a petition, and (b) not having to wait for a favorable decision on the petition before proceeding. Only mines that would choose to use belt air at the working places, and which do not already have granted petitions, would experience these cost savings. The estimate of petition costs includes the direct costs of filing petitions, and the indirect costs of waiting to obtain approval of a petition. These estimates are shown in Table IV-11 for existing mines, and in Table IV-12 for new mines.

The direct cost of a petition for 78% of the petitions is assumed to be 40 hours of managerial time per petition.[22] At a wage rate of $54.92 for a coal mine supervisor, this comes to $2,197 per petition. The direct cost of a petition for 22% of the petitions is

[22] The 40 hours of managerial time per petition is an assumption made in the information collection package (OMB control number 1219-0065, answer to question 12) for 30 CFR §§ 44.9, 44.10, and 44.11 *Petitions for Modification of Mandatory Safety Standards.* The assumption applies to 135 (78%) of 174 petitions.

Table IV-10.
Shaft Sinking Cost Savings Per Mine
for Mines That Choose to Use Belt Air

Mine Size (Number of Employees)	Shaft Sinking Cost	Number of Years Postponed	Value (Cost Saving) of Cost Postponement[1]	Postponements Per Mine Over 30-Year Period	Frequency (Per Year) of Cost Postponement[2]	Expected Annual Value (Cost Saving)[3]	Present Value of Cost (Cost Saving)[4]
1-19	$3,000,000	2	($379,684)	0.0	0.0%	$0	*$0*
20-99	$6,000,000	2	($759,368)	***0.0***	**0.0%**	*$0*	*$0*
100-500	$7,500,000	3	($1,377,766)	2.5	8.3%	($114,814)	($643,032)
Over 500	$9,000,000	3	($1,653,319)	3.5	11.7%	($192,887)	($1,080,294)

Table IV-11.
Present Value of Cost of Petition for Existing Mines to Use Belt Air at the Working Places

Mine Size (Number of Employees)	Direct Cost Per Mine of Filing Petition[1]	Indirect Waiting Cost Per Mine-- Lost Ventilation Savings[2]	Indirect Waiting Cost Per Mine-- Lost Shaft Sinking Savings[3]	Total Petition Cost Per Mine[4]
1-19	$2,153	$874	$0	$3,027
20-99	$2,153	$2,623	$0	$4,776
Estimates for Typical Belt-Air Mines				
100-500	$2,153	$4,371	$96,057	$102,581
Over 500	$2,153	$5,246	$161,376	$168,774
Estimates for Marginal Belt-Air Mines'				
100-500	$2,153	$1,237	$27,184	$30,574
Over 500	$2,153	$1,137	$34,989	$38,280

[1]Source: Information Collection, Office of Management and Budget (OMB) Control Number 1219-0065. Formula: (40 hours) x (Supervisor Wage Rate) x (135 / 174) + (16 hours) x (attorney rate of $125/hour) x (39 / 174).

'Source: (Table IV-8, Column 2) x (314.4 / 365) / $(1.07)^{(314.4 / 365 / 2)}$.

[3]Source: (Table IV-10, Column 7) x (314.4 / 365) / $(1.07)^{(314.4 / 365 / 2)}$.

[4](Columns 2 + 3 + 4).

[5]Columns 3, 4, and 5 of the bottom two rows are calculated as a (proportioning factor) x (the corresponding middle rows). This proportioning factor is 28.3% for mines with 100-500 employees and 21.7% for mines with over 5uu employees. See Table IV-13, Footnote 10 for formula,

Table IV-12.
Present Value of Cost of Petition for New Mines to Use Belt Air at the Working Places

Mine Size (Number of Employees)	Direct Cost Per Mine of Filing Petition[1]	Indirect Waiting Cost Per Mine-- Lost Ventilation Savings[2]	Indirect Waiting Cost Per Mine-- Lost Shaft Sinking Savings[3]	Total Petition Cost Per Mine[4]
1-19	$2,153	$4,371	$0	$6,524
20-99	$2,153	$8,743	$0	$10,895
Estimates for Typical Belt-Air Mines				
100-500	$2,153	$17,486	$96,057	$115,695
Over 500	$2,153	$43,714	$161,376	$207,242
Estimates for Marginal Belt-Air Mines[5]				
100-500	$2,153	$5,097	$28,002	$35,252
Over 500	$2,153	$9,450	$34,885	$46,487

'Source: Information Collection, Office of Management and Budget (OMB) Control Number 1219-0065. Formula: (40 hours) x (Supervisor Wage Rate) x (135 / 174) + (16 hours) x (attorney rate of $125/hour) x (39 / 174).

'Source: (Table IV-9, Column 2) x (314.4 / 365) / $(1.07)^{(314.4 / 365 / 2)}$.

[3]Source: (Table IV-10, Column 7) x (314.4 / 365) / $(1.07)^{(314.4 / 365 / 2)}$.

[4](Columns 2 + 3 + 4).

[5]Columns 3, 4, and 5 of the bottom two rows are calculated as a (proportioning factor) x (the corresponding middle rows). This proportioning factor is 29.2% for mines with 100-500 employees and 21.6% for mines with over 500 employees. See Table IV-14, Footnote 10 for formula.

eliminating petition costs to the mine operator. The proposed rule makes it easier for the mine operator to obtain savings from reduced ventilation costs and reduced shaft sinking costs.

MSHA believes that the value of an **AMS** for fire safety is likely to vary considerably from one mine to another. For example, some mines are at greater risk of fire than others, some mines are easier to evacuate than others, and some mines have more property at risk than others. Therefore, different mine operators may value early fire detection capability differently relative to the cost of an ***AMS***.

The proposed rule increases the profitability of an ***AMS*** by eliminating the cost of the petition process that is currently needed to obtain permission to use belt air at the working places. Eliminating the petition cost removes a regulatory obstacle, which in turn results in a cost saving to the mine operator. This reduction in cost to using belt air will encourage more mine operators to use belt air at the working places. At the same time, this reduction in cost will encourage more mine operators to install an AMS.

A mine operator's choice to install, or not install, an ***AMS***, reveals something about the value to the mine operator of the reduced fire risk provided by **an *AMS*.** These choices reveal a range of values for the implicit cost savings to the mine operator of using an **AMS** to provide improved fire safety.

The proposed rule reduces the "price" to the mine operator of using an ***AMS*** to achieve fire safety benefits. Under the existing rule, the mine operator must file a petition in order to use belt air at the working places. Under the proposed rule, the mine operator does not need to file a petition in order to use belt air at the working places. Accordingly, the "price" to the mine operator of using belt air at the working places is reduced by the amount of the petition cost.

There are three logical possibilities for a mine operator who might choose to use belt air at the working places. First, the mine operator might choose not to use belt air under either the existing or the proposed rules. For such a mine operator, the implied safety benefit from installing an ***AMS*** must be lower than the cost of the ***AMS***, minus the reduced ventilation cost and reduced shaft sinking cost from being allowed to use belt air at the working places. This calculation is shown in the seventh column of Tables IV-13 and IV-14.

Second, the mine operator might choose to use belt air under both the existing rule and the proposed rule. For such **a** mine operator, the implied safety benefit from installing an AMS is at least equal to the cost of the ***AMS***, plus the cost of filing a petition, minus the reduced ventilation cost and reduced shaft sinking cost. This calculation is shown in the ninth column of Tables **IV-13** and **IV-14.**

Third, the mine operator might choose to use belt air under the proposed rule, but choose not to use belt air under the existing rule. For such a mine operator, the implied safety benefit from installing an ***AMS*** must be at least equal to the cost of the ***AMS***, minus the reduced ventilation cost and reduced shaft sinking cost from using belt air. At the same time, the implied safety benefit to the mine operator from installing the ***AMS*** must be less than the cost of the ***AMS***, plus the petition cost, minus the reduced ventilation cost and reduced shaft sinking cost. This establishes a range of possible values of improved fire safety for the mine operator. The most reasonable estimate of this fire safety benefit for the

Mine Size (Number of Employees)	AMS Costs Per Mine[1]	Direct Petition Cost Per Mine[2]	Indirect Pstition Cost Per Mine[3]	Ventilation Cost (Cost Saving) Per Mine[4]	Shaft Sinking Cost (Cost Savng) Per Mine[5]	Fire Safety Benefit-- Upper Bound, for Mines that Never Use AMS[6]	Fire safety Benefit-- Midpoint Estimate, for Mines that Use AMS Only As Result of Rule[7]	Fire Safety Benefit-- Lower Bound, for Mines that Aways Use AMS[8]	Implied Cost (Cost Saving) to Mine Operator of Improved Fire Safety From Installing AMS[9]
1-19	$78,171	$2,153	$874	($3.748)	$0	$74,423	$75,936	$77,450	($75,936)
20-99	$121,710	$2,153	$2,623	($11,245)	$0	$110,465	$112,853	$115,240	($112,853)
Fire Safety Benefits of Larger Mines Proportioned to Estimates for Mines with 20-99 Employees (Estimates for Typical Belt-Air Mines):									
100-500	$334,656	$2,153	$100,428	($29,263)	($643,032)	N/A	$564,263	N/A	($564,263)
Over 500	$467,391	$2,153	$166,621	($35,116)	($1,080,294)	N/A	$1,128,526	N/A	($1,128,526)
Sources of Cost Savings (Including Fire Safety Benefit) Proportioned lo AMS Costs (Estimates for Marginal Belt-Air Mines):"'									
100-500	$334,656	$2,153	$28,421	($8,281)	($181,976)	$144,398	$159,685	$174,972	($159,685)
Over 500	$467,391	$2,153	$36,127	($7,614)	($234,229)	$225,547	$244,687	$263,827	($244,687)

Mine Size (Number of Employees)	AMS Costs Per Mine[1]	Direct Pe-ition Cost Per Mine[1]	Indirect Petition Cost Per Mine[3]	Ventilation Cost (Cost Saving) Per Mine[4]	Shaft sinking Cosl (Cost Saving) Per Mine[5]	Fire satety Benefit-- Upper Bound, for Mines that Never Use AMS[6]	Fire satety Benefit-- Midpoint Estimate, for Mines that Use AMS Only As Result of Rule[7]	Fire satety Benefit-- Lower Bound, for Mines that Always Use AMS[8]	Implied Cost (Cost Saving) to Mine Operator of Improved Fire Safety From Installing AMS[9]
1-19	$78,171	$2,153	$4,371	($18,742)	$0	$59,429	$62,691	$65,953	($62,691)
20-99	$121,710	$2,153	$8,743	($37,485)	$0	$84,226	$89,673	$95,121	($89,6731
Fire Safety Benefits of Larger Mines Proportioned to Estimates for Mines with 20-99 Employees (Estimates for Typical Belt-Air Mines):									
100-500	$334,656	$2,153	$113,543	($117,054)	($643,032))	N/A	$448,367	N/A	($448,367)
100-500	$334,656	$2,153	$33,099	($34,123)	($187,453)	$113,080	$130,706	$148,332	($130,706)
Over 500	$467,391	$2,153	$44,334	($63,259)	($233,528)	$170,604	$193,847	$217,091	($193,847)

mine operator is the midpoint of this range of possible values. This calculation is shown in the eighth column of Tables IV-13 and IV-14.

The mines that would use belt air as a result of the proposed rule, but not under the existing rule, are the only mines for which we can calculate the value of the fire safety benefit with any degree of precision. For these mines only, the implied cost saving to the mine operator from improved fire safety is calculated as the midpoint in the range of possible values. This implied cost saving is shown in the last column of Tables IV-13 and IV-14. This value is simply the negative of the value shown in the eighth column.

For mines with 1-100 employees, there are no reduced costs of shaft sinking. For these mines, cost savings from reduced ventilation cost are insufficient to justify the cost of installing an AMS. Hence, these mines would find it unprofitable to install an AMS simply in order to use belt air, unless they also experience fire safety benefits of sufficient value (in combination with the ventilation cost savings) to justify the cost of an AMS. The implied cost savings to the mine operator from the fire safety benefit are calculated according to the methodology explained above, and are shown in the last four columns of Tables IV-13 and IV-14.

For mines with 100 or more employees, the cost savings from reduced ventilation cost, in combination with the cost savings from reduced shaft sinking cost, are more than adequate to cover the cost saving of installing an AMS. For the typical belt-air mine with 100 or more employees, it is not possible to use the above methodology for computing the implied value of the fire safety benefit.

Instead, the fire safety estimates for typical belt-air mines of this size are computed as a multiple of the fire safety benefit estimated for mines with 20-99 employees. For mines with 100-500 employees, the estimated fire safety benefit is five times the midpoint fire safety estimate for mines with 20-99 employees. For mines with over 500 employees, the estimated fire safety benefit is ten times the midpoint fire safety estimate for mines with 20-99 employees. These estimates for typical belt-air mines are shown in the middle pair of rows in the eighth and tenth columns of Tables IV-13 and IV-14.

Tables IV-13 and IV-14 also compute estimates for "marginal belt-air mines." These are mines that choose to use belt air at the working places only because of implementation of the proposed rule. Because the typical belt-air mine with 100 or more employees experiences cost savings substantially in excess of costs, the marginal belt-air mine must be atypical in some fashion. The marginal belt-air mine must experience cost savings significantly less than what is typical, or they would choose to petition for belt air under the existing rule. Since they do not petition, these mines must have reduced *cost* savings. These mines may have reduced ventilation cost savings, reduced shaft sinking cost savings, or reduced fire safety cost savings. The atypical, marginal mine in this larger size category may perhaps have reduced cost savings in any three of these cost saving categories.

The bottom two rows of Tables IV-13 and IV-14 provide estimates for the marginal mines with 100 or more employees. The fourth, fifth, sixth, eighth, and tenth columns of the bottom two rows (for marginal mines) are pro-rated based on corresponding data in the middle two rows (for typical mines). These data are scaled down proportionately so that the resulting cost savings for the marginal mines equal the AMS costs plus half of the resulting petition costs.

Net Cost Savings

Finally, to estimate the total costs and cost savings, we must estimate for each type of mine, the costs and cost savings for the mine type, and the number or percentage of mines of that mine type that will incur the costs or cost savings. Table IV-15 provides estimates of the percentage of mines in each employment category that are expected to use belt air at the working places.

MSHA estimates that **55%** of existing mines with 100-500 employees would use belt air at the working places, whereas only **38%** currently **do. MSHA** also estimates that **75%** of new mines with 100-500 employees would use belt air at the working places, if the proposed rule were adopted, while only 60% of new mines would use belt air at the working places, if the proposed rule is not adopted.

Table IV-15 also provides estimates for other mine sizes. For mines with fewer than 100 employees, **MSHA** estimates significantly smaller percentages of mines using belt air at the working places. For mines with over 500 employees, **MSHA** estimates 100% of mines will use belt air at the working places, regardless of whether the proposed rule is adopted.

There are four general categories of mines for which costs and cost savings must be estimated. These are: 1) existing mines which currently use belt air at the working places, **2)** existing mines that do not currently use belt air, but that would use belt air if the proposed rule is adopted, 3) new mines that would use belt air, regardless of whether the proposed rule is adopted, and **4)** new mines that would not petition to use belt air under the existing rule, **but that would choose to use belt air under the proposed rule. Existing** and new mines **that** never use belt air at the working places, regardless of whether the proposed rule is adopted, will experience neither costs nor cost savings as a result of the proposed rule.

The first category is existing mines with three or more entries that currently have a granted petition to use belt air at the working places. If the proposed rule is implemented, these petitions for three-or-more-entry mines would be voided, and the existing mines using belt air would be obligated to meet the requirements of the proposed rule. Petitions for two-entry mines would not be superceded. The requirements under the proposed rule impose no significant additional costs compared with the requirements currently in the petitions. The major cost for using belt air is the AMS. Since an **AMS** is required under both the existing petitions and the proposed rule, it is not anticipated that the proposed rule will cause any **reduction in the use of belt air by existing mines.** Since these mines have already incurred the cost of filing a petition, these mines will experience no cost savings from eliminating the petition-filing requirement.

Some minor costs and cost savings may result for the existing mines that already have petitions to use belt air, since the requirements of the proposed rule differ somewhat from some of the petition requirements. For a fraction of the mines with older petitions to use belt air, there may be a need to install additional sensors. This is a minor cost item.

The proposed rule also provides some flexibility that could result in cost savings for existing mines, relative to the **usual petition requirements. In particular, for mines that have** difficulty meeting the 50-feet per minute airflow requirement (§ 75.351(e)(3)), the proposed rule provides two additional options that may result in cost savings for such mines. The first option is to point feed the belt air to maintain the required air velocity (§ 75.350(c)). The

	Percentage of Mines in Category			
Mine Size (Number of Employees)	Existing Mines Under Current Rule	txisting Mines Under Proposed Rule	New Mines Under Current Rule	New Mines Under Proposed Rule
1-19	1.9%	3.6%	4.4%	8.4%
20-99	4.4%	8.2%	9.9%	18.1%
100-500	38.4%	55.0%	60.0%	75.0%
Over 500	100.0%	100.0%	100.0%	100.0%

second option is to install more sensors to reduce the sensor spacing from 1,000 feet to 350 feet (§ 75.351(e)(3)). **MSHA** believes that minor cost savings may result for some mines from exercising these options.

There is no way to know whether these minor costs and cost savings, in total, yield either a net cost or a net cost saving for existing mines that already have petitions to use belt air. The net cost or cost saving would be minor in any event. For purposes of this regulatory analysis, **MSHA** assumes that these costs and cost savings net to zero.

The second category is existing mines that do not currently use belt air at the working places, but that would use belt air if the proposed rule were adopted. These mines must incur the cost of an *AMS*. Offsetting this cost is a saving from reduced ventilation cost, a saving from reduced shaft sinking cost, and an implied cost saving to the mine operator from improved fire safety. Because the use of belt air by the mine operator is voluntary, **MSHA** assumes there is an expected net cost saving to the mine operator who chooses this option.

Tables IV-16 and N-17 estimate the total costs and cost savings for those existing mines that are expected to use belt air at the working places *as* a *result* of this proposed rule. Therefore the numbers exclude mines which already use belt air at the working places, since their usage came prior to the proposed rule and not *as a result* of the proposed rule.

The third category is new mines that would use belt air, regardless of whether the proposed rule is adopted. Since these mines would have petitioned to use belt air under the existing rule, but do not need to petition under the proposed rule, these mines would save on petition costs. However, since these mines would have installed an AMS anyway, they experience no change in *AMS* costs and no change in fire safety benefits. They also experience no long-term change in ventilation costs or shaft sinking costs, except during the interim while waiting for a petition approval. These short-term differences in ventilation and shaft sinking costs are already incorporated into the calculation of petition costs (Tables IV-11 and IV-12).

Table IV-18 shows the saving in costs for those new mines that would have used belt air regardless of whether the proposed rule is adopted.

The fourth category is new mines that would not petition to use belt air under the existing rule, but that would choose to use belt air under the proposed rule. Since these mines would not have petitioned to use belt air under the existing rule, these mines do not save on petition costs. These mines are assumed to install an *AMS* in order to use belt air. Accordingly, they must pay the cost of an *AMS*, and experience an implied cost saving from improved fire safety. This implied cost saving is set equal to the implied fire safety benefit for existing mines that would decide to use belt air as a result of the proposed rule (from Table IV-13).

Because these are new mines, the mines can be designed better before construction to allow for additional reductions in ventilation cost relative to what an existing mine can achieve by using belt air. These new mines are also able to postpone some shaft sinking costs.

Tables IV-19 and IV-20 show the saving in costs for those new mines that would choose to use belt air only as a result of the proposed rule.

Mine Size (Number of Employees)	AMS Costs Per Mine[1]	ventilation Cost (Cost Saving) Per Mine[2]	Shaft sinking Gost (Cost Saving) Per Mine[3]	Implied Gost (Gost Saving) to Mine Operator of Improved Fire Safety From Installing AMS[4]	Gross Costs Per Mine[1]	Gross (Gost Savings) Per Mine[1]	Net Costs (Cost Savings) Per Mine[7]
1-19	$78,171	($3,748)	$0	($75,936)	$78,171	($79,684)	($1,513)
20-99	$121,710	($11,245)	$0	($112,853)	$121,710	($124,098)	($2,388)
100-500	$334,656	($8,281)	($181,976)	($159,685)	$334,656	($349,943)	($15,287)
Over 500	$467,391	($7,614)	($234,229)	($244,687)	$467,391	($486,530)	($19,140)
Total	N/A	NIA	N/A	NIA	N/A	NIA	NIA

Table IV-17.
Present Value of Total Costs and Cost Savings
for Existing Mines Not Already Using Belt Air at the Working Places,
Including Implied Cost Savings To Mine Operator From Improved Fire Safety

Mine Size (Number of Employees)	Increase in Existing Mines Using Belt Air[1]	Additional Number of Existing Mines[2]	Gross Costs Per Mine[3]	Gross (Cost Savings) Per Mine[4]	Total Gross Costs Per Mine'	Total Gross (Cost Savings) Per Mine'	Total Net Costs (Total Net Cost Savings)[7]
1-19	1.7%	3.9	$78,171	($79,684)	$304,009	($309,895)	($5,886)
20-99	3.9%	10.4	$121,710	($124,098)	$1,261,463	($1,286,211)	($24,748)
100-500	16.6%	11.0	$334,656	($349,943)	$3,691,561	($3,860,188)	($168,628)
Over 500	0.0%	0.0	$467,391	($486,530)	$0	$0	$0
Total	N/A	25.3	N/A	N/A	$5,257,032	($5,456,294)	($199,261)

'Source: Table IV-15: (Column 3) - (Column 2).

[2]Source: (Table 11-7, Column 5) x (Column 2).

[3]Source: Table IV-16, Column 6.

[4]Source: Table IV-16, Column 7.

[5](Column 4) x (Column 5).

'(Column 4) x (Column 6).

'Sum of Columns 6 + 7.

Table IV-18.
Present Value Each Year of Total Costs and Cost Savings for New Mines
That Would Have Petitioned to Use Belt Air at the Working Places Under the Current Rule

Mine Size (Number of Employees)	Percentage of New Mines Per Year That Would Petition for Belt Air[1]	Number of New Mines Per Year That Would Petition For Belt Air[2]	Petition Cost (Cost Saving) Per Mine[3]	Net Costs (Cost Savings) Per Mine[4]	Total Net Costs (Total Net Cost Savings)[5]
1-19	4.4%	1.9	($6,524)	($6,524)	($12,510)
20-99	9.9%	5.2	($10,895)	($10,895)	($56,546)
100-500	60.0%	4.0	($115,695)	($115,695)	($466,739)
Over 500	100.0%	0.3	($207,242)	($207,242)	($57,264)
Total	N/A	11.4	N/A	N/A	($593,059)

[1]Source: Table IV-15.

[2]Source: (Table 11-7, Column 6) x (Column 2).

[3]Source: Table IV-12. Data for mines with 100 or more employees are for typical belt-air mines, not marginal belt-air mines.

[4](Column 4).

[5](Column 3) x (Column 5).

Mine Size (Number of Employees)	AMS Costs Per Mine[1]	Ventilation Cost (Cost Saving) Per Mine[2]	Shaft Sinking Cost (Cost Saving) Per Mine[3]	implied Cost (Cost Saving) to Mine Operator of Improved Fire Safety From Installing AMS[4]	Gross Costs Per Mine[5]	Gross (Cost Savings) PerMine[6]	Net Costs (Cost Savings) Per Mine[1]
1-19	$78,171	($18,742)	$0	($62,691)	$78,171	($81,433)	($3,262)
20-99	$121,710	($37,485)	$0	($89,673)	$121,710	($127,158)	($5,448)
100-500	$334,636	($34,123)	($187,453)	($130,706)	$334,656	($352,282)	($17,626)
Over 500	$467,391	($63,259)	($233,528)	($193,847)	$467,391	($490,634)	($23,244)
Total	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Mine Size (Number of Employees)	Percentage ot New Mines Per Year That Would Use Belt Air, But Would Not Have Petitioned'	Number ot New Mines Per Year That Would Use Belt Air, But Would Not Have Petitioned[2]	Gross Costs Per Mine[3]	Gross (Cost Savings) Per Mine[4]	Total Gross Costs Per Mine[5]	Total Gross (Cost Savings) Per Mine'	Total Net Costs (Total Net Cost Savings)[7]
1-19	4.0%	1.8	$78,171	($81,433)	$137,304	($143,034)	($5,730)
20-99	81 %	4.3	$121,710	($127,158)	$517,507	($540,671)	($23,164)
100-500	15.0%	1.0	$334,656	($352,282)	$337,518	($355,295)	($17,777)
Over 500	0.0%	0.0	$467,391	($490,634)	$0	$0	$0
Total	N/A	7.0	NIA	N/A	$992,329	($1,038,999)	($46,670)

[3]Source: Table IV-19, Column 6.

[4]Source: Table IV-19, Column 7.

[5](Column 4) x (Column 5).

'(Column 4) x (Column 6).

[7]Sum of Columns 6 + 7.

Tables **IV-21, IV-22,** and **IV-23** summarize the total costs and cost savings of the proposed rule for all mines that would use belt air at the working places. These are calculated by adding the costs and cost savings for existing mines (Table IV-17) to the costs and cost savings for new mines (Tables **IV-18** and IV-20). The costs and cost savings for new and existing mines are summarized by converting them to yearly cost savings. The calculated present values for existing mines are converted to an annualized value at a 7% discount rate. The calculated present values for new mines are left as they are, because these present values occur every year as new mines are opened.

Paragraph (c) Mines That Choose to Point Feed

Mines That Use Belt Air at the Working Places and Point Feed

Three-or-more-entry mines with **an *AMS*** that use belt air at the working places may optionally choose to point feed the belt air using intake air. Mines may choose tn point feed because they need to maintain air velocity of 50 feet per minute in the belt entry or because they need to ventilate diesel engine exhaust contaminants (§ 75.325(f)(3)). MSHA estimates that 50% of mines using belt air at the working places will choose to point feed on a regular basis, and that the other 50% will point feed at least occasionally.

Regardless of the reason or frequency of point feeding, **MSHA** estimates the same cost for point feeding. This cost is estimated to be $800 for a door (including parts, labor, and materials) plus **$80** annually to maintain the door. The average number of point feed regulators per mine is assumed to vary by mine size from 0.5 to 4.0.

Mines that use belt air at the working places are also required to install additional sensors as part of the ***AMS.*** These additional sensors are included in the cost of the ***AMS,*** and are not listed separately. Mines that do not use belt air are not required to install sensors for the point feeds.

Table IV-24 presents the costs nf installing and maintaining point feeds on a per-mine basis, and also shows the present value of the initial and annual costs of point feeds.

Since MSHA estimates that all belt-air mines will at least occasionally point feed, all belt-air mines are assumed to incur the costs of installing point-feed regulators and associated sensors. These costs are added in to the costs of an AMS system (shown previously in Tables **IV-4** and **IV-5).**

Mines That Do Not Use Belt Air at the Working Places, But Do Point Feed

MSHA estimates that a significant propoition of mines not using belt air will also choose to point feed (Table IV-25). Reasons to point feed the belt air may include the need to dilute dust from belt transfer points or the need to dilute diesel exhaust contaminants. For those mines that do not use belt air at the working places, it is estimated that 95% **of** diesel mines and 10% of non-diesel mines will choose to point feed the belt air.

MSHA estimates that the implied convenience to the mine operator who chooses to point feed the belt area is about 200% of the cost of point feeding. This yields a net cost saving to the mine operator equal to **100%** of the cost of point feeding. Table **IV-26** shows these costs and cost savings on a per-mine basis.

Table IV-21.
Total Yearly Gross Costs for All Mines Using Belt Air at the Working Places

Mine Size (Number of Employees)	Present Value of Gross Costs for Existing Mines[1]	Annualized Value of Gross Costs for Existing Mines[2]	Present Value Each Year of Gross Costs for New Mines That Would Have Petitioned Under Existing Rule[3]	Present Value Each Year of Gross Costs for New Mines That Would Not Have Petitioned Under Existing Rule[4]	Total Yearly Gross Costs for All Mines[5]
1-19	**$304,009**	**$21,281**	$0	**$137,304**	**$158,585**
20-99	**$1,261,463**	**$88,302**	**$0**	**$517,507**	**$605,809**
100-500	**$3,691,561**	**$258,409**	$0	**$337,518**	**$595,927**
Over 500	$0	$0	$0	*$0*	***$0***
Total	**$5,257,032**	**$367,992**	**$0**	**$992,329**	**$1,360,322**

'Source: Table IV-17, Column 6.

[2](Column 2) x (7%).

[3]There are no incremental gross costs for existing mines.

[4]Source: Table IV-20, Column 6.

[5]Sum of Columns 3 + 4 + 5.

Mine Size (Number of Employees)	Present Value of (Gross Cost Savings) for Existing Mines'[1]	Annualized Value of (Gross Cost Savings) for Existing Mines[2]	Present Value tach Year of (Gross Cost Savings) for New Mines That Would Have Petitioned Under Existing Rule[3]	Present Value tach Year of (Gross Cost Savings) for New Mines That Would Not Have Petitioned Under Existing Rule[4]	Total Yearly (Gross Cost Savings) for All Mines[5]
1-19	($309,895)	($21,693)	($1 2,510)	($1 43,034)	($1 77,236
20-99	($1,286,211)	($90,035)	($56,546)	($540,671)	($687,252
100-500	($3,860,188)	($270,213)	($466,739)	($355,295)	($1,092,247
Over 500	$0	$0	($57,264)	$0	($57,264
Total	($5,456,294)	($331,941)	($593,059)	($1,038,999)	($2,013,999

[1]Source: Table IV-17, Column 7.

[2](Column 2) x (7%).

[3]Source: Table IV-18, Column 6.

[4]Source: Table IV-20, Column 7.

[5]Sum of Columns 3 + 4 + 5.

Mine Size (Number of Employees)	Present Value of Net Costs (Net Cost Savings) for Existing Mines'	Annualized Value of Net Costs (Net Cost Savings) for Existing Mines'	Present Value tach Year of Net Costs (Net Cost Savings) For New Mines That **Would** Have Petitioned Under Existing Rule[3]	Present Value tach Year of Net Costs (Net Cost Savings) for New Mines That Would Not Have Petitioned Under Existing Rule[4]	Total Yearly Net Costs (Net Cost Savings) for All Mines[5]
1-19	**($5,886)**	**($412)**	**($12,510)**	**($5,730)**	**($18,651)**
20-99	**($24,748)**	**($1,732)**	**($56,546)**	**($23,164)**	**($81,442)**
100-500	**($168,628)**	**($11,804)**	**($466,739)**	**($17,777)**	**($496,320)**
Over **500**	**$0**	**$0**	**($57,264)**	**$0**	**($57,264)**
Total	**($199,261)**	**($13,948)**	**($593,059)**	**($46,670)**	**($653,678)**

Mine Size (Number of Employees)	Number of Point Feed Regulators Per Mine	Initial Cost Per Point Feed Regulator[1]	Initial Cost (Present Value) Per Mine[2]	Annual Cost of Maintaining[3]	Present Value of Annual Costs[4]	Present Value of All Costs[5]
1-19	0.5	$800	$400	$40	$143	$543
20-99	1.0	$800	$800	$80	$287	$1,087
100-500	2.0	$800	$1,600	$160	$896	$2,496
Over 500	4.0	$800	$3,200	$320	$1,792	$4,992

[1]$800 is the cost of installing a door for the point feed.

[2](Column 2) x (Column 3).

[3](Column 2) x (10%).

[4]Source: (Table IV-3) x (Column 5).

[5](Column 4) + (Column 6).

Table IV-25.
Expected Usage of Point Feeding Under the Proposed Rule, by Mine Size

	Percentage of Mines in Category					
Mine Size (Number of Employees)	Existing Mines Also Using Belt Air[1]	Existing Mines Not Also Using Belt Air[2]	All Existing Mines That Would Point Feed[3]	New Mines Also Using Belt Air[4]	New Mines Not Also Using Belt Air[5]	All New Mines That Would Point Feed'
1-19	3.6%	14.2%	17.8%	8.4%	13.5%	21.9%
20-99	8.2%	29.2%	37.4%	18.1%	26.0%	44.1%
100-500	55.0%	29.7%	84.7%	75.0%	16.5%	91.5%
Over 500	100.0%	0.0%	100.0%	100.0%	0.0%	100.0%

Table IV-26.
Incremental Cost and Cost Saving Per Mine of Installing & Using Point Feeds For Mines That Do Not Use Belt Air at the Working Places

Mine Size (Number of Employees)	Present Value Per Mine of Gross Point Feeding Costs[1]	Present Value of Implied Convenience (Gross Cost Saving) Per Mine From Point Feeding[2]	Present Value of Net Cost (Net Cost Saving) Per Mine[3]
1-19	$543	($1,087)	($543)
20-99	$1,087	($2,174)	($1,087)
100-500	$2,496	($4,992)	($2,496)
Over 500	$4,992	($9,984)	($4,992)

'Source: Table IV-24.

[2] - **(Column 2)** *x* **(2.0).**

[3](Column 2) + (Column 3).

Table IV-27 shows the present value of the total cost savings for existing mines that choose to point feed, but not use belt air at the working places. Table IV-28 shows the present value each year of the total cost savings for new mines that choose to point feed, but not use belt air at the working places. Tables IV-29, IV-30, and IV-31 show the total present value of costs and cost savings for both existing and new mines that choose to point feed, but not use belt air at the working places.

§ 75.351 Atmospheric Monitoring Systems

Paragraph (a) AMS Operation

The operating costs of an *AMS* are of two types, electricity and the labor cost of an AMS operator. The costs of electricity are assumed to be $1 per day. However, in the absence of an **AMS** system with CO monitors, mines must have point-type heat sensors for fire detection in belt entries. The cost of electricity for point-type heat sensors is about the same as for ***CO*** monitors. Hence, there is no change in electricity cost for an ***AMS.***

The costs of the *AMS* operator are assumed to vary by the size of the mine. The typical mine with an **AMS** will also be using PLC. These systems already require a PLC operator to be on duty to monitor various mine activities. The incremental time needed for the same operator to monitor the AMS would be a small fraction of the workday. Depending on mine size, MSHA estimates the **AMS** operator spends between 10 and 30 minutes of labor time per shift, for between 1 and 3 shifts daily, monitoring the ***AMS.*** Assuming an hourly wage rate for miners of $28.07 per hour, these **costs** amount to between **$1,684** and $15,158 annually. The estimated operating costs for each mine size are shown in Table IV-32.

Paragraph (b) Designated surface location and AMS operator

Clause (1). Designated surface location. There is no extra cost for a mine that already has a PLC, which would be typical.

Clause (2). Designated AMS operator. This cost is included under paragraph (a) above.

Clause (3). An up-to-date map. Mapping facilities are normally provided as part of an AMS. This cost is included as part of the cost for a full AMS.

Clause (4). Names kept at designated surface location. This would be part of normal practice. The cost is minimal and insignificant.

Paragraph (c) Minimum operating requirements

The costs calculated under § 75.350(b) apply to an ***AMS*** that meets the minimum operating requirements. There are no additional **costs** associated with this paragraph.

Paragraph (d) Location and installation of AMS sensors

The costs calculated under § 75.350(b) apply to an *AMS* that meets these location requirements. There are no additional costs associated with this paragraph.

Mine Size (Number of Employees)	Percentage of Existing Mines That Would Point Feed, But Not Use Belt Air[1]	Number of Existing Mines That Would Point Feed, But Not Use Belt Air[2]	Present Value of Gross Cost Per Mine[3]	Present value of (Gross Cost Saving) Per Mine[4]	Present Value of Total Gross Cost[5]	Present value of (Total Gross Cost Saving)[6]	Total Net Costs (Total Net Cost Savings)[7]
1-19	14.2%	31.9	$543	($1,087)	$17,338	($34,676)	($17,338)
20-99	29.2%	78.1	$1,087	($2,174)	$84,869	($169,738)	($94,869)
100-500	29.7%	19.7	$2,496	($4,992)	$49,052	($98,104)	($49,052)
Over 500	0.0%	0.0	$4,992	($9,984)	$0	$0	$0
Total	N/A	129.6	N/A	N/A	$151,259	($302,518)	($151,259)

Table IV-28.
Present Value Each Year of Total Costs end Cost Savings lor New Mines
That Would Choose to Point Feed, But Not Use Belt Air at tie Working Places

Mine Size (Number of Employees)	Percentage ot New Mines That Would Point Feed, But Nct Use Belt Air[1]	Number ot New Mines That Would Point Feed, But Not Use Belt Air[2]	Present Value of Goss Cost Per Mine[3]	Present Value of (Gross Cost Saving) Per Mine[4]	Present Value of Total Gross Cost[5]	Present Value of (Total Gross Cost Saving)'	Total Net Costs (Total Net Cost Savings)[7]
1-19	13.5%	5.9	$543	($1,087)	$3,215	($6,429)	($3,215
20-99	26.0%	13.6	$1,087	($2,174)	$14,786	($29,573)	($14,786
100-500	16.5%	1.1	$2,496	($4,992)	$2,765	($5,529)	($2,765
Over 500	0.0%	0.0	$4,992	($9,984)	$0	$0	$0
Total	N/A	20.6	N/A	N/A	$20,766	($41,531)	($20,766

Table IV-29.
Total Yearly Gross Costs for **All** Mines
That Would Choose to Point Feed, But Not Use Belt Air at the Working Places

Mine Size (Number of Employees)	Present Value of Gross Costs for Existing Mines[1]	Annualized Value of Gross Costs for Existing Mines[2]	Present Value Each Year of Gross Costs for New Mines[3]	Total Yearly Gross Costs for All Mines[4]
1-19	$17,338	$1,214	$3,215	$4,428
20-99	$84,869	$5,941	$14,786	$20,727
100-500	$49,052	$3,434	$2,765	$6,198
Over 500	*$0*	$0	*$0*	*$0*
Total	$151,259	$10,588	$20,766	$31,354

[1]Source: Table IV-27, Column 6.

[2](Column 2) x (7%).

"Source: Table IV-28, Column 6.

[4](Column 3) + (Column **4).**

Mine Size (Number of Employees)	Present Value of (Gross Cost Savings) for Existing Mines[1]	Annualized Value of (Gross Cost Savings) for Existing Mines[2]	Present Value Each Year of (Gross Cost Savings) for New Mines[3]	Total Yearly (Gross Cost Savings) for All Mines[4]
1-19	($34,676)	($2,427)	($6,429)	($8,857)
20-99	($169,738)	($11,882)	($29,573)	($41,454)
100-500	($98,104)	($6,867)	($5,529)	($12,396)
Over 500	$0	$0	$0	$0
Total	($302,518)	($21,176)	($41,531)	($62,707)

Table IV-31.
Total Yearly Net Costs and Cost Savings for All Mines
That Would Choose to Point Feed, But Not Use Belt Air at the Working Places

Mine Size (Number of Employees)	[Present Value of Net Costs (Net Cost Savings) for Existina Mines'	f Net Costs (Net Cost S for Existing [2]	Year of Net Costs (Net Cost S for New	Total Yearly Net Costs (Net Cost Savings) for All Mines[4]
1-19	($17,338)		($3 215)	($4,428)
20-99	($84,869)	( )	14,7	($20,727)
100-500	($49,052)	($3,434)	($2,765)	($6,198)
Over 500	*$0*			$0
Total	($151,259)	,588,	($20.7	($31,354)

'Source: Table IV-27, Column 8.

[2](Column 2) x (7%).

[3]Source: Table IV-28, Column 8.

[4](Column 3) + (Column 4).

Table IV-32.
Full Cost Per Mine of Operating
an Atmospheric Monitoring System (AMS)

Mine Size (Number of Employees)	Operator Time Per Shift (minutes)	Shifts Per Day	Operator Time Per Day (Hours)[1]	Operator Wage Rate	Daily Operator Cost[2]	Annual Operator Cost[3]
1-19	10	1	0.17	$28.07	$5	$1,684
20-99		2	0.50	$28.07	$14	$5,053
100-500		3	1.00	$28.07	$28	$10,105
Over 500	30	3	1.50	$28.07	$42	$15,158

[1](Column 3) x (Column 2) / 60.

[2](Column 4) x (Column 5).

[3](Column 6) x 360.

Paragraph (e) Location of sensors - belt air course

The costs calculated under § 75.350(b) apply to an ***AMS*** that meets these location requirements. There are no additional costs associated with this paragraph.

Paragraph (f) Location of sensors - the primary escapeway

The costs calculated under § 75.350(b) apply to an ***AMS*** that meets these location requirements. There are no additional costs associated with this paragraph.

Paragraph (g) Location of sensors - return air split

The costs calculated under § 75.350(b) apply to an ***AMS*** that meets these location requirements. There are no additional costs associated with this paragraph.

Paragraph (h) Location of sensors - electrical installations

The costs calculated under § 75.350(b) apply to an ***AMS*** that meets these location requirements. There are no additional costs associated with this paragraph.

Paragraph (i) Establishing alert and alarm levels

Clause (1). Methane alarms for § 75.323(d)(1)(ii). There is no change from the existing rule, so there are no costs or cost savings associated with this clause.

Clause (2). Carbon monoxide alerts and alarms. The costs calculated under § 75.350(b) apply to an ***AMS*** that meets these alert and alarm level requirements. There are no additional costs associated with this paragraph.

This paragraph is related to proposed § 75.371(mm), for which 15 minutes of labor time is estimated. The District Manager as part of the mine ventilation plan may require reductions in the alert and alarm levels for carbon monoxide. For mines with high air volumes or high air velocities, these reductions in the alert and alarm levels may be necessary to assure that the resulting dilution of carbon monoxide in the air does not prevent timely warning of a fire. **MSHA** estimates that 5% of mines may be required to reduce the alert and alarm levels for CO sensors.

Clause (3). Methane alerts and alarms for § 75.362(f). There is no change from the existing rule, so there are no costs or cost savings associated with this clause.

Paragraph (j) Establishing carbon monoxide ambient levels

The costs calculated under § 75.350(b) apply to an ***AMS*** that meets these CO ambient level requirements. For mines that choose a zero ambient level, for carbon monoxide, there are no additional costs associated with this paragraph. The choice of a positive value for the carbon monoxide ambient level must be justified to the District Manager as part of the mine ventilation plan.

MSHA estimates that 50% of mines will choose to set a positive number for the ***CO*** ambient level. Such requests must be justified based on a study of conditions present at the mine making the request. **MSHA** estimates that **8** hours of supervisor time at $54.92 per hour is required. This paragraph is also related to existing § 75.371(hh), for which 15 minutes

of labor time are estimated. This comes to $453 per mine making the request. Table N-33 provides an estimate of cost for these two provisions.

These are incremental costs only for mines that choose to install an *AMS* as a result of this rule. Accordingly, they are added to the cost of installing an *AMS* and related components as shown in Tables IV-4 and N-6.

Paragraph (k) Installation and maintenance

The costs calculated under § 75.350(b) apply to an *AMS* that meets these installation and maintenance requirements. There are no additional costs associated with this paragraph.

Paragraph (l) Sensors

The costs calculated under § 75.350(b) apply to an *AMS* that meets these sensor requirements. There are no additional costs associated with this paragraph.

Paragraph (m) Time delays

Requests to use time delays on sensors must be justified to **the** District Manager as part of the mine ventilation plan. **MSHA** anticipates that only mines that use diesel equipment are likely to make such requests.

MSHA estimates that 40% of mines with diesel equipment will make requests for the use of time delays. Such requests must be justified based on a study of conditions present at the mine making the request. MSHA estimates that *8* hours of supervisor time at **$54.92** per hour is required. This paragraph is also related to proposed § 75.371(ll), for which an additional 15 minutes of labor time are estimated. Table IV-34 provides an estimate of the total cost for these two provisions.

These are incremental costs only for mines that choose to install an *AMS* as a result of this rule. Accordingly, they are added to the cost of installing an *AMS* and related components as shown in Tables N-4 and N-6.

Paragraph (n) Examination. testing, and calibration

Clause (1). On-shift visual examinations. It is anticipated that these examinations will be conducted at the same time as the on-shift examinations already required under existing **§ 75.362.** There is no additional time or cost associated with this examination.

Existing § 75.363(b) requires a record of any hazardous condition that may be found during the nn-shift examination For example, if a sensor is obviously damaged, or has fallen from its proper location, this would be a hazardous condition, because the sensor cannot perform its proper function of detecting and alerting fire hazards. MSHA estimates that recording such instances will take two minutes of a miner's time per record, at a wage rate of $28.07 per hour. MSHA also estimates that such instances will be fairly infrequent (for example, only six times a year in a mine with 100-500 employees). Table IV-35 provides an estimate of the cost of record keeping.

Clause (2). Weekly alarm testing. The typical larger mine (100-500 employees) is assumed to have 3 alarms associated with 60 sensors. The 3 alarms require 15 minutes each

Table **IV-33.**
Document Non-Zero Carbon-Monoxide Ambient Levels to Reduce Non-Fire Alerts and Alarms of an Atmospheric Monitoring System (AMS)

Mine Size (Number of Employees)	§ 75.351(j) Documentation Labor Time (Hours)	§ 75.371(hh) Documentation Labor Time (Hours)	Documenter Wage Rate	Initial Cost Per Affected Mine[1]	Affected Mines, As Percent of Belt-Air Mines	Expected Initial Cost Per Average Belt-Air Mine[2]
1-19	8	0.25	$54.92	$453	50.0%	$227
20-99	8	0.25	$54.92	$453	50.0%	$227
100-500	8	0.25	$54.92	$453	50.0%	$227
Over 500	8	0.25	$54.92	$453	50.0%	$227

[1](Columns 2 + 3) x (Column 4).

[2](Column 5) x (Column 6).

Mine Size (Number of Employees)	§ 75.351(m) Documentation Labor Time (Hours)	§ 75.371(l) Documentation Labor Time (Hours)	Documenter Wage Rate	Initial Cost Per Affected Mine'	Percent ot Mines Using Diesel[2]	Affected Mines, As Percent of Diesel Mines	Affected Mines, As Percent of Belt-Air Mines[3]	Expected Initial Cost Per Average Belt-Air Mine[4]
1-19	8	0.25	$54.92	$453	5.6%	40.0%	2.2%	$10
20-99	8	0.25	$54.92	$453	25.6%	40.0%	10.3%	$46
100-500	8	0.25	$54.92	$453	65.8%	40.0%	26.3%	$119
Over 500	8	0.25	$54.92	$453	100.0%	40.0%	40.0%	$181

Table IV-35.
Full Cost Per Mine of Recordkeeping for On-Shift Examination of an Atmospheric Monitoring System (AMS)

Mine Size (Number of Employees)	Examiner Time Per On-Shift Record (minutes)	Number of Records Per Year	Examiner Time Per Year (Hours)[1]	Examiner Wage Rate	Annual Cost Per Mine[2]
1-19	2	4	0.13	$28.07	$4
20-99	2	4	0.13	$28.07	$4
100-500	2	6	0.20	$28.07	$6
Over 500	2	12	0.40	$28.07	$11

to test, including travel time. This testing requires the use of a supervisor, at a wage rate of $54.92 per hour. Table IV-36 shows the estimated cost of this clause.

Clause (3). Monthly sensor calibration. The typical larger mine (100-500 employees) is assumed to have 60 sensors. The 60 sensors require 15 minutes each to calibrate, including travel time. This calibration requires supervisor's time, at a wage rate of $54.92 per hour. The calibration also requires the consumption of three bottles per month of calibration gases, at a cost of $80 per bottle. Table IV-37 shows the estimated cost of this clause.

Clause (4). Gas certification. The costs calculated under clause **(3)** apply to calibration gases that meet these gas certification requirements. There are no additional costs associated with this clause.

Paragraph (o) Recordkeeping

Clauses (1)(i) and (1)(ii). Records of AMS alerts, alarms, and malfunctions. Table IV-38 estimates the cost of record keeping associated with responding to alerts, alarms, and malfunctions. Mines with diesel equipment **are** anticipated to have substantially more non-fire alerts and alarms than mines without diesel equipment. **MSHA** also anticipates substantially fewer malfunction signals than alert and alarm signals. These costs are estimated at one minute per record, multiplied by the number of alert, alarm, and malfunction records shown in Table-31.

Clause (1)(iii). Records of tests, calibrations, and maintenance. Table IV-39 estimates the cost of supervisor record keeping associated with the weekly tests of alerts and alarms. These costs are estimated at one minute per record, multiplied by the number of records computed according to the assumptions of Table-29.

Table IV-40 estimates the cost of supervisor record keeping associated with the monthly calibrations. These costs are estimated at one minute per record, multiplied by the number **of** records computed according to the assumptions of Table-30.

Table-IV-41 estimates the cost of record keeping associated with maintenance of the AMS. These costs are estimated at two minutes per record, multiplied by the estimated number of maintenance events for which records must be kept.

Clause (2). Record requirements. The record costs listed for clauses (1)(i), (1)(ii), and (1)(iii) above apply to records that meet these record requirements. There are no additional costs associated with this clause.

Clause (3). Record security. The material costs for record security are pro-rated by the cost of the labor time spent on records of each type, and for each mine size. **A** materials-labor cost ratio is used to perform the pro-rating of materials cost among the different recordkeeping tasks. This ratio (0.0171) is calculated by dividing the estimated materials cost ($25) of record keeping for a mine with 100-500 employees by the total labor cost ($1,460) of the record keeping. These estimates are shown in Table IV-42.

r raph (Retention period

The retention period of one year is standard for mine records. There **is** no additional cost for this paragraph.

Mine Size (Number of Employees)	Tester Time Per Alarm (minutes)	Alarms Tested Per Week	Tester Time Per Week (Hours)'	Tester Wage Rate	Weekly Tester Cost'	Annual Cost Per Mine[3]
1-19	15	1	0.25	$54.92	$14	$714
20-99	15	2	0.50	$54.92	$27	$1,428
100-500	15	3	0.75	$54.92	$41	$2,142
Over 500	15	4	1.00	$54.92	$55	$2,856

Table IV-37.
Full Cost Per Mine for Monthly Calibration
of an Atmospheric Monitoring System (AMS)

Mine Size (Number of Employees)	Calibration Time Per Sensor (minutes)	Sensors Calibrated Per Month	Calibration Time Per Month (Hours)[1]	Calibrator Wage Rate	Calibration Gas Cylinders Per Month[2]	Cost of Calibration Gas Cylinder	Monthly Calibration Cost[3]	Annual Cost Per Mine[4]
1-19	15	5	1.25	$54.92	0.25	$80	$89	$1,064
20-99	15	23	5.00	$54.92	1.00	$80	$355	$4,255
100-500	15	63	15.00	$54.92	3.00	$80	$1,064	$12,766
Over 500	15	103	25.00	$54.92	5.00	$80	$1,773	$21,276

[1](Column 3) x (Column 2) / 60.

[2](Column 3) / 20.

[3](Column 4) x (Column 5) + (Column 6) x (Column 7).

[4](Column 8) x 12.

Mine Size (Number of Employees)	Alert & Alarm Records Per Year For Non-Diesel Mines	Alert & Alarm Records Per Year For Diesel Mines	Percentage of Diesel Mines'	Alert & Alarm Records Per Year For Average Mine[2]	Malfunction Records Per Year For Average Mine	Minutes Per Record	Annual Hours Per Mine[3]	Record Keeper Wage Rate	Annual Cost Per Mine[4]
1-19	15	450	5.6%	39	0.5	1	0.66	$28.07	$19
20-99	30	900	25.6%	253	1.0	1	4.23	$28.07	$119
100-500	60	1,800	65.8%	1,204	2.0	1	20.10	$28.07	$564
Over 500	90	2,700	100.0%	2,700	3.0	1	45.05	$28.07	$1,265

Mine Size (Number of Employees)	Tester Time Per Alarm Record (minutes)	Alarms Tested Per Week'	Tester Time Per Week (Hours)[2]	Tester Wage Rate	Weekly Record Cost[3]	Annual Cost Per Mine[4]
1-19	1	1	0.02	$54.92	$1	$48
20-99	1	2	0.03	$54.92	$2	$95
100-500	1	3	0.05	$54.92	$3	$143
Over 500	1	4	0.07	$54.92	$4	$190

[3](Column 4) x (Column 5).

[4](Column 6) x *52.*

'Mine Size (Number of Employees)	Calibrator Time Per Sensor Record (minutes)	Sensors Calibrated Per Month'	Calibrator Time Per Month (Hours)[2]	Calibrator Wage Rate	Monthly Record Cost[3]	Annual Cost Per Mine[4]
1-19	1	5	0.08	$54.92	$5	$55
20-99	1	20	0.33	$54.92	$18	$220
100-500	1	60	1.00	$54.92	$55	$659
Over 500	1	100	1.67	$54.92	$92	$1,098

[3](Column 4) x (Column 5).

[4](Column 6) * 12.

Mine Size (Number of Employees)	Time Per Maintenance Record (minutes)	Maintenance Records Per Year	Maintenance Recording Time Per Year (Hours)'	Maintenance Recorder Wage Rate	Annual Record Cost Per Mine[2]
1-19	2	10	0.33	$54.92	$18
20-99	2	40	1.33	$54.92	$73
100-500	2	120	4.00	$54.92	$220
Over 500	2	200	6.67	$54.92	$366

Mine Size (Number of Employees)	Materials for Alert, Alarm & Malfunction Records[1]	Materials for Maintenance Records[2]	Materials for Examining, Testing & Calibration Records[3]	Annual Materials Cost for Record Keeping[4]
1-19	$0	$0	**$2**	**$2**
20-99	**$2**	**$1**	**$5**	**$8**
100-500	**$9**	**$3**	**$13**	**$25**
Over 500	$20	**$6**	**$20**	**$46**

[1]Source: (Table IV-38) x (materials-labor ratio[5]).

[2]Source: (Table **IV-41)** x (materials-labor ratio[5]).

[3]Source: (Table **IV-35** + Table **IV-39** + Table **IV-40)** x (materials-labor ratio[5]).

[4]Sum of Columns 2 + **3** + **4.**

[5](materials-labor ratio) = (.0171). This ratio is calculated by dividing the estimated materials cost **($25)** for a mine with 100-500 employees by the total labor cost **($1,460)** spent on making **the** records. The total labor cost is obtained from Tables **IV-35, IV-38, IV-39, IV-40,** and **IV-41.**

Paragraph (q) Training

For a mine with 100-500 employees, MSHA estimates that 6 AMS operators must be trained for 2 hours annually. This training will require one training supervisor who spends five hours annually on training. The training supervisor must spend 15 minutes per year on record keeping. These costs are shown in Table IV-43.

Paragraph (r) Communications

For mines using belt air, this paragraph requires that the two-way voice communication system must be installed in a separate entry from the AMS. Most belt-air mines have already done this or would have done this anyway. MSHA estimates that only 25% of mines using belt air would need to move the existing communication system or install a second communication system to comply with this provision. For a mine with 100-500 employees, this is estimated to cost $900 in materials and 9 hours of labor time. These costs are shown in Table IV-44.

§ 75.352 Actions in Response to AMS Alert and Alarm Signals or Malfunctions

Paragraphs (a) & (b)

These paragraphs are analyzed together. For purposes of the cost analysis, we focus only on alerts, alarms, or malfunctions that are not related to any fire. If the AMS detects a fire, the system is functioning as intended. Since the AMS does not cause fires, the fire must have occurred for independent reasons. In such circumstance, the mine operator and mine workers can only be aided, not harmed, by early warning of a fire. The implied cost savings to the mine operator from early fire detection are discussed above in connection with § 75.350(b) and in Tables IV-13 and IV-14.

Paragraph (b) specifies procedures that must be followed "unless the cause of the alert or alarm signal is known not to be a hazard to the miners." Many alerts or alarms will have causes that are immediately known not to present a fire hazard. MSHA estimates that numerous such AMS signals will have obvious causes that are immediately known not to present a fire hazard. These obvious non-fire alerts and alarms are much more common in mines that use diesel equipment.

Such incidents with obvious causes are assumed to occur 10 times per year in mines without diesel equipment and 400 times per year in mines with diesel equipment. The time needed to ascertain that the cause is not hazardous is estimated at two minutes for each incident with an obvious cause. Table IV-45 presents the hours per year to respond to alerts and alarms with obvious non-fire causes, based on the percentage of diesel mines in each mine size category.

Table IV-46 provides an estimate of costs to respond to all non-fire alerts, alarms, and malfunctions of all types. For alerts whose causes are not obvious, MSHA estimates that 5 hours per year would be spent looking for the causes. For alarms that are not fire related, MSHA estimates that there may be one evacuation per year because the cause was not immediately known not to present a hazard. On average, such alarms would cause evacuation of eight miners from a section for about one hour. Malfunctions are expected to

Mine Size (Number of Employees)	Number of AMS Operators	Annual Hours Per AMS Operator	Operator Wage Rate	Number of Training Supervisors	Annual Training Hours Per Training Supervisor	Annual Record Keeping Hours Per Training Supervisor	Training Supervisor Wage Rate	Annual Cost Per Mine'
1-19	**2**	**2**	**$28.07**	**1**	**5**	**0.25**	**$54.92**	**$401**
20-99	**4**	**2**	**$28.07**	**1**	5	**0.25**	**$54.92**	**$513**
100-500	**6**	**2**	**$28.07**	**1**	**5**	**0.25**	**$54.92**	**$625**
Over **500**	**8**	**2**	**$28.07**	**1**	**5**	**0.25**	**$54.92**	**$737**

Table IV-44.
Average Incremental Cost Per Mine of Installing
a Two-Way Voice Communication System in a Separate Entry

Mine Size (Number of Employees)	Initial Material Cost	Hours for Initial Installation	Installer Wage Rate	Initial Cost Per Installing Mine'	Percent of Mines That Do Not Already Have Separately Installed Means of Communication	Expected Initial Cost Per Average Mine'
1-19	$200	2	$28.07	$256	25%	$64
20-99	$300	3	$28.07	$384	25%	$96
100-500	$900	9	$28.07	$1,153	25%	$288
Over 500	$1,200	12	$28.07	$1,537	25%	$384

Mine Size (Number ot Employees)	Obvious Non-Fire Alert & Alarm Signals Per Year For Non-Diesel Mines	Obvious Non-Fire Alert & Alarm Signals Per Year For Diesel Mines	Percentage of Diesel Mines'	Obvious Non-Fire Alert & Alarm Signals Per Year For Average Mine[2]	Minutes Per Obvious Non Fire Alert or Alarm	Hours Per Year on Obvious Nan-Fire Alerts & Alarms[3]
1-19	2.5	400	5.6%	25	2	0.82
20-99	5.0	400	25.6%	106	2	3.54
100-500	10.0	400	65.8%	266	2	8.88
Over 500	15.0	400	100.0%	400	2	13.33

Table IV-46.
Full Cost Per Mine of Response Procedures for Alerts, Alarms, and Malfunctions of an Atmospheric Monitoring System (AMS)

Mine Size (Number of Employees)	Hours Per Year on Obvious Non-Fire Alert or Alarm[1]	Hours Per Year on Other Non-Fire Alerts	Non-Fire Evacuation Alarm Signals Per Year For Average Mine	Evacuation Man-Hours Per Evacuation Alarm	Malfunction Signals Per Year For Average Mine	Correction Minutes Per Malfunction	Annual Hours Per Mine[2]	Miner Wage Rate	Annual Cost Per Mine[3]
1-19	0.82	1.25	0.25	a					3
20-99	3.54	2.50	0.50	a					9
100-500	8.88	5.00	1.00	a	2.0		22.38	$28.07	3
Over 500	13.33	7.50	1.50	8	3.0	15	33.58	$28.07	3

[1]Source: Table IV-45.

[2](Column 2) + (Column 3) + (Column 4) x (Column 5) + (Column 6) x (Column 7) / 60.

[3](Column a) x (Column 9).

occur relatively infrequently, about twice a year, and will have easy corrections, such as replacing a sensor.

Paragraph (c)

Methane sensors in the return air do not impact the decision to use belt air as intake air to ventilate the working places. This paragraph does not change the requirements of the existing rule, so there are no costs or cost savings from this paragraph.

Paragraph (d)

This paragraph specifies procedures of monitoring or patrolling that may be implemented if the AMS malfunctions and cannot be immediately repaired. MSHA does not anticipate that these procedures would normally be implemented for any long period of time, because it is generally easier to fix a malfunction than to carry out these procedures. For example, it is cheaper to replace a malfunctioning sensor than to station a trained person with a hand-held sensor at the location where an automatic sensor requires replacement. Since mine operators will most likely be carrying an inventory of spare parts, the need to carry out these procedures for an extended period of time will rarely or never arise.

This paragraph adds some flexibility, because the procedures may be more cost effective than shutting down the mine, even though more expensive than repairing the AMS. The cost of these procedures is hard to quantify and is therefore included in the "other maintaining" category in Table IV-5. No other costs or cost savings are attributed to this paragraph.

Paragraph (e)

This paragraph specifies procedures of monitoring or patrolling that may be implemented if the 50-foot per minute minimum air velocity cannot be maintained when required by § 75.351(e)(3). This situation may occur if the ventilation system malfunctions and cannot be immediately repaired. MSHA does not anticipate that these procedures would normally be implemented for any long period of time, because it would generally be preferable to fix a sudden malfunction in the ventilation system than to carry out these procedures. If the mine design is such that certain areas of the mine cannot achieve the 50-foot per minute minimum air velocity even with a well-functioning ventilation system, § 75.351(e)(3) permits the mine operator to install more sensors to achieve a 350-foot spacing between sensors.

This paragraph adds some flexibility, because the procedures may be more cost effective than shutting down the mine. The cost of these procedures is hard to quantify and is therefore included in the "other maintaining" category in Table IV-5. No other costs or cost savings are attributed to this paragraph.

§ 75.371 Mine Ventilation Plan

This section adds some requirements to the mine ventilation plan which underground coal mines are already required to provide under § 75.370. These additional requirements only apply to mines that voluntarily choose to use belt air at the working places or that choose to point feed the belt air. The added paragraphs are analyzed below.

Paragraph (ii) Locations of designated areas for dust measurement

This is a mapping requirement that requires insignificant extra resources. The mine operator is already required to provide accurate mine maps to the District Manager at least once per year (§ 75.372). No significant incremental costs are associated with this paragraph.

Paragraph (jj) Locations of point feeds

This is a mapping requirement that requires insignificant extra resources. The mine operator is already required to provide accurate mine maps to the District Manager at least once per year (§ 75.372). No significant incremental costs are associated with this paragraph.

Paragraph (kk) Locations of sensors

This is a mapping requirement that requires insignificant extra resources. The mine operator is already required to provide accurate mine maps to the District Manager at least once per year (§ 75.372). No significant incremental costs are associated with this paragraph.

Paragraph (ll) Length of time delay or other method to reduce non-fire alerts and alarms.

Major costs associated with this paragraph were discussed above in connection with § 75.351 (m) and listed in Table IV-34. This paragraph only requires reporting, not justification, of the time delay or other method used to reduce non-fire-related alerts and alarms. Accordingly, only 15 minutes of documentation time is assumed for mines that use these methods.

MSHA estimates that 40% of mines with diesel equipment will make requests for the use of time delays. § 75.351(m) requires that such requests be justified based on a study of conditions present at the mine making the request. MSHA estimates that **8** hours of supervisor time at $54.92 per hour is required for justification. Documentation under this paragraph requires 15 minutes. Table IV-34 provides an estimate of the total cost for these two provisions.

Paragraph (mm) Reduced sensor settings

Under § 75.351(i)(2), the District Manager as part of the mine ventilation plan may require reductions in the alert and alarm levels for carbon monoxide. For mines with high air volumes or high air velocities, these reductions in the alert and alarm levels may be necessary to assure that the resulting dilution of carbon monoxide in the air does not prevent timely warning of a fire. MSHA estimates that 5% of mines will be required to reduce the alert and alarm levels for CO sensors.

This paragraph **only** requires reporting, not justification, of the reduction in alert and alarm levels for carbon monoxide sensors. Accordingly, **MSHA** estimates that only 15 minutes of supervisor time at $54.92 per hour is required for documentation. Table IV-47 provides an estimate of the cost for this provision.

Table IV-47.
Document Reduced Alert and Alarm Levels for the Carbon Monoxide Sensors of an Atmospheric Monitoring System (AMS)

Mine Size (Number of Employees)	§ 75.371(mm) Documentation Labor Time (Hours)	Documenter Wage Rate	Initial Cost Per Affected Mine[1]	Affected Mines, As Percent of Belt-Air Mines	Expected Initial Cost Pe Average Belt-Air Mine[2]
1-19	0.25	$54.92	$14	5.0%	$1
20-99	0.25	$54.92	$14	5.0%	$1
100-500	0.25	$54.92	$14	5.0%	$1
Over 500	0.25	$54.92	$14	5.0%	$1

'(Column 2) x (Column 3).

[2](Column 4) x (Column 5).

Paragraph (nn) Alternate instruments

This paragraph specifies that if § 75.352(d)(7) applies, then the alternate instruments that would be used on an emergency basis in the event of ***AMS*** failure must be specified in the mine ventilation plan. Section 75.352(d)(7) applies only to ***AMS*** that use smoke sensors, or other sensors, rather than carbon monoxide sensors. Smoke detectors are usually not available as hand-held devices. The substitute hand-held sensor is therefore likely to be a carbon monoxide sensor.

MSHA estimates that initially there may be few mines using smoke detectors in the ***AMS***, though this number could significantly increase if the availability of smoke detectors improves. For purposes of the cost analysis, MSHA estimates that only 10%of mines would use smoke sensors as part of the ***AMS***. Documentation under this paragraph requires 15 minutes of supervisor time at $54.92 per hour. This documentation costs $14 per mine making the request. Table IV-48 provides an estimate of the total cost for this paragraph.

§ 75.372 Mine Ventilation Map

Paragraph (b)(16) Location and type of AMS sensors

Section 75.352 requires the mine operator to provide accurate mine maps to the District Manager at least once per year. The additional mapping requirement in proposed paragraph (b)(16) would require insignificant extra resources. No significant incremental costs are associated with this paragraph.

§ 75.380(g) Escapeway: Bituminous and Lignite Mines

This section is altered to permit point feeding as provided for in § 75.350(c). All costs and cost savings of point feeding are provided above in connection with the discussion of § 75.350(c). There are no additional costs or cost savings associated with this paragraph.

Mine Size (Number of Employees)	§ 75.371(nn) Documentation Labor Time (Hours)	Documenter Wage Rate	Initial Cost Per Affected Mine'	Affected Mines, As Percent of Belt-Air Mines	Initial Cost Per Average Belt-Air Mine[2]
1-19	0.25	$54.92	$14	10.0%	$1
20-99	0.25	$54.92	$14	10.0%	$1
100-500	0.25	$54.92	$14	10.0%	$1
Over 500	0.25	$54.92	$14	10.0%	$1

V. REGULATORY FLEXIBILITY CERTIFICATION AND INITIAL REGULATORY FLEXIBILITY ANALYSIS

INTRODUCTION

Pursuant to the Regulatory Flexibility Act of 1980, MSHA has analyzed the impact of this rule on small businesses. Further, MSHA has made a preliminary determination that it can certify that this proposal will not have a significant economic impact on a substantial number of small entities that are affected by this rulemaking. Under the Small Business Regulatory Enforcement Fairness Act (SBREFA) amendments to the Regulatory Flexibility Act (RFA), MSHA must include in the proposal a factual basis for this certification. If the proposed rule does have a significant economic impact on a substantial number of small entities, then the Agency must develop an initial regulatory flexibility analysis.

DEFINITION OF A SMALL MINE

Under the RFA, in analyzing the impact of a proposed rule on small entities, MSHA must use the Small Business Administration's (SBA's) definition for a small entity. Alternatively, after consultation with the SBA Office of Advocacy, the agency may establish an alternative definition for the mining industry by publishing that definition in the Federal Register for notice and comment. MSHA has not taken such an action, and hence is required to use the SBA definition.

The SBA defines a small entity as an establishment with 500 or fewer employees (13 CFR 121.201). All but 3 of the over 650 underground coal mines covered by this rule fall within SBA's definition and hence can be viewed as sharing the special regulatory concerns which the RFA was designed to address. The Agency is concerned, however, that looking only at the impacts of the proposed rule on all but 3 of the underground coal mines does not provide the Agency with a very complete picture on which to make decisions. Traditionally, the Agency has also looked at the impacts of its proposed rules on what the mining community refers to as "small mines" -- those with fewer than 20 employees. The way these small mines perform mining operations is generally different from the way other mines operate.

This analysis complies with the legal requirements of the RFA for an analysis of the impacts on "small entities" while continuing MSHA's traditional look at "small mines". MSHA concludes that it can certify that the proposed rule does not have a significant impact on a substantial number of small entities that are affected by this rulemaking. The Agency has determined that this is the case for affected mines for both categories: underground coal mines having between 1 and 19 employees, and underground coal mines having between 1 and 500 employees.

FACTUAL BASIS FOR CERTIFICATION

General Approach

The Agency's analysis of impacts on "small entities" begins with a "screening" analysis. The screening compares the estimated compliance costs of the proposed rule for

small mine operators in the affected sector to the estimated revenues for that sector. When estimated compliance costs are negative or less than 1 percent of estimated revenues (for the size categories considered), the Agency believes it is generally appropriate to conclude **that** there is no significant impact on a substantial number of small entities. When estimated compliance costs approach or exceed 1 percent of revenue, it tends to indicate that further analysis may be warranted. The Agency welcomes comment on its approach in this regard.

Derivation of Costs and Revenues

In the case of this proposed rule, because compliance costs must be absorbed only by underground coal mines, the Agency decided to focus its attention on the relationship between costs and revenues for these mines.

The compliance costs noted in this chapter were presented earlier in Chapter IV of this document along with an explanation of how they were derived. In estimating compliance costs, different assumptions often had to be made for mines of different employment sizes in order to account for differences in mining operations.

In determining revenues for underground **coal** mines, we multiplied mine production data (in tons) by the estimated price per ton of the commodity ($16.78 per ton in 2000).[26] The production data were obtained from MSHA's Office of Program Evaluation and Information Resources.

The Agency welcomes comment on alternative data sources that can help it more accurately estimate revenues for the final rule.

Results of Screening Analysis

As shown in Table V-1 for underground coal mines with 19 or fewer employees, the estimated cost of the proposed rule is negative (-0.011 percent of revenues). For underground coal mines that have 1-500 employees, the estimated cost of the rule is likewise negative (-0.011 percent of revenues).

For both definitions of a small mine, the cost of the proposed rule is both negative and substantially less than 1 percent of revenues. Since the proposed rule results in net cost savings, there would not be any burden placed on small mine operators. Accordingly, MSHA preliminarily determines that it can certify that there is no significant impact on any substantial number of small coal mining entities that are affected by this rule.

As required under the law, MSHA is complying with its obligation to consult with the Chief Counsel for Advocacy on this proposed rule, and on the Agency's preliminary determination of no significant economic impact on the mines affected by this rule. Consistent with Agency practice, notes of any meetings with the Chief Counsel's office on this rule, or any written communications, will be placed in the rulemaking record. The Agency will continue to consult with the Chief Counsel's office as the rulemaking process proceeds.

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[26] Average U.S. coal price from Department of Energy, Energy Information Administration, Coal Industry Annual 2000, January 2002, Table 80, p.206.

Mine Size (Number of Employees)	Total Yearly Costs (Cost Savings)'	Annual Revenue[2]	Cost Savings (-) as a Percent of Revenue[3]
1-19	($23,080)	$201,700,466	-0.011%

'Source: Table IV-1.

[2]Source: (Coal Production) x (Price of Coal). Year 2000 coal production data is from U.S. Department of Labor, Mine Safety and Health Administration, Office of Program Evaluation and Information Resources. Year 2000 price of coal is from U.S. Department of Energy, Energy Information Administration, ***Coal Industry Annual 2000,*** June 2002, Table 80, page 206.

[3](Column 2) / (Column 3).

VI. OTHER REGULATORY CONSIDERATIONS

THE UNFUNDED MANDATES REFORM ACT

For purposes of the Unfunded Mandates Reform Act of 1995, the proposed rule does not include any Federal mandate that may result in increased expenditures by State, local, or tribal governments, or increased expenditures by the private sector of more than $100 million annually.

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

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

EXECUTIVE ORDER 12988: CIVIL JUSTICE REFORM

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

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

In accordance with Executive Order 13045, MSHA has evaluated the environmental health and safety effects of the proposed rule on children. The Agency has determined that the proposed rule would not have an adverse impact on children.

EXECUTIVE ORDER 13132: FEDERALISM

MSHA has reviewed the proposed rule in accordance with Executive Order 13132 regarding federalism and has determined that it would not have "federalism implications." The proposed rule 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."

EXECUTIVE ORDER 13175: CONSULTATION AND COORDINATION WITH INDIAN TRIBAL GOVERNMENTS

MSHA certifies that the proposed **rule would not impose substantial direct** compliance costs on Indian tribal governments.

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

In accordance with Executive Order 13211, we have reviewed this proposed rule for its impact on the supply, distribution and use of energy. Because the proposed rule results in yearly net savings of $685 thousand to the coal mining industry, the proposed rule would neither reduce the supply of coal nor increase its price. We conclude, therefore, that the rule will have no significant adverse effect on the supply, distribution and use of energy and would not be considered a "significant energy action" as defined in the executive order.

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

In accordance with Executive Order 13272, 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. As discussed in Chapter V of the PREA, MSHA has determined that the proposed rule would not have a significant economic impact on a substantial number of small entities.

VII. PAPERWORK REDUCTION ACT OF 1995

INTRODUCTION

The paperwork requirements, as described below, have been submitted to the Office of Management and Budget (OMB) for review under section 3504(h) of the Paperwork Reduction Act of 1995, as amended (P.R.A.). The proposed rule contains information collection requirements in §§ 75.351, 75.352, 75.363, and 75.371. Section 75.363 is not reviscd by the proposed rule, but the paperwork required under that existing section *is* affected by proposed § 75.351(n)(1). The proposed rule, by eliminating the need to file petitions in order to use belt air, would also cause a reduction in the information collection requirements associated with existing §§ 44.9, 44.10, and 44.11.

The purpose of this chapter is to show the burden hours and related costs that would he borne **by** underground coal mine operators, as a result of the proposed rule. The costs and cost savings in this chapter are derived from Chapter IV of this PREA. However, in this chapter, we estimate costs and cost savings only in relation to the paperwork burden hours that the proposed rule would impose or reduce. Therefore, not all costs or cost savings derived in Chapter IV appear below. Those costs or cost savings derived in Chapter IV that are not related to information collection requirements or that do not have burden hours related to them do not appear in this chapter.

The burden costs reported in this chapter for particular provisions are larger than the total costs of corresponding provisions in Chapter IV. This is because Chapter IV only computes incremental costs, while this chapter reports the full costs of the paperwork provisions. Existing mines that use belt air, and new mines that would have petitioned to use belt air under the existing rule, already must follow similar paperwork requirements in order to use belt air, so their costs are excluded from the end calculations in Chapter IV. The full costs appear here, to fulfill the requirements of the Paperwork Reduction Act of 1995, because these full costs are not currently included in the Office of Management and Budget (OMB) information collection package for petitions for modification (OMB# 1219-0065). The only costs that appear in the OMB package are the costs of filing petitions, not the costs of complying with granted petitions. For the limited range of paperwork costs that do appear in the OMB package, we report the cost savings as a reduction in burden hours.

To the best of our knowledge, all tables in this chapter are the result of accurate calculations. However, since the numbers in the tables have been rounded for purposes of readability, some of the totals may appear to deviate from the sum or product of their component factors.

SUMMARY OF PAPERWORK BURDEN HOURS AND RELATED COSTS

Summarized below is detailed information about paperwork requirements that are related to this proposed rule, for those mine operators who choose to use belt air to ventilate the working places of a mine with three or more entries. MSHA estimates that there would be 18,268 burden hours for the first year, 18,832 hours for the second year, and 19,662 burden hours for the third year, for a total of 56,763 burden hours for Years 1 through 3 combined. This is associated with an annualized value of 19,520 hours per year, and an annualized cost of $973,313 per year. (See Table VII-1.)

Number of Employees	Number of Affected Operations[1]	Burden Hours Per Mine[2]	Total Annual Burden Hours[3]	Wage Rate[4]	Annual Burden Costs[5]
First Year					
1-19	11.7	43.73	513.66	$49.40	$25,373
20-99	31.5	120.87	3,809.93	$49.89	$190,067
100-500	41.5	300.85	12,483.62	$50.04	$624,676
Over 500	3.0	487.02	1,461.06	$49.68	$72,587
Total	87.8	208.16	18,268.28	$49.96	$912,702
Second Year					
1-19	13.5	41.22	556.63	$49.06	$27,308
20-99	35.8	117.80	4,219.01	$49.76	$209,921
100-500	42.7	295.35	12,616.04	$49.95	$630,156
Over 500	3.0	480.25	1,440.74	$49.61	$71,470
Total	95.0	198.16	18,832.42	$49.85	$938,855
Third Year					
1-19	15.0	41.54	621.94	$49.10	$30,540
20-99	39.4	118.09	4,653.83	$49.77	$231,614
100-500	43.8	295.40	12,945.84	$49.95	$646,641
Over 500	3.0	480.25	1,440.74	$49.61	$71,470
Total	101.2	194.28	19,662.34	$49.85	$980,265
Annualized Values[6]					
1-19	14.7	41.64	610.86	$49.12	$30,004
20-99	38.7	118.22	4,572.03	$49.77	$227.570
100-500	43.6	295.74	12,895.44	$49.96	$644,196
Over 500	3.0	480.69	1,442.07	$49.61	$71,543
Total	99.9	195.30	19,520.40	$49.86	$973,313

On a per-mine basis, MSHA estimates the same paperwork burdens for both new and existing mines that use belt air. However, MSHA estimates that as time goes by, a greater proportion of underground coal mines will be new mines, and a lesser proportion of **these** mines will be existing mines. Since MSHA estimates that a greater proportion of new mines will choose to use belt air, this means that the number of mines using belt air will increase over time. This greater number of mines using belt air will increase the total burden hours and paperwork cost over time. Hence, second year hours and costs are greater than first year hours and costs, and third year hours and costs are greater than second year hours and costs.

Table VII-2 estimates the number and percentage of existing and new mines for the first three years of the proposed rule. For purposes of this PREA, an "existing mine" is any mine that opened up prior to implementation of the proposed rule. A "new mine" is any mine that opens up after implementation of the proposed rule.

Table VII-3 estimates the number and percentage of existing and new mines that choose to use belt air during the first three years of the proposed rule. Table VII-3 also estimates the total number of mines that will be using belt air during the first three years of the proposed rule. MSHA estimates that a total of **88** underground coal mines will use belt air during the first year, 95 mines during the second year, and 101 mines during the third year. This table is most useful for calculating the total burden for costs that recur on an annual (or more frequent) basis.

Table VII-4 estimates the number and percentage of existing and new mines that will be newly subject to the proposed rule during each of the first three years. Table VII-4 also estimates the total number of mines using belt air that are newly subject to the proposed rule. MSHA estimates that 69 existing underground coal mines and 18 new mines will use belt air during the first year, 18 newly opened mines will use belt air during the second year, and 18 newly opened mines will use belt air during the third year. This table is most useful for calculating the total burden for costs that occur only initially, and that do not recur on an annual basis.

Table VII-5 estimates the expected number and percentage of new mines that would petition to use belt air under the existing rule, if the proposed rule would not be implemented. These numbers are estimated in order to calculate the reduction in burden hours and burden costs that results from the elimination of the need to file petitions in order to use belt air at the working places. MSHA estimates that approximately 11.4 new mines per year would petition to use belt air, **if** the proposed rule is not implemented.

METHODOLOGY FOR CALCULATING ANNUALIZED VALUES

Table VII-1 and Tables VII-6 through VII-22 present show values for the number of affected operations, the burden hours per mine, the wage rate, and the annual burden costs. These annualized values are estimated by computing the present value (using a 7% discount rate) of an infinite stream of values. This infinite stream is composed of the first-year value, the second-year value, and the third-year value. The third-year value is assumed to repeat indefinitely, for all years after the third year.

The present value of this infinite stream is annualized, by determining **a** single number that, if repeated indefinitely for all future years, would have the same present value

Number of Employees	Number of All Mines	Existing Mines Percentage'	New Mines Percentage*	Number ot Existing Mines[3]	Number of New Mines[4]
1-19	268	83.7%	16.3%	224.2	43.8
20-99	320	83.7%	16.3%	267.8	52.2
100-500	73	90.8%	9.2%	66.3	6.7
Over 500	3	90.8%	9.2%	2.7	0.3
Total	664	84.5%	15.5%	561.0	103.0
20-99	320	70.0%	30.0%	224.0	96.0
100-500	73	82.4%	17.6%	60.2	12.8
Over 500	3	82.4%	17.6%	2.5	0.5
Total	664	71.4%	28.6%	474.3	189.7
1-19	268	58.6%	41.4%	157.0	111.0
20-99	320	58.6%	41.4%	187.5	132.5
100-500	73	74.8%	25.2%	54.6	18.4
Over 500	3	74.8%	25.2%	2.2	0.8
Total	664	60.4%	39.6%	401.3	262.7

Source: U.S. Department of Labor, Mine Safety and Health Administration, Office of Program Evaluation and Information Resources.

'(First Year) = (100%) - (Column 4). (Second Year) = (First Year) x (First Year). (Third Year) = (Second Year) x (First Year).

[2]First Year Calculation: (New Mines in Category) / (All Mines in Category), where categories are 1-99 employees and 100 or more employees. For 1-99 employees, New Mines = 96 from Table 11-6, and All Mines = 268 + 320 = 588. (96 / 588) = 16.3%. For 100 or more employees, New Mines = 7 from Table 11-6, and All Mines = 73 + 3 = 76. (7 / 76) = 9.2%. Second & Third Year Calculations: (100%) - (Column 3).

[3](Column 2) x (Column 3).

[4](Column 2) x (Column 4).

Table VII-3.
Number of Existing and New Mines Using Belt Air in First Three Years of Proposed Rule

Number of Employees	Number of Existing Mines[1]	Number of New Mines[2]	Percentage of Existing Mines Using Belt Air[3]	Percentage of New Mines Using Belt Air[4]	Number ot Existing Mines Using Belt Air[5]	Number ot New Mines Using Belt Air[6]	Total Number of Mines Using Belt Air[7]
First Year							
1-19	224.2	43.8	3.6%	8.4%	8.1	3.7	11.7
20-99	267.8	52.2	8.2%	18.1%	22.1	9.4	31.5
100-500	66.3	6.7	55.0%	75.0%	36.5	5.0	41.5
Over 500	2.7	0.3	100.0%	100.0%	2.7	0.3	3.0
Total	561.0	103.0	12.4%	17.9%	69.3	18.4	87.8
Second Year							
1-19	187.6	80.4	3.6%	8.4%	6.8	6.7	13.5
20-99	224.0	96.0	8.2%	18.1%	18.5	17.3	35.8
100-500	60.2	12.8	55.0%	75.0%	33.1	9.6	42.7
Over 500	2.5	0.5	100.0%	100.0%	2.5	0.5	3.0
Total	474.3	189.7	12.8%	18.1%	60.8	34.2	95.0
Third Year							
1-19	157.0	111.0	3.6%	8.4%	5.7	9.3	15.0
20-99	187.5	132.5	8.2%	18.1%	15.5	24.0	39.4
100-500	54.6	18.4	55.0%	75.0%	30.0	13.8	43.8
Over 500	2.2	0.8	100.0%	100.0%	2.2	0.8	3.0
Total	401.3	262.7	13.3%	18.2%	53.4	47.8	101.2

'Table VII-2, Column 5.

'Table VII-2, Column 6.

[3]Table IV-15, Column 3.

[4]Table IV-15, Column 5.

[5](Column 2) x (Column 4).

'(Column 3) x (Column 5).

[7](Column 6) + (Column 7).

Number of Employees	Number of Existing Mines That Would Use Belt Air[1]	Number of Newly Opened Mines Using Belt Air[2]	Total Number of Mines Incurring Initial Cost[3]
1-19	8.1	3.7	11.7
20-99	22.1	9.4	31.5
100-500	36.5	5.0	41.5
Over 500	2.7	0.3	3.0
Total	69.3	18.4	87.8
Second Year			
1-19	N/A	3.71	3.7
20-99	N/A	9.4	9.4
100-500	N/A	5.0	5.0
Over 500	N/A	0.3	0.3
Total	N/A	18.4	18.4
1-19	N/A	3.7	3.7
20-99	N/A	9.4	9.4
100-500	N/A	5.0	5.0
Over 500	N/A	0.3	0.3
Total	N/A	18.4	18.4

'Table VII-3, Column 6, First Year only.

'Table VII-3, Column 7, First Year repeated each year.

'(Column 2) + (Column 3).

Number of Employees	Number ot Newly Opened Mines[1]	Percentage of Newly Opened Mines That Would Have Petitioned to Use Belt Air[2]	Number ot Newly Opened Mines That Would Have Petitioned to Use Belt Air[3]
1-19	43.8	4.4%	1.9
20-99	52.2	9.9%	5.2
100-500	6.7	60.0%	4.0
Over 500	0.3	100.0%	0.3
Total	103.0	11.1%	11.4
Second Year			
1-19	43.8	4.4%	1.9
20-99	52.2	9.9%	5.2
100-500	6.7	60.0%	4.0
Over 500	0.3	100.0%	0.3
Total	103.0	11.1%	11.4
Third Year			
1-19	43.81	4.4%	1.9
20-99	52.2	9.9%	5.2
100-500	6.7	60.0%	4.0
Over 500	0.3	100.0%	0.3
Total	103.0	11.1%	11.4

as the infinite stream of the three yearly values. The formula for calculating this annualized value is:

$$\begin{aligned}(\text{Annualized Value}) &= (\text{First Year Value}) \times (0.07 / 1.07) \\ &+ (\text{Second Year Value}) \times (0.07 / (1.07)^2) \\ &+ (\text{Third Year Value}) \times (0.07 / 0.0749).\end{aligned}$$

SECTION-BY-SECTIONDISCUSSION

§ 75.350(b) Permission to Use Belt Air; Implied Reduction in Petition Filing Costs for Existing §§ 44.9.44.10, and 44.11

Existing §§ 44.9, 44.10, and 44.11 regulate the posting, filing, service, and content of petitions to modify the rules that apply to particular mines. Proposed § 75.350(b) would permit the use of belt air at the working places, and would eliminate the need for mine operators to petition MSHA in order to use belt air. Accordingly, the paperwork requirements under existing §§ 44.9, 44.10, and 44.11 would be reduced. The reduction in burden hours and costs associated with the elimination of belt-air petition filings is shown in Table VII-6.

Since these savings are associated only with new mines that would have filed a belt-air petition under the existing rule, but which do not need to file a petition under the proposed rule, the number of affected operations is based on Table VII-5. Based on the information collection package (OMB control number 1219-0065, answer to question 12) for 30 CFR §§ 44.9, 44.10, and 44.11 *Petitions for Modification of Mandatory Safety Standards,* MSHA estimates that only 78% (135/174) of these mines would be expected to use in-house managerial labor to file the petitions. Hence, the number of affected operations is only 78% of the numbers shown in Table VII-5. MSHA estimates that 9 mines will be affected in the first year, and a total of 27 mines will he affected in the first three years.

Based on the information collection package (OMB control number 1219-0065, answer to question 12) for 30 CFR §§ 44.9, 44.10, and 44.11 *Petitions for Modification of Mandatory Safety Standards,* MSHA estimates a reduction of 40 hours of burden time per affected mine, at a supervisor's wage rate of $54.92 per hour. MSHA estimates annualized savings of 354 reduced burden hours and $19,461 in reduced burden costs. Table VII-6 provides details of these calculations.

§ 75.351(j) Initial Justification of Non-Zero CO Ambient Levels of an AMS

Section 75.351(j) requires approval of the CO ambient levels, and the means to determine those levels, in the mine ventilation plan. Establishment of CO ambient levels (other than zero) would be associated with initial documentation that justifies those levels. The burden hours and costs of this initial documenting are shown in Table VII-7.

Since this is an initial documentation requirement, the number of affected operations is based on Table VII-4. Since only 50% of mines are expected to establish non-zero CO ambient levels (see Table IV-33), the number of affected operations is only 50% of the numbers shown in Table VII-4. MSHA estimates that 44 mines will be affected in the first year, and a total of 62 mines will be affected in the first three years.

Table VII-6: Impact of Section 75.350(b) on Existing Sections 44.9, 44.10, and 44.11. Reduction in Burden Hours and Costs of Eliminating the Filing of Belt-Air Petitions

Number of Employees	Number ot Affected Operations'	Burden Hours Per Mine[2]	Total Annual Burden Hours[3]	Wage Rate[4]	Annual Burden Costs'
1-19	1.5	(40.0)	(59.5)	$54.92	($3,268)
20-99	4.0	(40.0)	(161.1)	$54.92	($8,846)
100-500	3.1	(40.0)	(125.2)	$54.92	($6,876)
Over 500	0.2	(40.0)	(8.6)	$54.92	($471)
Total	8.9	NIA	(354.3)	NIA	($19,461)
Second Year					
1-19	1.5	(40.0)	(59.5)	$54.92	($3,268)
20-99	4.0	(40.0)	(161.1)	$54.92	($8,846)
100-500	3.1	(40.0)	(125.2)	$54.92	($6,876)
Over 500	0.2	(40.0)	(8.6)	$54.92	($471)
Total	8.9	N/A	(354.3)	NIA	($19,461)
Third Year					
1-19	1.5	(40.0)	(59.5)	$54.92	($3,268)
20-99	4.0	(40.0)	(161.1)	$54.92	($8,846)
100-500	3.1	(40.0)	(125.2)	$54.92	($6,876)
Over 500	0.2	(40.0)	(8.6)	$54.92	($471)
Total	8.9	N/A	(354.3)	NIA	($19,461)
Annualized Values[5]					
1-19	1.5	(40.0)	(59.5)	$54.92	($3,268)
20-99	4.0	(40.0)	(161.1)	$54.92	($8,846)
100-500	3.1	(40.0)	(125.2)	$54.92	($6,876)
Over 500	0.2	(40.0)	(8.6)	$54.92	($471)
Total	8.9	N/A	(354.3)	N/A	($19,461)

'Source: Information Collection, Office of Management and Budget (OMB) Control **Number** 1219-0065 Formula: (Table VII-5, Column 4) x (135 / 174).

[2]Source: Information Collection, Office of Management and Budget (OMB) Control Number 1219-0065. Formula: (40 hours).

[3](Column 2) x (Column 3).

[4]Supervisor Wage Rate.

[5](Column 4) x (Column 5).

'Values are annualized according to the formula: (Annualized Value) = (First Year Value) x (0.07 / 1.07) + (Second **Year Value) x (0.07 / 1.07^2) + (Third Year Value) x** (0.07 10.0749). See text for rationale.

Number of Employees	Number ot Affected Operations'	Burden Hours Per Mine[2]	Total Annual Burden Hours[3]	Wage Rate[4]	Annual Burden Costs[5]
First Year					
1-19	5.9	8.0	46.99	$54.92	$2,580
20-99	15.8	8.0	126.08	$54.92	$6,924
100-500	20.7	8.0	165.98	$54.92	$9,116
Over 500	**1.5**	8.0	12.00	$54.92	$659
Total	43.9	N/A	351.05	N/A	$19,280
Second Year					
1-19	1.8	8.0	14.70	$54.92	$807
20-99	4.7	8.0	37.77	$54.92	$2,074
100-500	2.5	8.0	20.17	$54.92	$1,108
Over 500	0.1	8.0	1.11	$54.92	$61
Total	9.2	N/A	73.74	N/A	$4,050
Third Year					
1-19	1.8	8.0	14.70	$54.92	$807
20-99	4.7	8.0	37.77	$54.92	$2,074
100-500	2.5	8.0	20.17	$54.92	$1,108
Over 500	0.1	8.0	1.11	$54.92	$61
Total	9.2	N/A	73.74	N/A	$4,050
Annualized Values[6]					
1-19	2.1	8.0	16.81	$54.92	$923
20-99	5.4	8.0	43.55	$54.92	$2,391
100-500	3.7	8.0	29.71	$54.92	$1,632
Over 500	0.2	8.0	1.82	$54.92	$100
Total	11.5	N/A	91.88	N/A	$5,046

1

[5](Column 4) x (Column 5).

[6]Values arc annualized according to thc formula: (Annualized Value) = (First Year Value) x (0.07 / 1.07) + (Second Year Value) x (0.07 / 1.07^2) + (Third Year Value) x (0.07 10.0749). See text for rationale.

Based on Table IV-33, **MSHA** estimates **8** hours of burden time per affected mine, at a supervisor's wage rate of $54.92 per hour. **MSHA** estimates annualized values of 92 burden hours and $5,046 in burden costs. Table VII-7 provides details of these calculations.

§ 75.351(j) Implied Additional Costs for Existing § 75.371(hh) Initial Reporting of Non-Zero CO Ambient Levels of an AMS

Existing § 75.371(hh) requires reporting (as opposed to justification) within the mine ventilation plan of the "ambient level in parts per million of carbon monoxide. and the method for determining the ambient level, in all areas where carbon monoxide sensors are installed." This existing provision is impacted by proposed § 75.351(j). The burden hours and costs of this initial documenting are shown in Table VII-8.

Since this is an initial documentation requirement, the number of affected operations is based on Table VII-4. Since only 50% of mines are expected to establish non-zero CO ambient levels (see Table IV-33), the number of affected operations is only 50% of the numbers shown in Table VII-4. **MSHA** estimates that **44** mines will be affected in the first year, and a total of 62 mines will be affected in the first three years.

Based on Table IV-33, **MSHA** estimates 0.25 hour of burden time per affected mine, at a supervisor's wage rate of $54.92 per hour. **MSHA** estimates annualized values of 2.9 burden hours and $158 in burden costs. Table VII-8 provides details of these calculations.

§ 75.351(m) Initial Justification of Time Delay or Other Method Used with an AMS

Section 75.351(m) permits a mine to incorporate time delays into the AMS, or to use other methods for reducing non-fire alerts and alarm levels, provided they are specified and approved in the mine ventilation plan. Permission for such time delays, or other methods of reducing non-fire alerts and alarms, would be associated with initial documentation that justifies these changes. The burden hours and costs of this initial documenting are shown in Table VII-9.

Since this is an initial documentation requirement, the number of affected operations is based on Table VII-4. **MSHA** expects that only 40% of diesel mines would use time delays, and no non-diesel mines would use time delays (see Table IV-34). Hence, the number of affected operations is only a fraction of the numbers shown in Table VII-4. **MSHA** estimates that 16 mines will be affected in the first year. and a total of 21 mines will be affected in the first three years.

Based on Table IV-34, **MSHA** estimates **8** hours of burden time per affected mine, at a supervisor's wage rate of $54.92 per hour. **MSHA** estimates annualized values of 27 burden hours and $1,470 in burden costs. Table VII-9 provides details of these calculations.

§ 75.351(n)(1) Implied Additional Costs for Existing § 75.363(b), Recordkeeping for On-Shift Examination of an AMS

Section 75.351(n)(1) requires that the sensors and alarms of an AMS be visually examined at least once each shift. This is most conveniently done as part of the on-shift examination done under existing § 75.362(b). In the event a damaged sensor or alarm is visually observed, this would entail a recordkeeping requirement under existing § 75.363(b),

Number of Employees	Number ot Affected Operations'	Burden Hours Per Mine[2]	Total Annual Burden Hours[3]	Wage Rate[4]	Annual Burden Costs[5]
First Year					
1-19	5.9	0.25	1.47	$54.92	$81
20-99	15.8	0.25	3.94	$54.92	$216
100-500	20.7	0.25	5.19	$54.92	$285
Over 500	1.5	0.25	0.38	$54.92	$21
Total	43.9	N/A	10.97	N/A	$602
Second Year					
1-19	1.8	0.25	0.46	$54.92	$25
20-99	4.7	0.25	1.18	$54.92	$65
100-500	2.5	0.25	0.63	$54.92	$35
Over 500	0.1	0.25	0.03	$54.92	$2
Total	9.2	N/A	2.30	N/A	$127
Third Year					
1-19	1.8	0.25	0.46	$54.92	$25
20-99	4.7	0.25	1.18	$54.92	$65
100-500	2.5	0.25	0.63	$54.92	$35
Over 500	0.1	0.25	0.03	$54.92	$2
Total	9.2	N/A	2.30	N/A	$127
Annualized Values[6]					
1-19	2.1	0.25	0.53	$54.92	$29
20-99	5.4	0.25	1.36	$54.92	$75
100-500	3.7	0.25	0.93	$54.92	$51
Over 500	0.2	0.25	0.06	$54.92	$3
Total	11.5	N/A	2.87	N/A	$158

'Source: (Table VII-4, Column 4) x (Table IV-33, Column 6).

[2]**Table IV-33, Column 3.**

[3](Column 2) x (Column 3).

[4]**Table IV-33, Column 4**

[5](Column 4) x (Column 5).

'Values are annualized according to the formula: (Annualized Value) − (First Year Value) x (0.07 / 1.07) + (Second Year Value) x (0.07 / 1.07^2) + (Third Year Value) x (0.07 / 0.0749). See text for rationale.

Table VII-9: Section 75.351(m).
Burden Hours and Costs of Initial Justification of Time-Delay or Other Method to Reduce Non-Fire Alerts and Alarms of an Atmospheric Monitoring System (AMS) for Mines Using Belt Air

Number of Employees	Number of Affected Operations[1]	Burden Hours Per Mine[2]	Total Annual Burden Hours[3]	Wage Rate[4]	Annual Burden Costs[5]
First Year					
1-19	0.3	8.0	2.10	$54.92	$116
20-99	3.2	8.0	25.85	$54.92	$1,420
100-500	10.9	8.0	87.31	$54.92	$4,795
Over 500	1.2	8.0	9.60	$54.92	$527
Total	15.6	N/A	124.86	N/A	$6,857
Second Year					
1-19	0.1	8.0	0.66	$54.92	$36
20-99	1.0	8.0	7.74	$54.92	$425
100-500	1.3	8.0	10.61	$54.92	$583
Over 500	0.1	8.0	0.88	$54.92	$49
Total	2.5	N/A	19.90	N/A	$1,093
Third Year					
1-19	0.1	8.0	0.66	$54.92	$36
20-99	1.0	8.0	7.74	$54.92	$425
100-500	1.3	8.0	10.61	$54.92	$583
Over 500	0.1	8.0	0.88	$54.92	$49
Total	2.5	N/A	19.90	N/A	$1,093
Annualized Values[6]					
1-19	0.1	8.0	0.75	$54.92	$41
20-99	1.1	8.0	8.93	$54.92	$490
100-500	2.0	8.0	15.63	$54.92	$850
Over 500	0.2	8.0	1.45	$54.92	$80
Total	3.3	N/A	26.76	N/A	$1,470

[1]Source: (Table VII-4, Column 4) x (Table IV-34, Column 6) x (Table IV-34, Column 7).

[2]Table IV-34, Column 2.

[3](Column 2) x (Column 3).

[4]Table IV-34, Column 4.

[5](Column 4) x (Column 5).

[6]Values are annualized according to the formula: (Annualized Value) = (First Year Value) x (0.07 / 1.07) + (Second Year Value) x (0.07 / 1.07^2) + (Third Year Value) x (0.07 / **0.0749).** See **text for rationale.**

which requires that "A record shall be made of any hazardous condition found." The additional burden hours and costs of this implied recordkeeping requirement testing are shown in Table VII-10.

Since this is a documentation requirement that occurs on an irregular basis in every year, the number of affected operations is based on Table VII-3. MSHA estimates that 88 mines will be affected in the first year, 95 mines in the second year, and 101 mines in the third year.

Based on Table IV-35, MSIIA estimates between 0.13 and 0.40 hour of burden timc per affected mine, depending on mine size. This time is priced at the miner's wage rate of $28.07 per hour. MSHA estimates annualized values of 17 burden hours and $478 in burden costs. Table VII-10 provides details of these calculations.

§ 75.351(n)(2) Weekly Testing of an AMS

Section 75.351(n)(2) requires weekly testing of the alarms for an *AMS*. This weekly testing is accompanied by a documentation requirement in § 75.351(o)(1)(iii). The burden hours and costs of this weekly testing are shown in Table VII-11.

Since this is a documentation requirement that occurs weekly in every year, the number of affected operations is based on Table VII-3. MSHA estimates that 88 mines will be affected in the first year, 95 mines in the second year, and 101 mines in the third year.

Based on Table IV-36, MSHA estimates between 13 and 52 hours of burden time per affected mine, depending on mine size. This time is priccd at thc supervisor's wage ratc of $54.92 per hour. MSHA estimates annualized values of 3,053 burden hours and $167,661 in burden costs. Table VII-11 provides details of these calculations.

§ 75.351(n)(3) Monthlv Calibration of an AMS

Section 75.351(n)(3)(i) requires monthly calibration of the *CO* sensors for an *AMS*. This monthly calibration is accompanied by a documentation requirement in § 75.351(o)(1)(iii). The burden hours and costs of this monthly calibration are shown in Table VII-12.

Since this is a documentation requirement that occurs monthly in every year, the number of affected operations is based on Table VII-3. MSHA estimates that 88 mines will be affected in the first year, 95 mines in the second year, and 101 mines in the third year.

Based on Table IV-37, MSHA estimates between 15 and 300 hours of burden time per affectcd minc, dcpcnding on minc sizc. This timc is priccd at thc supervisor's wagc ratc of $54.92 per hour. MSHA estimates annualized values of 11,289 burden hours and $620,005 in burden costs. Table VII-12 provides details of these calculations.

§§ ' .351(and (o)(R i r Alerts, Alar a d lf of an AMS

Section 75.351(o)(1)(i) requires a record of all alerts and alarms of an AMS. Section 75.351(o)(1)(ii) requires a record of all malfunctions of an *AMS*. The burden hours and costs of this recordkeeping are shown in Table VII-13.

Table VII-10: Impact of Section 75.351(n)(1) on Existing Section 75.363(b). Burden Hours and Costs of Recordkeeping for On-Shift Examination of an Atmospheric Monitoring System (AMS) for Mines Using Belt Air

Number of Employees	Number ot Affected Operations'	Burden Hours Per Mine[2]	Total Annual Burden Hours[3]	Wage Rate[4]	Annual Burden Costs[5]
1-19	11.7	0.13	1.57	$28.07	$44
20-99	31.5	0.13	4.20	$28.07	$118
100-500	41.5	0.20	8.30	$28.07	$233
Over 500	3.0	0.40	1.20	$28.07	$34
Total	87.8	N/A	15.27	NIA	$429
Second Year					
1-19	13.51	0.13	1.801	$28.07	$51
20-99	35.8	0.13	4.78	$28.07	$134
100-500	42.7	0.20	8.54	$28.07	$240
Over 500	3.0	0.40	1.20	$28.07	$34
Total	95.0	N/A	16.32	NIA	$4583 1
Third Year					
1-19	15.0	0.13	2.00	$28.07	$56
20-99	39.4	0.13	5.25	$28.07	$1 48
100-500	43.8	0.20	8.76	$28.07	$246
Over 500	3.0	0.40	1.20	$28.07	$34
Total	101.2	N/A	17.22	N/A	$483
Annualized Values'					
1-19	14.7	0.13	1.96	$28.07	$55
20-99	38.7	0.13	5.16	$28.07	$1 45
100-500	43.6	0.20	8.72	$28.07	$245
Over 500	3.0	0.40	1.20	$28.07	$34
Total	99.9	NIA	17.03	N/A	$478

'Values are annualized according to the formula: (Annualized Value) = (First Year Value) x (0.07/1.07)+ (Second Year Value) x (0.07/1.07^2) + (Third Year Value) x (0.07/0.0749). See text for rationale.

Number of Employees	Number of Affected Operations[1]	Burden Hours Per Mine[2]	Total Annual Burden Hours[3]	Wage Rate[4]	Annual Burden Costs[5]
First Year					
1-19	11.7	13.00	152.71	$54.92	$8,387
20-99	31.5	26.00	819.54	$54.92	$45,009
100-500	41.5	39.00	1,618.29	$54.92	$88,877
Over 500	3.0	52.00	156.00	$54.92	$8,568
Total	87.8	N/A	2,746.54	N/A	$150,840
Second Year					
1-19	13.5	13.00	175.54	$54.92	$9,640
20-99	35.8	26.00	931.22	$54.92	$51,143
100-500	42.7	39.00	1,665.91	$54.92	$91,492
Over 500	3.0	52.00	156.00	$54.92	$8,568
Total	95.0	N/A	2,928.67	N/A	$160,842
Third Year					
1-19	15.0	13.00	194.64	$54.92	$10,690
20-99	39.4	26.00	1,024.67	$54.92	$56,275
100-500	43.8	39.00	1,709.14	$54.92	$93,866
Over 500	3.0	52.00	156.00	$54.92	$8,568
Total	101.2	N/A	3,084.45	N/A	$169,398
Annualized Values[6]					
1-19	14.7	13.00	190.73	$54.92	$10,475
20-99	38.7	26.00	1,005.54	$54.92	$55,224
100-500	43.6	39.00	1,700.55	$54.92	$93,394
Over 500	3.0	52.00	156.00	$54.92	$8,568
Total	99.9	N/A	3,052.82	N/A	$167,661

[3](Column 2) x (Column 3).

[4]Table IV-36, Column 5.

[5](Column 4) x (Column 5).

'Values are annualized according *to* the formula: (Annualized Value) = (First Year Value) x (0.07/1.07)+ (Second Year Value) x (0.07/1.07^2) + (Third Year Value) x (0.07/0.0749). See text for rationale.

Number of Employees	Number ot Affected Operations'	Burden Hours Per Mine[2]	Total Annual Burden Hours[3]	Wage Rate[4]	Annual Burden Costs[5]
First Year					
1-19	11.7	15.00	176.20	$54.92	$9,677
20-99	31.5	60.00	1,891.24	$54.92	$103,867
100-500	41.5	180.00	7,469.05	$54.92	$410,200
Over 500	3.0	300.00	900.00	$54.92	$49,428
Total	87.8	N/A	10,436.49	N/A	$573,172
Second Year					
1-19	13.5	15.00	202.54	$54.92	$11,124
20-99	35.8	60.00	2,148.97	$54.92	$118,022
100-500	42.7	180.00	7,688.81	$54.92	$422,269
Over 500	3.0	300.00	900.00	$54.92	$49,428
Total	95.0	N/A	10,940.33	N/A	$600,843
Third Year					
1-19	15.0	15.00	224.58	$54.92	$12,334
20-99	39.4	60.00	2,364.63	$54.92	$129,866
100-500	43.8	180.00	7,888.33	$54.92	$433,227
Over 500	3.0	300.00	900.00	$54.92	$49,428
Total	101.2	N/A	11,377.54	N/A	$624,855
Annualized Values[b]					
1-19	14.7	15.00	220.07	$54.92	$12,086
20-99	38.7	60.00	2,320.48	$54.92	$127,441
100-500	43.6	180.00	7,848.70	$54.92	$431,051
Over 500	3.0	300.00	900.00	$54.92	$49,428
Total	99.9	N/A	11,289.25	N/A	$620,005

Number of Employees	Number of Affected Operations'	Burden Hours Per Mine[2]	Total Annual Burden Hours[3]	Wage Rate[4]	Annual Burden Costs[5]
First Year					
1-19	11.7	0.66	7.80	$28.07	$219
20-99	31.5	4.23	133.40	$28.07	$3,745
100-500	41.5	20.10	834.12	$28.07	$23,414
Over 500	3.0	45.05	135.15	$28.07	$3,794
Total	87.8	N/A	1,110.48	N/A	$31,171
Second Year					
1-19	13.5	0.66	8.97	$28.07	$252
20-99	35.8	4.23	151.58	$28.07	$4,255
100-500	42.7	20.10	858.66	$28.07	$24,103
Over 500	3.0	45.05	135.15	$28.07	$3,794
Total	95.0	N/A	1,154.36	N/A	$32,403
Third Year					
1-19	15.0	0.66	9.94	$28.07	$279
20-99	39.4	4.23	166.80	$28.07	$4,682
100-500	43.8	20.10	880.94	$28.07	$24,728
Over 500	3.0	45.05	135.15	$28.07	$3,794
Total	101.2	N/A	1,192.83	N/A	$33,483
Annualized Values[6]					
1-19	14.7	0.66	9.74	$28.07	$273
20-99	38.7	4.23	163.68	$28.07	$4,595
100-500	43.6	20.10	876.52	$28.07	$24,604
Over 500	3.0	45.05	135.15	$28.07	$3,794
Total	99.9	N/A	1,185.09	N/A	$33,266

Since this is a documentation requirement that occurs repeatedly in every year, the number of affected operations is based on Table VII-3. **MSHA** estimates that 88 mines will be affected in the first year, 95 mines in the second year, and 101 mines in the third year.

Based on Table IV-38, **MSHA** estimates between 0.66 and 45 hours of burden time per affected mine, depending on mine size. This time is priced at the miner's wage rate of $28.07 per hour. **MSHA** estimates annualized values of 1,185 burden hours and $33,266 in burden costs. Table VII-13 provides details of these calculations.

§ 351 rdke Testing, Calibration, and Maintenance of an AMS

Section 75.351(o)(1)(iii) requires a record of all testing, calibration, and malfunctions of an *AMS*. These three recordkeeping requirements are analyzed separately below.

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The burden hours and costs of the recordkeeping associated with the weekly testing of an *AMS* are shown in Table VII-14.

Since this is a documentation requirement that occurs weekly in every year, the number of affected operations is based on Table VII-3. **MSHA** estimates that 88 mines will be affected in the first year, 95 mines in the second year, and 101 mines in the third year.

Based on Table IV-39, **MSHA** estimates between 0.87 and 3.47 hours of burden time per affected mine, depending on mine size. This time is priced at the supervisor's wage rate of **$54.92** per hour. MSHA estimates annualized values of 204 burden hours **and** $1 1,117 in burden costs. Table VII-14 provides details of these calculations.

Recordkeeping for Monthly Calibration of an AMS

The burden hours and costs of the recordkeeping associated with the monthly calibration of **an** *AMS* are shown in Table VII-15.

Since this is a documentation requirement that occurs monthly in every year, the number of affected operations is based on Table VII-3. **MSHA** estimates that 88 mines will be affected in the first year, 95 mines in the second year, and 101 mines in the third year.

Based on Table IV-40, **MSHA** estimates between 1 and 20 hours of burden time per affected mine, depending on mine size. This time is priced at the supervisor's wage rate of $54.92 per hour. **MSHA** estimates annualized values of 753 burden hours and $41,334 in burden costs. Table VII-15 provides details of these calculations.

Recordkeeping for Maintenance of an AMS

The burden hours and costs of the recordkeeping associated with the maintenance of an *AMS* are shown in Table VII-16.

Since this is a documentation requirement that occurs on an irregular basis in every year, the number of affected operations is based on Table **VII-3.** **MSHA** estimates that 88 mines will be affected in the first year, 95 mines in the second year, and 101 mines in the third year.

Table VII-14: Section 75.351(o)(1)(iii).
Burden Hours and Costs of Recordkeepingfor Weekly Testing
of an Atmospheric Monitoring System (AMS) for Mines Using Belt Air

Number of Employees	Number of Affected Operations[1]	Burden Hours Per Mine[2]	Total Annual Burden Hours[3]	Wage Rate[4]	Annual Burden Costs[5]
First Year					
1-19	11.7	0.87	10.18	$54.92	$559
20-99	31.5	1.73	54.64	$54.92	$3,001
100-500	41.5	2.60	107.89	$54.92	$5,925
Over 500	3.0	3.47	10.40	$54.92	$571
Total	87.8	N/A	183.10	N/A	$10,056
Second Year					
1-19	13.5	0.87	11.70	$54.92	$643
20-99	35.8	1.73	62.08	$54.92	$3,410
100-500	42.7	2.60	111.06	$54.92	$6,099
Over 500	3.0	3.47	10.40	$54.92	$571
Total	95.0	N/A	195.24	N/A	$10,723
Third Year					
1-19	15.0	0.87	12.98	$54.92	$713
20-99	39.4	1.73	68.31	$54.92	$3,752
100-500	43.8	2.60	113.94	$54.92	$6,258
Over 500	3.0	3.47	10.40	$54.92	$571
Total	101.2	N/A	205.63	N/A	$11,293
Annualized Values[6]					
1-19	14.7	0.87	12.72	$54.92	$698
20-99	38.7	1.73	67.04	$54.92	$3,682
100-500	43.6	2.60	113.37	$54.92	$6,226
Over 500	3.0	3.47	10.40	$54.92	$571
Total	99.9	N/A	203.52	N/A	$11,177

[1]Source: (Table VII-3, Column *8).*

[2](Table IV-39, Column 4) x 52.

[3](Column 2) x (Column 3).

[4]Table IV-39, Column 5.

[5](Column 4) x (Column 5).

[6]Values are annualized according to the formula: (Annualized Value) = (First Year Value) x (0.07 / 1.07) + (Second Year Value) x (0.07 / 1.07^2) + (Third Year Value) x (0.07 / 0.0749). See text for rationale.

Number of Employees	Number of Affected Operations'	Burden Hours Per Mine[2]	Total Annual Burden Hours[3]	Wage Rate[4]	Annual Burden Costs[5]
First Year					
1-19	11.7	1.00	11.75	$54.92	$645
20-99	31.5	4.00	126.08	$54.92	$6,924
100-500	41.5	12.00	497.94	$54.92	$27,347
Over 500	3.0	20.00	60.00	$54.92	$3,295
Total	87.8	N/A	695.77	N/A	$38,211
Second Year					
1-19	13.5	1.00	13.50	$54.92	$742
20-99	35.8	4.00	143.26	$54.92	$7,868
100-500	42.7	12.00	512.59	$54.92	$28,151
Over 500	3.0	20.00	60.00	$54.92	$3,295
Total	95.0	N/A	729.36	N/A	$40,056
Third Year					
1-19	15.0	1.00	14.97	$54.92	$822
20-99	39.4	4.00	157.64	$54.92	$8,658
100-500	43.8	12.00	525.89	$54.92	$28,882
Over 500	3.0	20.00	60.00	$54.92	$3,295
Total	101.2	N/A	758.50	N/A	$41,657
Annualized Values'					
1-19	14.7	1.00	14.67	$54.92	$806
20-99	38.7	4.00	154.70	$54.92	$8,496
100-500	43.6	12.00	523.25	$54.92	$28,737
Over 500	3.0	20.00	60.00	$54.92	$3,295
Total	99.9	N/A	752.62	N/A	$41,334

'Source: (Table VII-3, Column 8).

[2](Table IV-40, Column 4) x 13

[3](Column 2) x (Column3).

[4]Table IV-40, Column 5.

[5](Column 4) x (Column5).

[6]Values are annualized according to the formula: (Annualized Value) = (First Year Value) x (0.07 / 1.07) + (Second Year Value) x (0.07 / 1.07^2) + (Third Year Value) x (0.07 10.0749). See text for rationale.

Number of Employees	Number of Affected Operations[1]	Burden Hours Per Mine[2]	Total Annual Burden Hours[3]	Wage Rate[4]	Annual Burden Costs[5]
First Year					
1-19	11.7	0.33	3.92	$54.92	$215
20-99	31.5	1.33	42.03	$54.92	$2,308
100-500	41.5	4.00	165.98	$54.92	$9,116
Over 500	3.0	6.67	20.00	$54.92	$1,098
Total	87.8	N/A	231.92	N/A	$12,737
Second Year					
1-19	13.5	0.33	4.50	$54.92	$247
20-99	35.8	1.33	47.75	$54.92	$2,623
100-500	42.7	4.00	170.86	$54.92	$9,384
Over 500	3.0	6.67	20.00	$54.92	$1,098
Total	95.0	N/A	243.12	N/A	$13,352
Third Year					
1-19	15.0	0.33	4.99	$54.92	$274
20-99	39.4	1.33	52.55	$54.92	$2,886
100-500	43.8	4.00	175.30	$54.92	$9,627
Over 500	3.0	6.67	20.00	$54.92	$1,098
Total	101.2	N/A	252.83	N/A	$13,886
Annualized Values[6]					
1-19	14.7	0.33	4.89	$54.92	$269
20-99	38.7	1.33	51.57	$54.92	$2,832
100-500	43.6	4.00	174.42	$54.92	$9,579
Over 500	3.0	6.67	20.00	$54.92	$1,098
Total	99.9	N/A	250.87	N/A	$13,778

Based on Table IV-41, **MSHA** estimates between 0.33 and 6.67 hours of burden time per affected mine, depending on mine size. This time is priced at the supervisor's wage rate of $54.92 per hour. MSHA estimates annualized values of 251 burden hours and $13,788 in burden costs. Table VII-16 provides details of these calculations.

§ 75.351(q) Training of AMS Operators

Section 75.351(q) requires annual training of all AMS operators in the proper operation of the ***AMS***, and that a record be kept of such training. This involves two types of burden hours. First, there is the time spent by the AMS operators in learning. Second, there is the time spent by the *AMS* trainer in teaching and recordkeeping. These are analyzed separately below.

Learning Time for Training of AMS Operators

The burden hours and costs of the learning time of *AMS* operators associated with the training of ***AMS*** operators are shown in Table VII-17.

Since this is a training requirement that occurs every year, the number of affected operations is based on Table VII-3. **MSHA** estimates that 88 mines will be affected in the first year, 95 mines in the second year, and 101 mines in the third year.

Based on Table IV-43, **MSHA** estimates beween 4 and 16 hours of burden time per affected mine, depending on mine size. This time is priced at the miner's wage rate of $28.07 per hour. **MSHA** estimates annualized values of 939 burden hours and $26,367 in burden costs. Table VII-17 provides details of these calculations.

Teaching Time and Recordkeeping for Training of AMS Operators

The burden hours and costs of the teaching time and recordkeeping of AMS trainers associated with the training of *AMS* operators are shown in Table **VII-**18.

Since this is a training requirement that occurs every year, the number of affected operations is based on Table VII-3. **MSHA** estimates that 88 mines will be affected in the first year, 95 mines in the second year, and 101 mines in the third year.

Based on Table IV-43, **MSHA** estimates 5 hours of burden time for training and 0.25 hours of burden time for recordkeeping. This totals to 5.25 hours of burden time per affected mine. This time is priced at the supervisor's wage rate of $54.92 per hour. **MSHA** estimates annualized values of 525 burden hours and $28,819 in burden costs. Table VII-18 provides details of these calculations.

§§ 75.352(a) and (b) Response Procedures for Alerts, Alarms, and Malfunctions of an AMS

Sections 75.352(a) and (b) require procedures to be followed in response to all alerts, alarms, and malfunction signals of an ***AMS***. These procedures are accompanied by a documentation requirement in §§ 75.351(o)(1)(i) and (ii). The burden hours and costs of these procedures are shown in Table VII-19.

Table VII-17: Section 75.351(q).
Burden Hours and Costs of Learning Time for Training of Operators for an Atmospheric Monitoring System (AMS) for Mines Using Belt Air

Number of Employees	Number of Affected Operations[1]	Burden Hours Per Mine[2]	Total Annual Burden Hours[3]	Wage Rate[4]	Annual Burden Costs[5]
First Year					
1-19	11.7	4.00	46.99	$28.07	$1,319
20-99	31.5	8.00	252.16	$28.07	$7,078
100-500	41.5	12.00	497.94	$28.07	$13,977
Over 500	3.0	16.00	48.00	$28.07	$1,347
Total	87.8	N/A	845.09	N/A	$23,722
Second Year					
1-19	13.5	4.00	54.01	$28.07	$1,516
20-99	35.8	8.00	286.53	$28.07	$8,043
100-500	42.7	12.00	512.59	$28.07	$14,388
Over 500	3.0	16.00	48.00	$28.07	$1,347
Total	95.0	N/A	901.13	N/A	$25,295
Third Year					
1-19	15.0	4.00	59.89	$28.07	$1,681
20-99	39.4	8.00	315.28	$28.07	$8,850
100-500	43.8	12.00	525.89	$28.07	$14,762
Over 500	3.0	16.00	48.00	$28.07	$1,347
Total	101.2	N/A	949.06	N/A	$26,640
Annualized Values[6]					
1-19	14.7	4.00	58.69	$28.07	$1,647
20-99	38.7	8.00	309.40	$28.07	$8,685
100-500	43.6	12.00	523.25	$28.07	$14,688
Over 500	3.0	16.00	48.00	$28.07	$1,347
Total	99.9	N/A	939.33	N/A	$26,367

[1]Source: (Table VII-3, Column **8).**

[2]**(Table IV-43, Column 2) x (Table IV-43, Column 3).**

[3](Column 2) x (Column 3).

[4]**Table IV-43, Column 4.**

[5](Column 4) x (Column 5).

'Values are annualized according to the formula: (Annualized Value) = (First Year Value) **x** (0.07 / 1.07) + (Second Year Value) **x** (0.07 / 1.07^2) + (Third Year Value) **x** (0.07 / 0.0749). See text for rationale.

Number of Employees	Number ot Affected Operations'	Burden Hours Per Mine'	Total Annual Burden Hours[3]	Wage Rate[4]	Annual Burden Costs[5]
First Year					
1-19	11.7	5.25	61.67	$54.92	$3,387
20-99	31.5	5.25	165.48	$54.92	$9,088
100-500	41.5	5.25	217.85	$54.92	**$1** 1,964
Over 500	3.0	5.25	15.75	$54.92	$865
Total	87.8	N/A	460.75	N/A	$25,304
Second Year					
1-19	13.5	5.25	70.89	$54.92	$3,893
20-99	35.8	5.25	188.04	$54.92	**$1** 0,327
100-500	42.7	5.25	224.26	$54.92	**$1** 2,316
Over 500	3.0	5.25	15.75	$54.92	$865
Total	95.0	N/A	498.93	N/A	$27,401
Third Year					
1-19	15.0	5.25	78.60	$54.92	$4,317
20-99	39.4	5.25	206.91	$54.92	**$1** 1,363
100-500	43.8	5.25	230.08	$54.92	**$1** 2,636
Over 500	3.0	5.25	15.75	$54.92	$865
Total	101.2	N/A	531.34	N/A	$29,181
Annualized Values[b]					
1-19	14.7	5.25	77.02	$54.92	$4,230
20-99	38.7	5.25	203.04	$54.92	$11,151
100-500	43.6	5.25	228.92	$54.92	**$1** 2,572
Over 500	3.0	5.25	15.75	$54.92	$865
Total	99.9	N/A	524.74	N/A	$28,819

[1]Source: (Table VII-3, Column ***8).***

'(Table IV-43, Column 6) x (Table IV-43, Columns 6 + 7).

[3](Column 2) x (Column 3).

[4]Table IV-43, Column 8.

[5](Column 4) x (Column 5).

'Values are annualized according to the formula: (Annualized Value) = (First Year Value) x (0.07 / 1.07) + (Second Year Value) x (0.07 / 1.07^2) + (Third Year Value) x (0.07 10.0749). See text for rationale.

Number of Employees	Number of Affected Operations[1]	Burden Hours Per Mine[2]	Total Annual Burden Hours[3]	Wage Rate[4]	Annual Burden Costs[5]
First Year					
1-19	11.7	4.20	49.34	$28.07	$1,385
20-99	31.5	10.29	324.37	$28.07	$9,105
100-500	41.5	22.38	928.71	$28.07	$26,069
Over 500	3.0	33.58	100.75	$28.07	$2,828
Total	87.8	N/A	1,403.16	N/A	$39,387
Second Year					
1-19	13.5	4.20	56.71	$28.07	$1,592
20-99	35.8	10.29	368.57	$28.07	$10,346
100-500	42.7	22.38	956.03	$28.07	$26,836
Over 500	3.0	33.58	100.75	$28.07	$2,828
Total	95.0	N/A	1,482.06	N/A	$41,601
Third Year					
1-19	15.0	4.20	62.88	$28.07	$1,765
20-99	39.4	10.29	405.56	$28.07	$11,384
100-500	43.8	22.38	980.84	$28.07	$27,532
Over 500	3.0	33.58	100.75	$28.07	$2,828
Total	101.2	N/A	1,550.03	N/A	$43,509
Annualized Values"					
1-19	14.7	4.20	61.62	$28.07	$1,730
20-99	38.7	10.29	397.99	$28.07	$11,171
100-500	43.6	22.38	975.91	$28.07	$27,394
Over 500	3.0	33.58	100.75	$28.07	$2,828
Total	99.9	N/A	1,536.27	N/A	$43,123

[1]Source: (Table VII-3, Column 8).

[2]**Table IV-46,** Column ***8.***

[3](Column 2) x (Column 3).

[4]Table IV-46, Column 9.

[5](Column 4) x (Column 5).

'Values are annualized according to the formula: (Annualized Value) – (First Year Value) x (0.07 / 1.07) + (Second Year Value) x (0.07 / 1.07^2) + (Third Year Value) x (0.07 / 0.0749). See text for rationale.

Since these procedures must be followed on a recurring basis, the number of affected operations is based on Table VII-3. MSHA estimates that 88 mines will be affected in the first year, 95 mines in the second year, and 101 mines in the third year.

Based on Table IV-46, MSHA estimates between 4.20 and 34 hours of burden time per affected mine, depending on mine size. This time is priced at the miner's wage rate of $28.07 per hour. MSHA estimates annualized values of 1,536 burden hours and $43,123 in burden costs. Table VII-19 provides details of these calculations.

§ 75.371(ll) Initial Reporting of Time Delay or Other Method Used with an AMS

Existing § 75.371(ll) requires reporting (as opposed to justification) within the mine ventilation plan of the "length of the time delay or any other method used for reducing the number of non-fire related alert and alarm signals from carbon monoxide sensors, § 75.351(m)." The burden hours and costs of this initial documenting are shown in Table VII-20.

Since this is an initial documentation requirement, the number of affected operations is based on Table VII-4. MSHA expects that only 40% of diesel mines would use time delays, and no non-diesel mines would use time delays (see Table IV-34). Hence, the number of affected operations is only a fraction of the numbers shown in Table VII-4. MSHA estimates that 16 mines will be affected in the first year, and a total of 21 mines will be affected in the first three years.

Based on Table IV-34, MSHA estimates 0.25 hour of burden time per affected mine, at a supervisor's wage rate of $54.92 per hour. MSHA estimates annualized values of 0.8 burden hour and $46 in burden costs. Table VII-20 provides details of these calculations.

§ 75.371(mm) Initial Reporting of Reduced CO Alert and Alarm Levels of an AMS

Section 75.371(mm) requires reporting (as opposed to justification) within the mine ventilation plan of the "lower alert and alarm settings for carbon monoxide sensors, § 75.351(m)." The burden hours and costs of this initial documenting are shown in Table VII-21.

Since this is an initial documentation requirement, the number of affected operations is based on Table VII-4. Since only 5% of mines are expected to reduce alert and alarm levels (see Table IV-47), the number of affected operations is only 5% of the numbers shown in Table VII-4. MSHA estimates that 4 mines will be affected in the first year, and a total of 6 mines will be affected in the first three years.

Based on Table IV-47, MSHA estimates 0.25 hour of burden time per affected mine, at a supervisor's wage rate of $54.92 per hour. MSHA estimates annualized values of 0.29 burden hour and $16 in burden costs. Table VII-21 provides details of these calculations.

§ 75.371(nn) Initial Reporting of Emergency Instruments for AMS Failure

Section 75.371(nn) requires reporting within the mine ventilation plan of the "alternate instrument and the alert and alarm levels associated with the instrument, § 75.352(d)(7)." The burden hours and costs of this initial documenting are shown in Table VII-22.

Number of Employees	Number ot Affected Operations'	Burden Hours Per Mine[2]	Total Annual Burden Hours[3]	Wage Rate[4]	Annual Burden Costs[5]
First Year					
1-19	0.3	0.25	0.07	$54.92	$4
20-99	3.2	0.25	0.81	$54.92	$44
100-500	10.9	0.25	2.73	$54.92	$150
Over 500	1.2	0.25	0.30	$54.92	$16
Total	15.6	N/A	3.90	N/A	$214
Second Year					
1-19	0.1	0.25	0.02	$54.92	$1
20-99	1.0	0.25	0.24	$54.92	$13
100-500	1.3	0.25	0.33	$54.92	$18
Over 500	0.1	0.25	0.03	$54.92	$2
Total	2.5	N/A	0.62	N/A	$34
Third Year					
1-19	0.1	0.25	0.02	$54.92	$1
20-99	1.0	0.25	0.24	$54.92	$13
100-500	1.3	0.25	0.33	$54.92	$18
Over 500	0.1	0.25	0.03	$54.92	$2
Total	2.5	N/A	0.62	N/A	$34
Annualized Values[6]					
1-19	0.1	0.25	0.02	$54.92	$1
20-99	1.1	0.25	0.28	$54.92	$15
100-500	2.0	0.25	0.49	$54.92	$27
Over 500	0.2	0.25	0.05	$54.92	$2
Total	3.3	N/A	0.84	N/A	$46

[1]Source: (Table Vll-4, Column 4) x (Table IV-34, Column 6) x (Table IV-34, Column 7).

[2]Table IV-34, Column 3.

[3](Column 2) x (Column 3).

[4]Table IV-34, Column 4.

[5](Column 4) x (Column 5).

[6]Values are annualized according to the formula: (Annualized Value) = (First Year Value) x (0.07 / 1.07) + (Second Year Value) x (0.07 / 1.07^2) + (Third Year Value) x (0.07 / **0.0749). See text for rationale.**

Table VII-21: Section 75.371 (mm).
Burden Hours and Costs of Initial Reporting of Reduced Alert and Alarm Levels for the Carbon Monoxide Sensors of an Atmospheric Monitoring System (AMS) for Mines Using Belt Air

Number of Employees	Number of Affected Operations[1]	Burden Hours Per Mine[2]	Total Annual Burden Hours[3]	Wage Rate[4]	Annual Burden Costs[5]
First Year					
1-19	0.6	0.25	0.15	$54.92	$8
20-99	1.6	0.25	0.39	$54.92	$22
100-500	2.1	0.25	0.52	$54.92	$28
Over 500	0.2	0.25	0.04	$54.92	$2
Total	4.4	N/A	1.10	N/A	$60
Second Year					
1-19	0.2	0.25	0.05	$54.92	$3
20-99	0.5	0.25	0.12	$54.92	$6
100-500	0.3	0.25	0.06	$54.92	$3
Over 500	0.0	0.25	0.00	$54.92	$0
Total	0.9	N/A	0.23	N/A	$13
Third Year					
1-19	0.2	0.25	0.05	$54.92	$3
20-99	0.5	0.25	0.12	$54.92	$6
100-500	0.3	0.25	0.06	$54.92	$3
Over 500	0.0	0.25	0.00	$54.92	$0
Total	0.9	N/A	0.23	N/A	$13
Annualized Values[6]					
1-19	0.2	0.25	0.05	$54.92	$3
20-99	0.5	0.25	0.14	$54.92	$7
100-500	0.4	0.25	0.09	$54.92	$5
Over 500	0.0	0.25	0.01	$54.92	$0
Total	1.1	N/A	0.29	N/A	$16

'Source: (Table VII-4, Column 4) x (Table IV-47, Column 6).

[2]**Table IV-47, Column 3.**

[3](Column 2) x (Column 3).

[4]**Table IV-47, Column 4.**

[5](Column 4) x (Column 5).

'Values are annualized according to the formula: (Annualized Value) = (First Year Value) x (0.07 / 1.07) + (Second Year Value) x (0.07 / 1.07^2) + (Third Year Value) x (0.07 / 0.0749). See text for rationale.

Table VII-22: Section 75.371(nn).
Burden Hours and Costs of Initial Reporting of Emergency Instruments for Use in the Event of Failure of an Atmospheric Monitoring System (AMS) for Mines Using Belt Air

Number of Employees	Number of Affected Operations[1]	Burden Hours Per Mine[2]	Total Annual Burden Hours[3]	Wage Rate[4]	Annual Burden Costs[5]
First Year					
1-19	1.2	0.25	0.29	$54.92	$16
20-99	3.2	0.25	0.79	$54.92	$43
100-500	4.1	0.25	1.04	$54.92	$57
Over 500	0.3	0.25	0.08	$54.92	$4
Total	8.8	N/A	2.19	N/A	$120
Second Year					
1-19	0.4	0.25	0.09	$54.92	$5
20-99	0.9	0.25	0.24	$54.92	$13
100-500	0.5	0.25	0.13	$54.92	$7
Over 500	0.0	0.25	0.01	$54.92	$0
Total	1.8	N/A	0.46	N/A	$25
Third Year					
1-19	0.4	0.25	0.09	$54.92	$5
20-99	0.9	0.25	0.24	$54.92	$13
100-500	0.5	0.25	0.13	$54.92	$7
Over 500	0.0	0.25	0.01	$54.92	$0
Total	1.8	N/A	0.46	N/A	$25
Annualized Values[6]					
1-19	0.4	0.25	0.11	$54.92	$6
20-99	1.1	0.25	0.27	$54.92	$15
100-500	0.7	0.25	0.19	$54.92	$10
Over 500	0.0	0.25	0.01	$54.92	$1
Total	2.3	N/A	0.57	N/A	$32

[1]Source: (Table VII-4, Column 4) x (Table IV-48, Column 5).

[2]**Table IV-48, Column 2.**

[3](Column 2) x (Column 3).

[4]**Table IV-48, Column 3.**

[5](Column 4) x (Column 5).

'Values are annualized according to the formula: (Annualized Value) = (First Year Value) x (0.07 / 1.07) + (Second Year Value) x (0.07 / 1.07^2) + (Third Year Value) x (0.07 / 0.0749). See text for rationale.

Since this is an initial documentation requirement, the number of affected operations is based on Table VII-4. Since only 10% of mines are expected to use smoke detectors that require substitute hand-held instruments for emergency use (see Table IV-18), the number of affected operations is only 10% of the numbers shown in Table VII-4. MSHA estimates that 9 mines will be affected in the first year, and a total of 12 mines will be affected in the first three years.

Based on Table IV-48, MSHA estimates 0.25 hour of burden time per affected mine, at a supervisor's wage rate of $54.92 per hour. MSHA estimates annualized values of 0.6 burden hour and $32 in burden costs. Table VII-22 provides details of these calculations.

SUMMARY OF SECTION-BY-SECTION DISCUSSION

Table VII-23 summarizes the annualized total burden hours on a section-by-section basis. Of the 14 provisions listed, only six of the provisions have total burden hours in excess of 1,000 hours annually. One of the provisions reduces the total burden hours. The remaining seven provisions have total burden hours of less than 100 hours annually.

Table **VII-24** summarizes the annualized total burden costs on a section-by-section basis. Of the 14 provisions listed, only six of the provisions have total burden costs in excess of $30,000 annually. One of the provisions reduces the total burden costs. The remaining seven provisions have total burden costs of less than $5,000 annually.

The six provisions with the largest burden hours are the same as the six provisions with the largest burden costs. These six provisions are:

§ 75.351(n)(2) Weekly Testing of an AMS. This provision accounts for 14% of the burden hours and 16% of the burden costs of the proposed rule.

§ 75.351(n)(3) Monthly Calibration of an *AMS*. This provision accounts for 53% of the burden hours and 60% of the burden costs of the proposed rule.

§§ 75.351(o)(1)(i) and (o)(1)(ii) Recordkeeping for Alerts, Alarms, and Malfunctions of an *AMS*. This provision accounts for 6% of the burden hours and 3% of the burden costs of the proposed rule.

§ 75.351(o)(1)(iii) Recordkeeping for Testing, Calibration, and Maintenance of an AMS. This provision accounts for 5% of the burden hours and *6%* of the burden costs of the proposed rule.

§ 75.351(q) Training of AMS Operators. This provision accounts for 7% of the burden hours and 5% of the burden costs of the proposed rule.

§§ 75.352(a) and (b) Response Procedures for Alerts, Alarms, and Malfunctions of an *AMS*. This provision accounts for 15% of the burden hours and 9% of the burden costs of the proposed rule.

These six provisions, in total, account for 99.3% of the burden hours and 99.3% of the burden costs. The remaining seven provisions, in total, account for only 0.7% of the burden hours and only 0.7% of the burden costs. The provision of the proposed rule that eliminates the requirement to file petitions for belt air causes a reduction in burden hours of 1.8% and a reduction in burden cost of 2.0%.

Table VII-23: Total Burden Hours of Proposed Rule.
Summary of All Burden Hours, By Mine Size and By Provision

Provision	Annualized Burden Hours[1]				
	Mines with 1-19 Employees	Mines with 20-99 Employees	Mines with 100-500 Employees	Mines with Over 500 Employees	Total Annual Burden Hours
§ 75.350(b), implied impact on existing §§ 44.9, 44.10, and 44.11[2]	(59.51)	(161.07)	(125.20)	(8.58)	(354.35)
§ 75.351(j)[3]	16.81	43.55	29.71	1.82	91.88
§ 75.351(j), implied impact on existing § 75.371(hh)[4]	0.53	1.36	0.93	0.06	2.87
§ 75.351(m)[5]	0.75	8.93	15.63	1.45	26.76
§ 75.351(n)(1), implied impact on existing § 75.363(b)[6]	1.96	5.16	8.72	1.20	17.03
§ 75.351(n)(2)[7]	190.73	1,005.54	1,700.55	156.00	3,052.82
§ 75.351(n)(3)[8]	220.07	2,320.48	7,848.70	900.00	11,289.25
§ 75.351(o)(1)(i)&(ii)[9]	9.74	163.68	876.52	135.15	1,185.09
§ 75.351(o)(1)(iii)[10]	32.28	273.30	811.03	90.40	1,207.01
§ 75.351(q)[11]	135.71	512.44	752.17	63.75	1,464.07
§ 75.352(a)&(b)[12]	61.62	397.99	975.91	100.75	1,536.27
§ 75.371(ll)[13]	0.02	0.28	0.49	0.05	0.84
§ 75.371(mm)[14]	0.05	0.14	0.09	0.01	0.29
§ 75.371(nn)[15]	0.11	0.27	0.19	0.01	0.57
Total	610.86	4,572.03	12,895.44	1,442.07	19,520.40

'Source: Column 4 of Tables VII-4B through VII-20.

[2]Table VII-6, Column 4.

?able VII-7, Column 4.

?able VII-8, Column 4.

[5]Table VII-9, Column 4.

[6]Table VII-10, Column 4.

[7]Table VII-11, Column 4.

*Table VII-12, Column 4.

[9]Table VII-13, Column 4.

"(Table VII-14, Column 4) + (Table VII-15, Column 4) + (Table VII-16, Column 4).

"(Table VII-17, Column 4) + (Table VII-18, Column 4).

[12]Table VII-19, Column 4.

'?able VII-20, Column 4.

[14]Table VII-21, Column 4.

[15]Table VII-22, Column 4.

Table VII-24: Total Burden Costs of Proposed Rule.
Summary of All Burden Costs, By Mine Size and By Provision

Provision	Annualized Burden Costs[1]				
	Mines with 1-19 Employees	Mines with 20-99 Employees	Mines with 100-500 Employees	Mines with Over 500 Employees	Total Annual Burden Hours
§ 75.350(b), implied impact on existing §§ 44.9, 44.10, and 44.11[2]	($3,268)	($8,846)	($6,876)	($471)	($19,461)
§ 75.351(j)[3]	$923	$2,391	$1,632	$100	$5,046
§ 75.351(j), implied impact on existing § 75.371(hh)[4]	$29	$75	$51	$3	$158
§ 75.351(m)[5]	$41	$490	$858	$80	$1,470
§ 75.351(n)(1), implied impact on existing § 75.363(b)[6]	$55	$145	$245	$34	$478
§ 75.351(n)(2)[7]	$10,475	$55,224	$93,394	$8,568	$167,661
§ 75.351(n)(3)[8]	$12,086	$127,441	$431,051	$49,428	$620,005
§ 75.351(o)(1)(i)&(ii)[9]	$273	$4,595	$24,604	$3,794	$33,266
§ 75.351(o)(1)(iii)[10]	$1,773	$15,010	$44,542	$4,965	$66,289
§ 75.351(q)[11]	$5,877	$19,836	$27,260	$2,212	$55,185
§ 75.352(a)&(b)[12]	$1,730	$11,171	$27,394	$2,828	$43,123
§ 75.371(ll)[13]	$1	$15	$27	$2	$46
§ 75.371(mm)[14]	$3	$7	$5	$0	$16
§ 75.371(nn)[15]	$6	$15	$10	$1	$32
Total	$30,004	$227,570	$644,196	$71,543	$973,313

'Source: Column 6 of Tables VII-4B through VII-20.

[2]Table VII-6, Column 6.

[3]Table VII-7, Column 6.

[4]Table VII-8, Column 6.

[5]Table VII-9, Column 6.

[6]Table VII-10, Column 6.

'Table VII-11, Column 6.

'Table VII-12, Column 6.

''(Table VII-14, Column 6) + (Table VII-15, Column 6) + (Table VII-16, Column 6).

''(Table VII-17, Column 6) + (Table VII-18, Column 6).

[12]Table VII-19, Column 6.

[13]Table VII-20, Column 6.

[14]Table VII-21, Column 6.

[15]Table VII-22, Column 6.

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