

# **Regulatory Economic Analysis**

## **Emergency Mine Evacuation**

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## **I. EXECUTIVE SUMMARY**

### **INTRODUCTION**

The Mine Safety and Health Administration (MSHA) issued an emergency temporary standard (ETS) on emergency mine evacuation on March 9, 2006 (71 FR 12252) in accordance with § 101(b) of the Federal Mine Safety and Health Act of 1977 (Mine Act), as amended. In accordance with the Mine Act, the ETS served as the proposed rule and was effective upon publication.

MSHA issued the ETS in response to tragedies that occurred during January 2006 at the Sago Mine in West Virginia, and at the Aracoma Alma Mine No. 1 also in West Virginia. MSHA solicited public comment on the ETS and held four public hearings. The rulemaking public comment period, scheduled to close on May 30, 2006, was extended to June 29, 2006 (71 FR 29785).

The final rule includes requirements for immediate accident notification applicable to all mines. In addition, the final rule includes the following requirements for underground coal mines: increased availability and storage of self-contained self-rescue devices (SCSRs); improved training for SCSRs and evacuation drills; and installation and maintenance of lifelines. The requirements provide an improved, integrated approach to training and emergency preparedness.

This Regulatory Economic Analysis (REA) examines the costs and benefits of MSHA's final rule on emergency mine evacuation.

### **SCOPE**

MSHA used 2004 data to develop the estimates in this analysis. Based on these data, the final rule applies to the 634 underground coal mine operators having 33,490 miners and 3,697 contractors who work underground in coal mines. The immediate notification provisions of the final rule apply to the entire mining industry. Using 2004 data, the rule would affect 214,450 miners and 72,739 contractors, in 14,480 U.S. mines.

### **BENEFITS SUMMARY**

To estimate benefits, MSHA focused on the four accidents where it is reasonable to expect that miners' lives might have been saved had the final rule been in effect. These accidents occurred at: Wilberg Mine in 1984; Pyro No. 9 Slope, William Station Mine in 1989; Sago Mine in 2006; and Aracoma Alma No. 1 Mine, in 2006. In these accidents, there were, in total, 51 fatalities and one serious injury. One of the miners at Sago Mine died in an initial explosion and would have perished even if the final rule had been in effect. Also, MSHA's investigation of the 1989 accident at Pyro No. 9 Slope, William Station Mine provided only enough evidence to establish that five of the ten fatalities could have been saved if the final rule had been in effect. Whether the other five miners could have been saved by the final rule is speculative.

This leaves 45 fatalities that might have been prevented if the final rule had been in effect. If the final rule had been in place at the time of these accidents, most or all of these miners' lives could have been saved. Quantitatively, MSHA projects that approximately 80 percent of miners in future similar accidents could be saved by the final rule. The resultant calculation, 80 percent of 45, yields the Agency's projected 36 lives that could have been saved by the final rule.

January 1, 1983 is the starting point for the accident records in MSHA's electronic Teradata database. Starting at January 1, 1983 and ending on March 9, 2006, the date when the ETS was published, is a time span of 23.2 years. In this analysis, MSHA projects that 1.55 lives per year would have been saved by the final rule (36 lives divided by 23.2 years). A similar calculation provides an estimate of 0.034 serious injuries per year that would have been prevented. The actual number of miners' lives saved by the final rule could be much larger.

## **COMPLIANCE COST SUMMARY**

MSHA estimates that the final rule will result in total yearly costs (including those associated with the March 9, 2006 ETS) for the underground mining industry of approximately \$44.1 million, which include the amortized value of first-year costs of approximately \$146.9 million. Of the \$44.1 million yearly costs, \$2.8 million will be incurred by mine operators with 1-19 employees; \$37.0 million by mine operators with 20-500 employees; and \$4.3 million by mine operators with 501+ employees.

MSHA anticipates that mine operators will have already expended some of these costs to achieve compliance with the ETS. This analysis therefore reflects costs in two ways: (1) total yearly costs of the final rule, and (2) net yearly costs after deducting costs associated with the ETS. The Agency estimates net yearly costs of approximately \$39.7 million, which include the amortized value of first-year costs of approximately \$83.0 million. Of the \$39.7 million yearly costs, \$2.6 million will be incurred by mine operators with 1-19 employees; \$33.3 million by mine operators with 20-500 employees; and \$3.8 million by mine operators with 501+ employees.

The Agency estimates that nearly all total and net yearly costs will be borne by underground coal operators. A negligible amount of yearly costs (less than \$3,000), associated with immediate notification requirements in Part 50, will be borne by underground metal and nonmetal (M/NM) mine operators. MSHA estimates that the final rule will impose no additional costs on surface mine operators.

## **REGULATORY FLEXIBILITY CERTIFICATION AND ANALYSIS**

In accordance with § 605 of the Regulatory Flexibility Act, MSHA certifies that the final rule will not have a significant economic impact on a substantial number of small entities. Under the Small Business Regulatory Enforcement Fairness Act (SBREFA) amendments to the Regulatory Flexibility Act, the Agency must include in the final rule a factual basis for this certification. The Agency must also publish the regulatory flexibility certification statement in the Federal Register, along with the factual

basis. The analysis that provides the factual basis for this certification is discussed in Chapter V of this document and in the preamble to the final rule for publication in the Federal Register. MSHA has consulted with the Small Business Administration's (SBA's) Office of Advocacy and believes that the analysis provides a reasonable basis for this certification.

## II. INDUSTRY PROFILE

### INTRODUCTION

This industry profile provides information concerning the structure and economic characteristics of the mining industry, which includes data about the number of mines and miners by type and size of mine.

The value of the U.S. mining industry's production of coal and metal and nonmetal (M/NM) was estimated to be approximately \$66.1 billion, or 0.56 percent of 2004 Gross Domestic Product (GDP). Coal mining contributed approximately \$22.1 billion to the GDP,<sup>1</sup> while the M/NM mining sector contributed approximately \$44.0 billion.<sup>2</sup>

### STRUCTURE OF THE MINING INDUSTRY

MSHA divides the mining industry into two major sectors based on commodity: (1) coal mines and (2) M/NM mines. These two sectors are further divided by type of operation (e.g., underground mines or surface mines). The Agency maintains data on the number of mines and on mining employment by mine type and size. MSHA also collects data on the number of independent contractor firm and their employees by mining sector.

MSHA generally categorizes mines in three different sizes based on employment. These are mines with 1-19 employees; 20-500 employees; and 501+ employees.<sup>3</sup> For the past 20 years, for rulemaking purposes, the Agency has consistently defined a small mine to be one employing 1-19 employees and a large mine to be one employing 20 or more employees. However, to comply with the requirements of the SBREFA amendments to the 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 mine as one with 1-500 employees and a large mine as one with 501+ employees.

Table II-1 presents the total number of coal mines and their employment, excluding contractors, by mine type and size. The table presents mine size categories: (1) 1-19 employees; (2) 20-500 employees; and (3) 501+ employees. In addition, it shows that, of all coal mines, approximately 32 percent are underground mines

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<sup>1</sup> Coal production data are from U.S. Department of Labor (DOL), Mine Safety and Health Administration (MSHA), Office of Program Evaluation and Information Resources (PEIR), 2004 data. The average U.S. price of underground and surface coal for 2004 is from the Department of Energy (DOE), Energy Information Administration (EIA), *Annual Coal Report 2004*, November 2005, Table 29, page 55.

<sup>2</sup> U.S. Department of the Interior (DOI), U.S. Geological Survey (USGS), *Mineral Commodities Summaries 2005*, January 2005, p. 8.

<sup>3</sup> For some cost provisions in this REA the mine size category 20-500 employees has been further disaggregated into mines with 20-49 employees, mines with 50-99 employees, and mines with 100-500 employees.

employing approximately 51 percent of miners, while 68 percent are surface mines employing roughly 49 percent of miners.

**Table II-1: Distribution of Coal Mines and Employment (Excluding Contractors) by Mine Type and Size, 2004**

Mine Type	Size of Coal Mine*									All Coal Mines		
	1-19 Employees			20 to 500 Employees			501+ Employees			Mines	Miners	Office Emp.
	Mines	Miners	Office Emp.	Mines	Miners	Office Emp.	Mines	Miners	Office Emp.			
Underg. <sup>o</sup>	237	2,351	57	389	30,496	904	8	4,694	124	634	37,541	1,085
Surface	912	5,503	463	460	27,949	1,877	3	1,994	39	1,375	35,446	2,379
Total	1,149	7,854	520	849	58,445	2,781	11	6,688	163	2,009	72,987	3,464

\*Based on MSHA's traditional definition, small mines are those with 1-19 employees. Based on SBA's definition, small mines are those with 1-19 employees and 20-500 employees.

<sup>o</sup>Note that the sum of the miners shown in this table differs from the totals described in Chapter I and shown in Table IV-4 because those totals exclude surface employees and other employees who do not work in underground portions of underground coal mines.

Source: U.S. DOL, MSHA, PEIR.

Table II-2 presents data on the number of independent coal contractors by size and type of coal contractor. Table II-2 shows that approximately 29 percent of contractors operate in underground mines and employ approximately 29 percent of contractor employees (excluding office employment), while 71 percent operate at surface mines and employ 71 percent of contractor employees (excluding office employment).

**Table II-2: Distribution of Coal Contractors and Contractor Employment by Size of Operation, 2004**

Contr. Type	Size of Coal Contractor*									All Coal Contractors		
	1-19 Employees			20 to 500 Employees			501+ Employees			Firms	Emp.	Office Emp.
	Firms	Emp.	Office Emp.	Firms	Emp.	Office Emp.	Firms	Emp.	Office Emp.			
Underg. <sup>o</sup>	632	2,817	186	108	5,949	399	0	0	0	740	8,766	585
Surface	1,546	6,898	456	264	14,564	977	0	0	0	1,811	21,462	1,433
Total	2,178	9,715	642	372	20,513	1,376	0	0	0	2,550	30,228	2,018

\* Based on MSHA's traditional definition, small contractors are those with 1-19 employees. Based on SBA's definition, small contractors are those with 1-19 employees and 20-500 employees.

<sup>o</sup>Note that the sum of contractor employment shown in this table differs from the totals described in Chapter I and shown in Table IV-4 because those totals exclude surface employees and other employees who do not work in underground portions of underground coal mines.

Source: U.S. DOL, MSHA, PEIR.



Table II-3 presents the total number of M/NM mines and their employment, excluding contractors, by mine type and size. The table presents mine size categories: (1) 1-19 employees; (2) 20-500 employees; and (3) 501+ employees. The M/NM mining segment consists of metal mines (copper, iron ore, gold, silver, etc.) and nonmetal mines (stone including granite, limestone, dolomite, sandstone, slate, and marble; sand and gravel; and others such as clays, potash, soda ash, salt, talc, and pyrophyllite.) As Table II-3 indicates, approximately 98 percent of all M/NM mines are surface mines that employ approximately 91 percent of M/NM miners, excluding office employees.

**Table II-3: Distribution of M/NM Mines and Employment (Excluding Contractors) by Size of Operation, 2004**

Mine Type	Size of M/NM Mine*									All M/NM Mines		
	1-19 Employees			20 to 500 Employees			501+ Employees			Mines	Miners	Office Emp.
	Mines	Miners	Office Emp.	Mines	Miners	Office Emp.	Mines	Miners	Office Emp.			
Underg.	121	884	172	114	9,322	970	4	2,771	89	239	12,977	1,231
Surface	10,647	53,004	10,497	1,567	73,103	12,342	16	10,817	1,655	12,230	136,924	24,494
Total	10,768	53,888	10,669	1,681	82,425	13,312	20	13,588	1,744	12,469	149,901	25,725

\* Based on MSHA's traditional definition, small mines are those with 1-19 employees. Based on SBA's definition, small mines are those with 1-19 employees and 20-500 employees.

Source: U.S. DOL, MSHA, PEIR.

Table II-4 presents data on the number of independent M/NM contractors and their employment. Table II-4 shows that, of M/NM contractor firms, approximately 10 percent operate in underground mines and employ approximately 11 percent of contractor employees (excluding office employment), while 90 percent operate at surface mines and employ 89 percent of contractor employees (excluding office employment).

**Table II-4: Distribution of M/NM Mine Contractor Employment by Size of Operation, 2004**

Contr. Type	Size of M/NM Contractor*									All M/NM Contractors		
	1-19 Employees			20 to 500 Employees			501+ Employees			Firms	Emp.	Office Emp.
	Firms	Emp.	Office Emp.	Firms	Emp.	Office Emp.	Firms	Emp.	Office Emp.			
Underg.	368	1,749	71	46	2,273	126	1	571	0	415	4,593	197
Surface	3,314	15,745	638	411	20,460	1,136	3	1,713	0	3,728	37,918	1,774
Total	3,682	17,494	709	457	22,733	1,262	4	2,284	0	4,143	42,511	1,971

\* Based on MSHA's traditional definition, small contractors are those with 1-19 employees. Based on SBA's definition, small contractors are those with 1-19 employees and 20-500 employees.

Source: U.S. DOL, MSHA, PEIR.

## **STRUCTURE OF THE COAL MINING INDUSTRY**

Agency data in Table II-1 indicate that there were 2,009 coal mines that reported production during some portion of calendar year 2004. When applying MSHA's small mine definition (1-19 employees), 1,149 (approximately 57 percent) were small mines and 860 (approximately 43 percent) were large mines. Using SBA's small mine definition, 11 mines (0.5 percent) were large mines and the rest were small mines.

Coal mine employment in 2004 was 76,451, of which 72,987 were miners and 3,464 were office employees. Based on MSHA's small mine definition, 7,854 coal miners (11 percent) worked at small mines and 65,133 (89 percent) worked at large mines. Using SBA's small mine definition, 66,299 coal miners (91 percent) worked at small mines and 6,688 coal miners (9 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 33 miners and each large coal mine employs 608 miners.

## **ECONOMIC CHARACTERISTICS OF THE COAL MINING INDUSTRY**

MSHA classifies the U.S. coal mining sector into two major commodity groups: bituminous and anthracite. The former is further divided into sub-bituminous and lignite. Bituminous operations represent approximately 92% of mining operations, employ over 98% of all miners, and account for over 99% of total production. The remaining 8% of coal mining operations are anthracite.<sup>4</sup>

The U.S. coal sector produced approximately 1.11 billion short tons of coal (0.744 billion tons at surface mines and 0.367 billion tons at underground mines) in 2004. The average price of coal at surface and underground mines was \$14.75 and \$30.36 per ton,

<sup>4</sup> U.S. DOE, EIA, *Annual Energy Review 2004*, August 2005, Table 7.2, p. 207.

respectively.<sup>5</sup> Surface coal mines accounted for \$11.0 billion of revenues and underground coal mines accounted for \$11.1 billion, for a total of \$22.1 billion. Based on MSHA's definition, small mines produced 28.7 million tons, valued at approximately \$0.585 billion. Based on SBA's definition, small mines produced 896 million tons, valued at \$18.1 billion, or approximately 81% of coal production and approximately 82% of coal revenues.<sup>6</sup>

Mines east of the Mississippi River accounted for approximately 44 percent of coal production in 2004. For the period 1949 through 2004, coal production east of the Mississippi River ranged from a low of 444 million tons in 1949 to a high of 630 million tons in 1990; 2004 production was estimated at 484 million tons. Coal production west of the Mississippi increased each year from a low of 21 million tons in 1960 to an estimated record high of 627 million tons in 2004.<sup>7</sup> Growth in western coal mines is due, in part, to environmental concerns that increase demand for low-sulfur coal, which is abundant in the West. In addition, surface mining, with its higher average productivity, is much more prevalent in the West.

Average domestic coal prices (nominal and real prices) for the period 1950-2004 are presented in Table II-5. 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 II-5, the real price is in terms of 2000 dollars). During this period the inflation-adjusted, or real, price of coal has generally declined. The only exceptions were a spike in coal prices during the OPEC petroleum price increases in the 1970s and the modest increase in real coal prices since 2000. The real price of coal in 2004 was approximately 42 percent lower than in 1950.<sup>8</sup> The real price of coal per Btu was approximately 28 percent lower in 2004 than in 1950, which has caused coal to become the least expensive of the major fossil fuels in terms of dollars per Btu.<sup>9</sup>

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<sup>5</sup> Coal prices are the average open market sales prices for 2004. U.S. DOE, EIA, *Annual Coal Report* 2004, November 2005, Table 28.

<sup>6</sup> Coal production obtained from U.S. DOL, MSHA, PEIR, 2004 data. Average U.S. coal price estimates obtained from the DOE, EIA, *Annual Coal Report* 2004, November 2005, Table 29, p. 52. Underground and surface coal revenues were separately computed, then summed to obtain total coal revenue.

<sup>7</sup> U.S. DOE, EIA, *Annual Energy Review 2004*, August 2005, Table 7.2, p. 207.

<sup>8</sup> *Ibid.*, Table 7.8, p. 219.

<sup>9</sup> *Ibid.*, Table 3.1, p. 67. Coal energy (per Btu) was more expensive than natural gas energy in 1950, but was less expensive in 2001. Both coal and gas energy were less expensive than crude oil energy in 1950 and 2001.

**Table II.-5: Coal Prices 1950-2004**  
(Dollars per Short Ton and Dollars per Million BTU)

Year	Nominal Price (Dollars/Short Ton)	Real Price (2000 Dollars/Short Ton)	Nominal Price (Dollars/10 <sup>6</sup> BTU)	Real Price (2000 Dollars/10 <sup>6</sup> BTU)
1950	5.19	31.40	0.21	1.25
1955	4.69	25.02	0.19	0.99
1960	4.83	22.96	0.19	0.92
1965	4.55	20.19	0.18	0.82
1970	6.34	23.03	0.27	0.87
1975	19.35	50.92	0.85	2.22
1980	24.65	45.61	1.10	2.04
1985	25.20	36.15	1.15	1.65
1990	21.76	26.67	1.00	1.22
1991	21.49	25.45	0.99	1.17
1992	21.03	24.34	0.97	1.12
1993	19.85	22.46	0.93	1.05
1994	19.41	21.50	0.91	1.01
1995	18.83	20.44	0.88	0.96
1996	18.50	19.71	0.97	0.92
1997	18.14	19.01	0.95	0.89
1998	17.67	18.32	0.83	0.86
1999	16.63	16.99	0.79	0.81
2000	16.78	16.78	0.80	0.80
2001	17.38	16.97	0.83	0.82
2002	17.98	17.27	0.87	0.84
2003	17.85	16.84	0.87	0.82
2004	19.85	18.34	0.97	0.90

Source: DOE, EIA, *Annual Energy Review 2004*, August 2005, Table 7.8, p. 219; Table 3.1, p.67.

## COAL MINING INDUSTRY OUTLOOK

The U.S. coal industry has enjoyed a fairly steady domestic demand, historically following the growth of electrical power demand of approximately 1.2 percent a year. Approximately 90 percent of U.S. coal demand was accounted for by electric power producers in 2004.<sup>10</sup> Domestic coal demand is projected to increase because of growth in coal used for electricity generation. Coal consumption for electricity generation is projected to increase by 51 percent from 2002 to 2025 as the utilization of existing coal-fired generation capacity increases and as new capacity is added.<sup>11</sup>

<sup>10</sup> U.S. DOE, EIA, *Annual Energy Review 2004*, August 2005, Table 7.3, p. 209.

<sup>11</sup> U.S. DOE, EIA, *Annual Energy Outlook 2004*. January 2004, p. 101.

## **THE STRUCTURE OF THE METAL/NONMETAL MINING INDUSTRY**

The M/NM mining sector consists of approximately 80 different commodities including industrial minerals. There were 12,469 M/NM mines in the U.S. in 2004, of which 10,768 (86%) were small mines and 1,701 (14%) were large mines, using MSHA's traditional definition of small and large mines. Based on SBA's definition, however, only 20 M/NM mines (0.16%) were large mines.<sup>12</sup>

The data in Table II-3 indicate that employment at M/NM mines in 2004 was 175,626, of which 64,557 employees (37%) were employed by small mines and 111,069 employees (63%) were employed by large mines (excluding contractors), using MSHA's definition. Based on SBA's definition, however, 160,294 employees (91%) were employed by small mines and 15,332 employees (9%) were employed by large mines (excluding contractors). Using MSHA's definition, there is an average of 6 employees at a small M/NM mine and 65 employees at a large M/NM mine. Using SBA's definition, there is an average of 13 employees in each small M/NM mine and 767 employees in each large M/NM mine.<sup>13</sup>

### Metal Mining

There are approximately 24 metal commodities mined in the U.S. Underground metal mines use a few basic mining methods, such as room and pillar and block caving, but all these mines, small and large, rely heavily on diesel-powered production and support equipment.

Surface metal mines normally include drilling, blasting, loading, and hauling; these processes are typical in all surface mines, irrespective of commodity types. Surface metal mines in the U.S. rank among some of the largest mines in the world.

Metal mines constitute 2 percent of all M/NM mines and account for 16 percent of all M/NM employment. Under MSHA's traditional definition of a small mine, 54 percent of metal mines are small and account for 3 percent of employment in metal mines. Using SBA's definition, 93 percent of metal mines are small and account for 54 percent of employment in metal mines.<sup>14</sup>

### Stone Mining

In the stone mining subsector, there are eight different stone commodities, of which seven are further classified as either dimension stone or crushed and broken stone. Stone mining in the U.S. is predominantly done by quarrying, with only a few slight variations. Crushed stone mines typically drill and blast, while dimension stone mines generally use channel burners, drills, or wire saws. Diesel powered-haulage is used to transfer the broken rock from the quarry to the mill where crushing and sizing are done.

Stone mines constitute 35 percent of all M/NM mines, and account for 45 percent of all M/NM employment. Using MSHA's definition of a small mine, 77 percent of

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<sup>12</sup> U.S. DOL, MSHA, PEIR, calendar year 2004 data.

<sup>13</sup> Ibid.

<sup>14</sup> Ibid.

stone mines are small and account for 33 percent of employment in stone mines. Using SBA's definition, 99.98 percent of stone mines are small and account for 99 percent of employment in stone mines.<sup>15</sup>

### Sand & Gravel Mining

Sand and gravel, for construction, is generally extracted from surface deposits using dredges or draglines. Further preparation involves washing and screening. As in other surface mining operations, sand and gravel uses diesel-driven machines, such as front-end loaders, trucks, and bulldozers, for haulage. The preparation of industrial sand and silica flour involves the use of crushers, ball mills, vibrating screens, and classifiers.

The sand and gravel subsector represents the single largest commodity group in the U.S. mining industry based on the number of mining operations. Sand and gravel mines comprise 57 percent of all M/NM mines, and account for 25 percent of all M/NM employment. Using MSHA's definition of a small mine, 95 percent of sand and gravel mines are small and account for 76 percent of employment in sand and gravel mines. Using SBA's definition, 100 percent of sand and gravel mines are small and have 44,592 employees.<sup>16</sup>

### Nonmetal Mining

For enforcement and statistical purposes, MSHA separates stone and sand and gravel mining from other nonmetal mining. There are approximately 35 nonmetal commodities, not including stone, and sand and gravel. Nonmetal mining uses a wide variety of underground mining methods such as continuous mining (similar to coal mining), in-situ retorting, block caving, and room and pillar. The mining method is dependent on the geologic characteristics of the ore and host rock. Some nonmetal operations use kilns and dryers in ore processing. Ore crushing and milling are processes common to both nonmetal and metal mining.

As with underground mining, there is a wide range of mining methods utilized in extracting minerals by surface mining. In addition to drilling and blasting, other mining methods, such as evaporation and dredging, are also utilized, depending on the ore formation.

Nonmetal mines comprise 6 percent of all M/NM mines and account for 13 percent of all M/NM employment. Using MSHA's definition of a small mine, 69 percent of nonmetal mines are small and account for 14 percent of employment in nonmetal mines. Using SBA's definition, 99.7 percent of nonmetal mines are small and account for 93 percent of employment in nonmetal mines.<sup>17</sup>

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<sup>15</sup> Ibid.

<sup>16</sup> Ibid.

<sup>17</sup> Ibid.

## **ECONOMIC CHARACTERISTICS OF THE METAL/NONMETAL MINING INDUSTRY**

The value of all M/NM mining output in 2004 was estimated at \$44 billion. Metal mines, which include copper, gold, iron, lead, silver, tin, and zinc mines, contributed \$10.8 billion.<sup>18</sup> Nonmetal production was valued at \$33.2 billion: \$8.8 billion from stone mining, \$6.9 billion from sand and gravel, and \$17.5 billion from other nonmetals, such as potash, clay, and salt.<sup>19</sup>

The end uses of M/NM mining output are diverse. For example, iron and aluminum are used to produce vehicles and other heavy duty equipment, as well as consumer goods such as household equipment and soft drink cans. Other metals, such as uranium and titanium, have more limited uses. Nonmetals, like cement, are used in construction while salt is used as a food additive and for road de-icing in the winter. Soda ash, phosphate rock, and potash also have a wide variety of commercial uses. Stone and sand and gravel are used in numerous industries and extensively in the construction industry.

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<sup>18</sup> U.S. DOI, USGS, *Mineral Commodity Summaries 2005*, January 6, 2005, p. 8.

<sup>19</sup> *Ibid.*, pp.140, 142, 156, and 158.

### III. BENEFITS, NET BENEFITS, AND COST-EFFECTIVENESS

#### BACKGROUND

During the past twenty-three years, at least 45 miners have died in accidents involving explosion or fire because they were unable to escape through smoky air. In addition, there have been numerous “near misses,” in which miners did escape, but might have died if the circumstances had been different. Two of these near misses (Mathies Mine, 1990; Willow Creek Mine, 1998) placed as many as 20 miners at risk.

Under the ETS, a reportable mine fire was defined as an unplanned mine fire not extinguished within thirty minutes of discovery.<sup>20</sup> There were 56 reported fires in underground coal mines during the ten-year period from February 1, 1996 through February 1, 2006. During this same ten-year period, there were over 650 ignitions or explosions of methane or coal dust. Any of these events, at least potentially, could have created a mine fire that might threaten miners’ lives.

Briefly mentioned here are four mine accidents where the final rule could have saved lives:

#### Wilberg Mine

On December 19, 1984, a fire on the longwall panel of the Wilberg mine near Orangeville, Utah claimed the lives of 27 miners. Although several of the victims had donned SCSR devices, many of the victims appeared to be lost or disoriented in the thick smoke. A main finding from the investigation was that there was inadequate training on self-rescuers.

#### Pyro No. 9 Slope, William Station Mine<sup>21</sup>

On September 13, 1989, an explosion occurred on longwall panel “O”. This accident claimed the lives of 10 miners. Survivors testified that at least 5 victims, who died from CO poisoning encountered problems donning self-rescuers, removed their rescuers to communicate verbally, stayed to attempt to revive fallen coworkers, and/or had difficulty finding the escape route. The mine had an SCSR storage plan, and 12 SCSRs should have been stored at both the headgate and tailgate. However, at the time of the explosion, the SCSRs had been removed with the tailgate equipment, and the SCSRs at the headgate had been moved to the 4<sup>th</sup> West Track Entry.

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<sup>20</sup> The final rule, in 30 CFR § 50.2(h)(6), redefines a reportable mine fire: “In underground mines, an unplanned fire not extinguished within 10 minutes of discovery; in surface mines and surface areas of underground mines, an unplanned fire not extinguished within 30 minutes of discovery.”

<sup>21</sup> The ETS did not include this accident.



### Sago Mine

On January 2, 2006, an explosion in the Sago mine near Buchannon, West Virginia resulted in the deaths of 12 miners. Twelve miners had donned SCSR devices and located themselves in a temporary barricade on the 2 Left working section. Only one of the twelve miners was found alive in the barricade. The surviving miner suffers from the effects of carbon monoxide poisoning.

### Aracoma Alma No. 1 Mine

On January 19, 2006, a conveyor belt entry fire at the Aracoma Alma No. 1 mine near Stollings, West Virginia resulted in the deaths of two miners. Although a crew of ten miners donned SCSR devices and successfully evacuated the mine, the two victims became separated from the larger group and were found near the fire area.

## **BENEFITS OF THE FINAL RULE**

The final rule was designed to increase the chances of survival in an emergency, including fires, explosions, or water and gas inundations. The requirements in the final rule provide an improved, integrated approach to emergency evacuation training and emergency preparedness. The potential for fire is ever-present in an underground coal mine because the coal mine contains highly flammable substances (coal, coal dust, and methane). The final rule is particularly addressed to the situation where a smoky or otherwise irrespirable atmosphere exists in the miner's route of escape.

In a situation where an uncontrolled fire is present, the miner's best chance for survival is through escape. The final rule reiterates that the first line of defense in a mine emergency is for a miner to escape the mine. The final rule increases the miner's chances to successfully escape by requiring lifelines that provide tactile directions on the correct route of escape, additional SCSRs to provide miners with additional oxygen, training in how to use SCSRs, and a requirement to notify MSHA immediately (within 15 minutes) in certain situations, so that MSHA and others in the mining community can assist in emergency response.

For each of the referenced incidents in which lives were lost, MSHA estimated the probability that the final rule might have saved lives, and how many. Although MSHA's estimates are subjective, they are based on expert opinion, and are used to project the expected number of lives that might be saved by the final rule.

Between January 1, 1983 and March 9, 2006, there were 21 separate fire or explosion events with at least one fatality, resulting in 103 deaths in underground coal mines. For purposes of estimating the benefits from the final rule, MSHA focused on only those four accidents where the Agency determined that better preparation or more successful evacuation procedures would have significantly improved the outcome.

To estimate benefits, MSHA focused on the four accidents where it is reasonable to expect that miners' lives might have been saved by the final rule. These accidents occurred at: Wilberg Mine in 1984; Pyro No. 9 Slope, William Station Mine in 1989; Sago Mine in 2006; and Aracoma Alma No. 1 Mine, in 2006. These accidents resulted in 51 fatalities and one serious injury. MSHA has determined that the final rule would have

made no difference for the miner who died in the initial explosion at the Sago mine. MSHA's investigation of the 1989 accident at Pyro No. 9 Slope, William Station Mine provided evidence to establish that only five of the ten miners could have been saved had the final rule been in effect.

This leaves 45 fatalities that might have been prevented if the final rule had been in effect. MSHA predicts that most or all of these miners could have been saved by the final rule. MSHA expects that approximately 80 percent of miners in future similar accidents could be saved by the final rule. The resultant calculation, 80 percent of 45, yields the Agency's projected 36 lives that could have been saved by the final rule.

January 1, 1983 is the starting point for the accident records in MSHA's electronic database. Starting at January 1, 1983 and ending on March 9, 2006, the effective date of the ETS, is a time span of 23.2 years. In this analysis, MSHA projects that 1.55 lives per year would have been saved by the final rule (36 lives divided by 23.2 years). A similar calculation provides an estimate of 0.034 serious injuries per year that would have been prevented. These estimates are displayed in Table III-1.

Table III-1.  
Total Number and Rates Per Year of Fatalities and Severe Injuries  
At Selected Underground Coal Mine Fires and Explosions

Mine Name	Year	Fatalities	Severe Injuries <sup>1</sup>
Aracoma Alma #1 Mine	2006	2	0
Sago Mine	2006	12	1
Pyro No. 9 Slope, William Station Mine	1989	10	0
Wilberg Mine	1984	27	0
<b>Total Miner Fatalities<sup>2</sup></b>			
	1983-2006	51	1
<b>Miners Potentially Saved by Evacuation<sup>3</sup></b>			
	1983-2006	45	1
<b>Miners Saved by Final Rule (low estimate)<sup>4</sup></b>			
	1983-2006	31.5	0.7
<b>Miners Saved by Final Rule (mid-range estimate)<sup>4</sup></b>			
	1983-2006	36	0.8
<b>Miners Saved by Final Rule (high estimate)<sup>4</sup></b>			
	1983-2006	40.5	0.9
<b>Miners Saved by Final Rule Per Year (low estimate)<sup>5</sup></b>			
	1983-2006	1.36	0.030
<b>Miners Saved by Final Rule Per Year (mid-range estimate)<sup>5</sup></b>			
	1983-2006	1.55	0.034
<b>Miners Saved by Final Rule Per Year (high estimate)<sup>5</sup></b>			
	1983-2006	1.75	0.039

<sup>1</sup>The only severe injury listed in this column is carbon-monoxide poisoning of one miner.

<sup>2</sup>(Total Miner Fatalities) = (Sum of four mines: Alma, Sago, Pyro, and Wilberg).

<sup>3</sup>(Miners Potentially Saved by Evacuation) = (Total Miner Fatalities) - (Miners Who Could Not Be Saved by Better Evacuation Equipment and Training). Six miner fatalities are subtracted from "Total Miner Fatalities" because not all of the fatalities are identified as miners who could have been saved by the final rule.

<sup>4</sup>(Miners Saved by Final Rule) = (Miners Potentially Saved by Evacuation) x (Percentage Saved), where (Percentage Saved) = 70% for low estimate, 80% for mid-range estimate, and 90% for high estimate.

<sup>5</sup>(Miners Saved by Final Rule Per Year) = (Miners Saved by Final Rule) / (23.2 Years).

For informational purposes only, MSHA has estimated the monetary value of the benefits associated with the final rule, the net benefits, and the cost-effectiveness of the final rule. These estimates are informational because MSHA does not use benefit-cost analysis as a basis for decision-making. In order to estimate monetary values for the benefits associated with the final rule, MSHA reviewed the approaches taken by other regulatory agencies for similar health and safety regulations. For MSHA's primary estimate, the Agency is applying a value recently used by the Department's Occupational Safety and Health Administration (OSHA) of \$6.8 million for each premature fatality avoided. The \$6.8 million value represents the sum of many individuals' willingness-to-pay (WTP) to reduce a small risk of premature death. Multiplying \$6.8 million by 1.55 lives saved per year yields \$10.5 million per year in benefits due to lives saved (compared to \$44.1 million in costs at the 7 percent discount rate, as derived in Chapter IV of this REA). Because of the very small number of injuries avoided and

uncertainty regarding valuing the many types of injuries possible in a mine accident, MSHA did not attempt to monetize the value of injuries avoided due to the final rule.

As a result of these calculations, the final rule leads to net costs of approximately \$33.5 million per year, using the 7 percent discount rate costs. In terms of cost-effectiveness, the final rule compels mines to spend approximately \$28.5 million for each life saved. MSHA acknowledges considerable uncertainty in these numbers, as the true number of lives saved, injuries avoided, and costs could be considerably larger or smaller than those estimated here.<sup>22</sup>

## **SUMMARY**

In conclusion, MSHA estimates that the final rule will result in an average of 1.55 miners' lives being saved every year, as well as the prevention of additional injuries. The actual number of lives saved could be much larger.

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<sup>22</sup> A sensitivity analysis of these estimates is provided in Appendix III-A to this chapter.

## APPENDIX III-A: SENSITIVITY ANALYSIS

For the primary estimate, MSHA assumes that future accidents will occur at roughly the same rate as past accidents, and projects that the final rule will be 80 percent effective in saving the lives of 45 miners, based on those killed in four past accidents where it is reasonable to expect that miners' lives might have been saved by the final rule. If, instead of 80 percent effective, the final rule is only 50 percent effective (or if there are approximately 40 percent fewer accidents in the future than in the past), then the number of lives saved per year drops to approximately 1, the estimated net cost of the final rule increases to approximately \$37.5 million per year, and the cost per life saved increases to approximately \$45.5 million. On the other hand, if the rule is 100 percent effective (or if there are approximately 25 percent more accidents in the future than in the past), then the number of lives saved per year increases to approximately 2, the net cost of the final rule drops to \$30.9 million per year, and the cost per life saved drops to \$22.7 million.

MSHA estimates that the cost of compliance with this final rule is approximately \$44.1 million per year. If the actual cost of compliance is 50 percent higher than this, then the net cost of the final rule increases to approximately \$55 million per year, and the cost per life saved increase to \$42.7 million. If the actual cost of compliance is 50 percent lower than this, then the net cost of the final rule decreases to approximately \$11.5 million per year, and cost per life saved decreases to \$14.2 million.

As noted above, MSHA reports the net benefits of the final rule purely for informational purposes. OMB circular A-4 acknowledges the considerable uncertainty inherent in monetizing the value individuals place on small changes in risk, but also states that "A substantial majority of the resulting estimates of Value of Statistical Life (VSL) vary from roughly \$1 million to \$10 million per statistical life." Using a VSL of \$1 million would increase the net cost of the final rule to approximately \$42.5 million. Using a VSL of \$10 million would decrease the net cost of the final rule to \$28.6 million.

Finally, combining the first two assumptions leads to an uncertainty range of between \$11.4 million and \$68.3 million per life saved. Combining all three assumptions leads to an uncertainty range of between \$2.7 and \$63 million per year in net costs.

## IV. COMPLIANCE COSTS

### INTRODUCTION

In this chapter, MSHA estimates the total cost of the final rule on the mining industry. The final rule includes accident notification provisions in Part 50 which apply to all mines. The other provisions of the final rule – concerning training, lifelines, and additional SCSR devices – will apply only to underground coal mines.

MSHA estimates that the final rule will result in total yearly costs (including those associated with the March 9, 2006 ETS) of approximately \$44.1 million for the underground mining industry. These total yearly costs include the amortized value of first-year costs of approximately \$146.9 million. Nearly all of the yearly costs will be borne by underground coal mine operators. A negligible amount of yearly costs (less than \$3,000), having to do with accident notification requirements in Part 50, will be borne by underground M/NM mine operators. MSHA expects that the final rule will impose no additional costs on surface mine operators.

MSHA estimates that the approximately \$44.1 million total yearly costs will be allocated to the following requirements: \$13.7 million for training; \$0.5 million for lifelines; \$29.8 million for SCSRs; and \$5,000 for Part 50. Disaggregated by mine size, yearly costs will be \$2.8 million for mine operators with 1-19 employees; \$37.0 million for mine operators with 20-500 employees; and \$4.3 million for mine operators with 501+ employees. Table IV-1 summarizes the estimated yearly costs for the final rule by mine size and type of provision, using a 7 percent discount rate.<sup>23</sup>

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<sup>23</sup> All cost estimates in this REA are presented in 2004 dollars. Total costs reported in all tables in the REA, to the best of MSHA's knowledge, are the result of accurate calculations. In some cases, however, due to rounding, the totals may appear to deviate from the sum or product of their components.

**Table IV-1: Summary of Yearly Compliance Costs for Final Rule  
(Including Costs Associated with the ETS) <sup>a</sup>**

Section	1-19	20-500	501+	Total
Training (Tables IV-A) <sup>b</sup>	\$981,914	\$11,027,817	\$1,696,676	\$13,706,406
Part 50 (Table IV-B) <sup>c</sup>	\$165	\$2,891	\$2,110	\$5,167
Lifelines (Tables IV-C) <sup>d</sup>	\$117,027	\$385,155	\$13,087	\$515,268
SCSRs (Tables IV-D) <sup>e</sup>	\$1,654,401	\$25,544,711	\$2,624,983	\$29,824,095
<b>Total Compliance Costs</b>	<b>\$2,753,506</b>	<b>\$36,960,574</b>	<b>\$4,336,856</b>	<b>\$44,050,937</b>

<sup>a</sup> Yearly costs = annualized first-year costs + annual costs.

<sup>b</sup> Source: Table IV-A19.

<sup>c</sup> Source: Table IV-B1.

<sup>d</sup> Source: Table IV-C6.

<sup>e</sup> Source: Table IV-D42.

Certain cost provisions in the final rule are associated with the March 9, 2006 ETS that became effective upon publication. In Table IV-2, the compliance costs associated with the ETS using a 7 percent discount rate are subtracted from Table IV-1 compliance costs to arrive at the net yearly costs of the final rule.

Table IV-2 shows total yearly costs (excluding costs associated with the ETS) for the underground mining industry of approximately \$39.7 million, which include the amortized value of first-year costs of approximately \$83.0 million. Nearly all of the yearly costs are associated with requirements for underground coal mine operators. A negligible amount of yearly costs (less than \$3,000) are associated with Part 50 requirements for underground M/NM mine operators.

Of the \$39.7 million yearly costs approximately \$13.6 million comes from training requirements; \$0.4 million comes from lifeline requirements; \$25.8 million comes from requirements related to SCSRs; and \$5,000 comes from Part 50 requirements. Disaggregated by mine size, yearly costs will be \$2.6 million for mine operators with 1-19 employees; \$33.3 million for mine operators with 20-500 employees; and \$3.8 million for mine operators with 501+ employees.

**Table IV-2: Summary of Yearly Compliance Costs  
That are Associated Only with the Final Rule  
(Excluding Costs Associated with the ETS) <sup>a</sup>**

Section	1-19	20-500	501+	Total
Training (Tables IV-A) <sup>b</sup>	\$973,619	\$10,891,667	\$1,693,316	\$13,558,601
Part 50 (Table IV-B) <sup>c</sup>	\$165	\$2,891	\$2,110	\$5,167
Lifelines (Tables IV-C) <sup>d</sup>	\$94,300	\$279,355	\$7,698	\$381,353
SCSRs (Tables IV-D) <sup>e</sup>	\$1,521,116	\$22,160,385	\$2,083,204	\$25,764,704
Total Net Compliance Costs	\$2,589,200	\$33,334,297	\$3,786,328	\$39,709,825

<sup>a</sup> Yearly costs = annualized first-year costs + annual costs.

<sup>b</sup> These costs equals training costs in Table IV-1 minus Table IV-A2 costs.

<sup>c</sup> These costs are the same as the Part 50 costs in Table IV-1, because no Part 50 costs are associated with the March 9, 2006 ETS.

<sup>d</sup> Source: Table IV-C7.

<sup>e</sup> Source: Table IV-D44.

The costs in Tables IV-1 and IV-2 were derived by using a 7 percent discount rate. MSHA has also estimated the costs of the final rule by using an alternative discount rate. Tables IV-X1 and IV-X2, shown at the end of Chapter IV in Appendix IV-A, summarize the estimated yearly costs for the final rule by mine size and type of provision using a 3 percent, instead of a 7 percent, discount rate.

## **METHODOLOGY**

For the final rule, MSHA estimates the following costs: (1) one-time or intermittent costs; (2) annual costs; and (3) annualized costs. One-time costs are those that are incurred only once, usually in the first year of compliance. Intermittent costs are those costs that may recur from time to time, but not annually. Capital expenditures, such as equipment costs, are an example of one-time or intermittent costs. Annual costs are costs that normally occur every year. Two examples of annual costs are maintenance costs and recordkeeping costs. Annualized costs are one-time or intermittent costs that are amortized over the economic life of the investment using a specified interest (or discount) rate to produce an equivalent constant stream of costs. For this REA, the Agency used a (real) discount rate of 7 percent, as recommended by the Office of Management and Budget (OMB) using the annualization formula:

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



where “a” is the annualization factor, “i” is the annual discount rate, and “n” is the economic life of the non-annual recurring investment. Yearly costs are the sum of annual costs and annualized costs.

MSHA used underground coal mine hourly wage rates of \$26.55 for an underground coal miner, \$57.82 for an underground coal mine supervisor, \$52.31 for an underground M/NM supervisor, and \$20.96 for a coal clerical employee.<sup>24</sup> The wage rates include benefits such as social security, unemployment insurance, and workers’ compensation, but they do not reflect shift differentials or overtime pay. For convenience, MSHA refers to miner “compensation” in this REA as “wages,” where that term is understood to include benefits.

## **SCOPE**

The cost provisions of the final rule apply to all underground coal mines. In addition, a cost provision in Part 50 of the final rule on mine fires applies to underground M/NM mines.<sup>25</sup>

Table IV-3 provides the number of underground coal mines by mine size and by state. In this table, the mine size category of 20-500 employees has been separated into three categories: 20-49 employees; 50-99 employees; and 100-500 employees. MSHA separated the mine size category for 20-500 employees to account for differences in the number of shifts and other factors relevant to developing cost estimates. The number of underground coal mines by state and size has been provided in Table IV-3 because, in costing out the lifeline provisions of the final rule, MSHA had to take into account the fact that some of the underground coal mines in Kentucky, West Virginia, and Virginia are in compliance as a result of state requirements.

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<sup>24</sup> Hourly wage rates are derived from Western Mine Engineering Inc., *U.S. Coal Mine Salaries, Wages, & Benefits – 2004 Survey Results*.

<sup>25</sup> There is also a non-cost immediate accident notification provision in part 50 of the final rule that concerns notifying MSHA of certain incidents that occur at the mine (final §50.10 Immediate Notification). This provision applies to all underground and surface coal and M/NM mines.

**Table IV-3: Number of Underground Coal Mines by Size and State<sup>a</sup>**

Locations of Underground Coal Mines	Category					Grand Total
	1-19	20-49	50-99	100-500	501+	
AL	1	2		5	1	9
AR	1					1
CO		2	1	5		8
IL	1		1	10	1	13
IN		1	2	4		7
KY	99	97	26	19		241
MD		2		1		3
MT		1				1
NM				1		1
OH	2	3	1	3		9
OK		1				1
PA	30	18	7		5	60
TN	7	6				13
UT	1	6	1	6		14
VA	36	34	10	3		83
WV	59	61	26	22	1	169
WY		1				1
Grand Total	237	235	75	79	8	634

<sup>a</sup> Source: U.S. DOL, MSHA, PEIR.

Table IV-4 presents the total number of underground coal miners and contractors, by mine size, covered by the final rule. The totals differ from the sum of the miners and contractors shown in Table II-1 and Table II-2, because the numbers in those tables include surface employees and other employees who do not work in underground portions of underground coal mines.

**Table IV-4: No. of Miners and Contractors Underground  
in Underground Coal Mines, 2004 <sup>a</sup>**

	1-19	20-49	50-99	100-500	501+	Total
Ug. Coal Miners	2,110	6,545	4,339	16,275	4,221	33,490
Ug. Contractors	233	722	479	1,797	466	3,697
Ug. Coal Miners & Ug. Contractors	2,343	7,267	4,818	18,072	4,687	37,187

<sup>a</sup> Source: Special Teradata run. DOL, MSHA, PEIR. February 2006.

### **SECTION-BY-SECTION ANALYSIS**

This is a section-by-section analysis of costs estimates in the final rule. Where possible, the specific data sources that MSHA relied on for its estimates have been identified. Where no data source is specified, MSHA relied on estimates provided by technical staff from its Directorates of Coal Mine Safety and Health; Metal and Nonmetal Safety and Health; Educational Policy and Development; and Technical Support. These staffs have considerable rulemaking and field experience and knowledge in estimating the resources required to comply with program development and training requirements of provisions similar to those in the final rule.

For convenience, tables in the section-by-section discussion in this chapter have been numbered according to the type of requirements: IV-A for training; IV-B for accident notification; IV-C for lifelines; and IV-D for SCSRs.

## Compliance Costs for Section IV-A

### § 48.3 Training plans; time of submission; where filed; information required; method for disapproval; commencement of training; approval of instructors.

Paragraph (p) of the final rule requires each underground coal mine to submit a revised training plan to address SCSR donning and transfer procedures, requiring insertion-of-the-mouthpiece training under Part 48. To facilitate operator compliance with this provision, MSHA will provide a training plan addendum to operators. The revised training plan must be submitted to the appropriate District Manager for approval. MSHA estimates that it takes approximately 0.5 hours at mines with 1-19 employees; and 0.75 hours at mines with 20 or more employees for a safety director to revise the training plan. Table IV-A1 summarizes the costs related to revising training plans.

**Table IV-A1: Costs for Underground Coal Mine Operators to Revise Training Plans to Comply with § 48.3**

Mine Size	Underground Coal Mines				Total First Year Cost <sup>b</sup>	Total Annualized Cost <sup>c</sup>
	# of Mines	# of Hours Needed to Revise Training Plan	Average Hourly Wage Rate for a Safety Director	Cost to Send in a Revised Training Plan <sup>a</sup>		
1-19	237	0.50	\$ 57.82	\$ 2.80	\$ 7,515	\$ 526
20-500	389	0.75	\$ 57.82	\$ 5.10	\$ 18,851	\$ 1,320
501+	8	0.75	\$ 57.82	\$ 5.10	\$ 388	\$ 27
Total	634				\$ 26,754	\$ 1,873

<sup>a</sup> Cost to send in a revised training plan =  $[S + (P \times \$0.15) + (T_c \times W_c)]$ , where S is the cost of shipping and handling to send in a training plan (S=\$1 for mines with 1-19 employees; and S=\$1.50 for mines with 20 or more employees); P is the number of sheets in a training plan (P=5 for small mines; and P=10 for large mines); \$0.15 is the cost to photocopy a sheet of paper;  $T_c$  is the # of hours a clerical worker needs to print a training plan and to prepare mailing ( $T_c = 3$  minutes or 0.05 hours for small mines;  $T_c=6$  minutes or 0.1 hours for large mines); and  $W_c$  is the hourly wage rate of a clerical worker ( $W_c=\$20.96$ ).

<sup>b</sup> Total first-year cost = {# of mines x [(# of hours needed to revise training plan x average hourly wage rate for a safety director) + cost to send in a training plan]}.

<sup>c</sup> Total annualized cost = total first-year cost x a, where a is the annualization factor (a=0.07).

There will be no additional cost to new underground coal mines opening after the final rule goes into effect. New mines will incorporate these new training requirements into their original training plans; therefore, no revision is necessary.

§ 48.5 Training of new miners; minimum courses of instruction; hours of instruction.

This section retains the existing requirements for self-rescue and respiratory device training, including instruction and demonstration in the use, care, and maintenance of self-rescue and respiratory devices used at the mine. However, the final rule removes the option of allowing miners to simulate inserting the mouthpiece while explaining proper insertion and requires miners to actually insert the mouthpiece. The final rule clarifies MSHA's intent that transferring from a "self-rescue device to an SCSR" applies to all applicable self-rescue devices at the mine. The Agency has included the time to insert the mouthpiece in the 40 hours of new miner training, and the cost for mine operators to purchase mouthpieces is included under the costs for § 75.1504(b).

Mine operators have to purchase an adequate number of SCSR training models for donning and transfer to match the SCSRs in their mine. From MSHA's experience, most existing underground coal mines have only one type of SCSR, and they already have the SCSR training models to train the miners. However, each mine operator has to purchase extra training models to accommodate the "...transferring from one self-rescue device to an SCSR" for § 48.5.<sup>26</sup> An SCSR training unit costs approximately \$500. On average, each mine with 1-19 employees needs approximately 1 new SCSR training model; each mine with 20-500 employees needs approximately 10 SCSR training units; and each mine with 501+ employees needs approximately 12 SCSR training units. For most mine operators, the additional training units will be of the same type that they already own. For the remainder with more than one type of SCSR used in the mine, the additional training units will be of the type that they did not previously have. Table IV-A2 presents the costs associated with the purchase of extra SCSR training units.

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<sup>26</sup> These training models should be distinguished from the "realistic" training units, discussed under expectations training, which provide the sensation of SCSR airflow resistance and "heat."

**Table IV-A2: Costs for Underground Coal Mine Operators to Purchase Extra SCSR Training Units to Comply with § 48.5**

Mine Size	Underground Coal Mines			Total First-Year Cost <sup>a</sup>	Total Annualized Cost <sup>b</sup>
	# of Mines	# of Extra SCSR Training Units per Mine	Average Price of SCSR Training Unit		
1-19	237	1	\$ 500	\$ 118,500	\$ 8,295
20-500	389	10	\$ 500	\$ 1,945,000	\$ 136,150
501+	8	12	\$ 500	\$ 48,000	\$ 3,360
Total	634			\$ 2,111,500	\$ 147,805

<sup>a</sup> Total first-year cost = (# of mines x # of extra SCSR training units per mine x average price of SCSR training unit).

<sup>b</sup> Total annualized cost = (total first-year cost x a), where a is the annualization factor (a = 0.07).

Table IV-A3 presents the costs associated with new mines having to purchase extra SCSR training units.

**Table IV-A3: Costs for New Underground Coal Mine Operators Starting in Year 2 to Purchase Extra SCSR Training Units to Comply with § 48.5**

Mine Size	Underground Coal Mines			Total Annual Cost <sup>b</sup>
	# of New Mines <sup>a</sup>	# of Extra SCSR Training Units Per Mine	Average Price of SCSR Training Unit	
1-19	47	1	\$ 500	\$ 22,150
20-500	35	10	\$ 500	\$ 163,598
501+	0	12	\$ 500	\$ -
<b>Total</b>	<b>82</b>			<b>\$ 185,748</b>

<sup>a</sup> Based on a special data run conducted by MSHA's Office of Program Evaluation and Information Resources (PEIR), the proportion of all underground coal mines that are new each year is about 20 percent for mines with 1-19 employees; about 9% for mines with 20-500 employees; and 0 percent for mines with 501+ employees.

<sup>b</sup> Total annual cost = (# of new mines x # of extra SCSR training units per mine x average price of SCSR training unit) / b, where b is the discount factor (b=1.07) to reflect the fact that these annual costs start in year two.

The requirement in existing paragraph (e) is being moved to § 75.1504. There is no economic impact in § 48.5 associated with this change.

§ 48.6 Experienced miner training.

This section retains the existing requirements for self-rescue and respiratory device training, including instruction and demonstration in the use, care, and maintenance of self-rescue and respiratory devices used at the mine. However, MSHA has removed the option of allowing miners to simulate inserting the mouthpiece while explaining proper insertion and requires miners to actually insert the mouthpiece. The final rule clarifies MSHA's intent that transferring from a "self-rescue device to an SCSR" applies to all applicable self-rescue devices at the mine. The Agency has included costs associated with inserting the mouthpiece and purchase of mouthpieces, for convenience, under the costs for § 75.1504(b). The requirement in the existing paragraph (f) is being moved to § 75.1504.

§ 48.8 Annual refresher training of miners; minimum courses of instruction; hours of instruction.

The requirements in the section for M/NM mines do not change. The only change in this paragraph is that MSHA is moving the requirement for underground coal mines to review the emergency evacuation and firefighting plans in effect at the mine to § 75.1504.

Paragraph (b)(8) no longer applies to those underground coal miners that receive “hands on” training in donning self-rescue devices and transferring from self-rescue device to self-rescue device under § 75.1504. Underground coal miners will receive refresher training on this skill at least every quarter as a part of drill training and expectations training. There are no cost savings from shifting this training to § 75.1504 because mine operators are still required to provide 8 hours of annual refresher training.

#### § 48.11 Hazard training.

Paragraph (a)(4) requires mine operators to provide hands-on training in transferring from one self-rescue device to another self-rescue device used at the mine and in inserting the mouthpiece for miners defined in § 48.2(a)(2)—any person working in an underground mine, including any delivery, office, or scientific worker or occasional, short-term maintenance or service worker contracted by the operator, and any student engaged in academic projects involving his or her extended presence at the mine. The requirement in this paragraph does not obligate mine operators to use approved instructors to do hazard training; thus, mine operators can have miners who have proficiency in training perform this task. Although miners who receive hazard training are typically not employed by the mine operator, MSHA assumes that the mine operator will absorb these costs. MSHA also assumes that the worker receiving hazard training will receive a wage rate similar to what an underground coal miner makes.

The existing regulation requires miners to have training in the use of self-rescue devices, including complete donning procedures. The only additional requirements in the final rule are that miners be trained in transferring from one self-rescue device to another self-rescue device and inserting the mouthpiece. MSHA estimates that it takes approximately 15 additional minutes of a trainer’s and miner’s time to carry out these tasks. MSHA estimates that 80 percent of underground coal contractors need hazard training.<sup>27</sup> The Agency has also increased the number of other persons receiving this training from the ETS. The cost for a mouthpiece is \$5. Table IV-A4 summarizes the costs related to training miners in accordance with § 48.11.

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<sup>27</sup> The remaining 20 percent of underground coal contractors are assumed to receive comparable hands-on training under § 75.1504. The training costs for these contractors are estimated later in this section.



**Table IV-A4: Costs to Train Miners (Defined in § 48.2(a)(2)) and Contractors with § 48.11**

Mine Size	Underground Coal Mines						Total Annual Cost <sup>c</sup>
	# of Mines	Annual # of Times Hazard Training Given <sup>a</sup>	# of Contractors <sup>b</sup>	Total # of Additional Hours Needed for Training	Cost for a Mouthpiece	Average Hourly Wage Rate for a Miner	
1-19	237	60	186	0.50	\$5.00	\$26.55	\$263,277
20-500	389	120	2,398	0.50	\$5.00	\$26.55	\$896,908
500+	8	200	373	0.50	\$5.00	\$26.55	\$36,053
<b>Total</b>	<b>634</b>		<b>2,958</b>				<b>\$1,196,238</b>

<sup>a</sup> Based on MSHA's knowledge and experience.

<sup>b</sup> MSHA estimates that 80 percent of underground coal contractors need hazard training.

<sup>c</sup> Total annual cost = { (# of mines x annual # of times hazard training given) + # of contractors } x [(total # of additional hours needed for training x average hourly wage rate for a miner) + cost for a mouthpiece].

§ 75.1502 Mine emergency evacuation and firefighting program of instruction.

This section requires each underground coal mine operator to revise the program of instruction to reflect the new requirements in the mine emergency evacuation and firefighting program and send it to the appropriate District Manager for approval. The program of instruction must include scenarios of various mine emergencies (e.g., fires, explosions, gas or water inundations) and the best options for evacuation under each type of emergency. Most of the requirements under this section of the final rule come from the ETS. The final rule includes a new requirement that miners receive expectations training in donning and transferring SCSRs in smoke or simulated smoke and in breathing through a realistic training unit. In computing costs, MSHA estimates that a safety director would take: one and a half hours at a mine with 1-19 employees; two and a half hours at a mine with 20-500 employees; and three and a half hours at a mine with 501+ employees to revise a program of instruction with MSHA compliance assistance. A safety director's hourly wage rate is roughly the same as a mine supervisor, approximately \$57.82 an hour. Once the program of instruction is complete, the mine operator is required to send it to the District Manager for approval and to instruct miners of any changes. It takes approximately 6 minutes of a clerical worker's time to photocopy and send a program of instruction to the District Manager, with shipping and handling costs of \$1 at mines with 1-19 employees and \$2 at mines with 20 or more employees. MSHA anticipates that mine operators will instruct miners of the changes in the program of instruction as part of the introduction to the first quarter drill. Therefore, MSHA expects there will not be additional costs attached. Table IV-A5 summarizes the

costs for existing mines related to updating the mine emergency evacuation and firefighting program of instruction.

**Table IV-A5: Costs for Mine Operators to Update Mine Emergency Evacuation and Firefighting Program of Instruction in Accordance with § 75.1502**

Mine Size	Underground Coal Mines				Total First Year Cost <sup>b</sup>	Total Annualized Cost <sup>c</sup>
	# of Mines	# of Hours Needed to Update Program of Instruction	Average Hourly Wage Rate for a Safety Director	Cost to Send in Program of Instruction <sup>a</sup>		
1-19	237	1.5	\$ 57.82	\$ 3.55	\$ 21,395	\$ 1,498
20-500	389	2.5	\$ 57.82	\$ 5.00	\$ 58,173	\$ 4,072
501+	8	3.5	\$ 57.82	\$ 5.00	\$ 1,659	\$ 116
Total	634				\$ 81,228	\$ 5,686

<sup>a</sup> Cost to send in program of instruction =  $[S + (P \times \$0.15) + (T_c \times W_c)]$ , where S is the cost of shipping and handling to send in a program of instruction (S=\$1 for mines with 1-19 employees; and S=\$2 for mines with 20 or more employees); P is the average number of sheets in a program of instruction (P=3 for mines with 1-19 employees; and P=6 for mines with 20 or more employees); \$0.15 is the cost to photocopy a sheet of paper; T<sub>c</sub> is the # of hours a clerical employee needs to prepare mailing in a program of instruction (T<sub>c</sub> =6 minutes or 0.1 hours); and W<sub>c</sub> is the hourly wage rate of a clerical employee (W<sub>c</sub>=\$20.96).

<sup>b</sup> Total first-year cost = {# of mines x [(# of hours needed to update a program of instruction x average hourly wage rate for a safety director) + cost to send in program of instruction]}.

<sup>c</sup> Total annualized cost = total first-year cost x a, where a is the annualization factor (a=0.07).

There will be no additional cost to new underground coal mines opening after the final rule goes into effect. New mines will incorporate these new training requirements into their program of instruction plans; therefore, no revision is necessary.

Paragraph (d) specifies the requirements for a trainer; the training must be conducted by a person designated by the operator who has the ability, training, knowledge, or experience to provide training to miners in that person's area of expertise. There is no additional cost related to having a trainer because, from MSHA's experience, the existing trainers already possess these skills.

§ 75.1503 Use of fire suppression equipment.

This section is moved from the existing standard § 75.1502(b)(1), (2), and (3). There is no economic impact associated with this relocation of the existing section.

§ 75.1504 Mine emergency evacuation drills.

This section renumbers and revises the ETS § 75.1502(c). The ETS enhanced the requirements for evacuation training and drills by requiring that these drills be more than a simulation.

Paragraph (a) (1) requires each newly hired miner, including those newly employed experienced miners who have not participated in a mine emergency training and drill at the mine within the previous 3 months, to participate in the next training and drill. The evacuation drill introduces the miner to all aspects of the underground escapeways and emergency procedures at the mine. It includes “hands-on” practice in donning and transferring from self-rescue device to self-rescue device used in the mine (including the use, care, and maintenance of self-rescue devices) and inserting the mouthpiece; training that emphasizes the importance of proper use of SCSRs; and review of the mine map, the escapeway system, and emergency evacuation plans in effect at the mine. There will not be any additional cost to perform this training component because mine operators are already providing this training at some point of time within the first 90 days under quarterly drills (whose costs are estimated later in this section). The effect of the final rule only changes the timing of this training and drill.

Paragraph (a)(2) requires a new foreman to travel both escapeways prior to assuming duties on the section or outby work location. Table IV-A6 shows the number of section and outby foremen in underground coal mines.

**Table IV-A6: Total Number of Foremen in Underground Coal Mines**

Mine Size	Underground Coal Mines		Total
	Section Foremen <sup>a</sup>	Outby Foremen <sup>b</sup>	
1-19	237	237	474
20-500	573	287	860
501+	33	50	83
Total	843	574	1,417

<sup>a</sup> MSHA's Coal Safety Division, 2004 data. The relationship between MMUs and section foremen is one to one.

<sup>b</sup> Based on MSHA's knowledge, on average:

\*Mines with 1-19 employees: number of outby foremen is the same as the number of section foremen.

\*Mines with 20-500 employees: half of the number of section foremen.

\*Mines with 501+ employees: number of section foremen multiplied by 1.5.

Based on MSHA's experience, approximately 20 percent of section and outby foremen are new each year. New foremen also include those experienced foremen who transfer to a new underground coal mine. They have to travel both escapeways prior to assuming duties. It takes approximately 1 hour at a mine with 1-19 employees; 1.5 hours at a mine with 20-500 employees; and 2 hours at a mine with 501+ employees to travel both escapeways. Table IV-A7 estimates the annual costs for new foremen to travel both escapeways.

**Table IV-A7: Total Annual Costs for New Foremen to Travel Both Escapeways in Accordance with § 75.1504(a)(2)**

Mine Size	Underground Coal Mines			Total Annual Costs <sup>b</sup>
	Annual # of New Section & Outby Foremen <sup>a</sup>	Time Required to Travel Both Escapeways	Hourly Wage Rate for Section or Outby Foreman	
1-19	94.8	1.00	\$ 57.82	\$ 5,481
20-500	172.0	1.50	\$ 57.82	\$ 14,918
501+	16.6	2.00	\$ 57.82	\$ 1,920
Total	283.4			\$ 22,319

<sup>a</sup> Source: Table IV-A6. Based on MSHA's experience and knowledge, about 20% of the total number of section and outby foremen are new.

<sup>b</sup> Total annual costs = annual # of new section & outby foremen x time required to travel both escapeways x hourly wage rate for section or outby foreman.

Current section and outby foremen who are assigned work at a new work location are also required to travel both escapeways in their entirety. MSHA estimates that a typical section foreman receives approximately one significant new assignment a year and a typical outby foreman receives approximately 2 significant new assignments a quarter, or 8 a year. It takes approximately 1 hour at a mine with 1-19 employees; 1.5 hours at a mine employing 20-500 employees; and 2 hours at a mine with 501+ employees to travel both escapeways. Table IV-A8 summarizes the annual costs for current section and outby foremen who are assigned a new work location to travel both escapeways.

**Table IV-A8: Total Annual Costs for Foremen Who Receive New Assignments to Travel Both Escapeways Under § 75.1504(a)(2)**

Mine Size	Total # of Section Foremen <sup>a</sup>	Total # of Outby Foremen <sup>a</sup>	# of New Work Locations Annually for Section Foremen	# of New Work Locations Annually for Outby Foremen	Hours Required for Section and Outby Foremen to Travel Both Escapeways	Total Annual Costs <sup>b</sup>
1-19	237	237	1	8	1.0	\$123,330
20-500	573	287	1	8	1.5	\$248,828
501+	33	50	1	8	2.0	\$50,072
<b>Total</b>	<b>843</b>	<b>574</b>				<b>\$422,231</b>

<sup>a</sup> Source: Table IV-A6.

<sup>b</sup> Total annual costs = [(total # of section foremen x # of new work locations) + (total # of outby foremen x # of new work locations)] x hours required for foremen to travel both escapeways x hourly wage rate for a foreman (\$57.82).

The final rule combines § 75.383(b) and ETS § 75.1502(c) into a new, improved, and expanded § 75.1504. Existing § 75.383(b)(2) and (3) require a mine supervisor and two miners to travel the entire escapeway and the operator to rotate miners for these 6-week drills. For costing purposes, MSHA is estimating in Table IV-A9 and Table IV-A10 the cost savings from eliminating these two provisions. The costs of the new, improved and expanded § 75.1504 are estimated later in this section.

**Table IV-A9: Total Annual Savings to Eliminate Existing § 75.383(b)(2)**

Mine Size	Underground Coal Mines				Total Annual Savings <sup>d</sup>
	Total # of Coal Producing Sections <sup>a</sup>	# of Hours to Travel an Escapeway	Total # of Hours for a Mine Supervisor & 2 Miners to Travel an Escapeway Every 6 Weeks <sup>b</sup>	Weighted Average of Hourly Wage Rates of Those Who Take Part in Traveling an Escapeway <sup>c</sup>	
1-19	237	0.5	1.50	\$36.97	(\$113,915)
20-500	573	0.75	2.25	\$36.97	(\$413,122)
501+	33	1.0	3.00	\$36.97	(\$31,723)
<b>Total</b>	<b>843</b>				<b>(\$558,760)</b>

<sup>a</sup> Source: Table IV-A6. MSHA's Coal Safety Division, 2004 data. The relationship between MMUs and coal producing section is one to one.

<sup>b</sup> Three times the amount of time to travel an escapeway because the existing regulation requires a mine supervisor and two miners to travel an escapeway.

<sup>c</sup> Weighted average of hourly wage rates of those who take part in traveling an escapeway =  $[W_s + (W_m \times 2)] / 3$ , where  $W_s$  is the hourly wage rate for a mine supervisor ( $W_s = \$57.82$ );  $W_m$  is the hourly wage rate for a miner ( $W_m = \$26.55$ ); 2 is the number of miners; and 3 is the combined number of miners and supervisors.

<sup>d</sup> Total annual savings = (# of coal producing sections x total #of hours for a mine supervisor & 2 miners to travel an escapeway every 6 weeks x weighted average of hourly wage rates of those who take part in traveling an escapeway x 52) / 6, where 52/6 is the # of times a year the current regulation requires a supervisor and two miners in a coal producing section to travel an escapeway.

**Table IV-A10: Total Annual Savings to Eliminate Existing § 75.383(b)(3)**

Mine Size	Underground Coal Mines						Total Annual Savings <sup>e</sup>
	# of Mines <sup>a</sup>	Total # of Maintenance Shifts in a Mine	# of Crews in a Maintenance Shift	Total # of Maintenance Crews in All Mines <sup>b</sup>	Total # of Hours for a Supervisor and 2 Miners to Travel an Escapeway Every 6 Weeks <sup>c</sup>	Weighted Average of Hourly Wage Rates of Those Who Take Part in Traveling an Escapeway <sup>d</sup>	
1-19	237	1	1	237	1.50	\$36.97	(\$113,915)
20-500	389	1	1	389	2.25	\$36.97	(\$280,461)
501+	8	1	2	16	3.00	\$36.97	(\$15,381)
Total	634						(\$409,757)

<sup>a</sup> Source: Table II-1.

<sup>b</sup> Total # of crews in all mines = # of mines x total # of maintenance shifts in a mine x # of crews in a maintenance shift.

<sup>c</sup> On average, it takes a supervisor working on a maintenance shift (0.5 hours at mines with 1-19 employees, 0.75 hours at mines with 20-500 employees, and 1 hour at mines with 500+ employees) to travel an escapeway. The total hours equals three times the # of hours for a mine supervisor working on a maintenance shift to travel an escapeway, because the existing regulation requires a mine supervisor and two miners to travel an escapeway.

<sup>d</sup> Weighted average of hourly wage rates of those who take part in traveling an escapeway =  $[W_s + (W_m \times 2)] / 3$ , where  $W_s$  is the hourly wage rate for a mine supervisor ( $W_s = \$57.82$ );  $W_m$  is the hourly wage rate for a miner ( $W_m = \$26.55$ ); 2 is the number of miners; and 3 is the combined number of miners and supervisors.

<sup>e</sup> Total annual savings = (total # of maintenance crews in all mines x total # of hours for a mine supervisor & 2 miners to travel an escapeway every 6 weeks x weighted average of hourly wage rates of those who take part in traveling an escapeway x 52) / 6, where 52/6 is the # of times a year the current regulation requires a supervisor and two miners in a coal producing section to travel an escapeway.

Paragraph (b)(1) of § 75.1504 comes from existing §§ 48.5(b)(2), 48.6(b)(12), and 48.8(b)(8). Under the existing regulation, mine operators are already providing SCSR training to miners as part of their annual refresher training. However, this could not be counted as one of the four SCSR training sessions required in the final rule, because it does not cover the transfer from a self-rescue device to another self-rescue device, and insertion of the mouthpiece. There is no cost savings associated with the elimination of SCSR annual refresher training. Mine operators have to provide eight hours of annual refresher training, even if they exclude SCSR training from annual refresher training. MSHA estimates that it takes 20 minutes for a miner to don the SCSR, insert the mouthpiece, and transfer from one self-rescue device to an SCSR. In this REA, MSHA is adding 20 percent of underground coal contractors to this training; MSHA estimates that this group of contractors works on a long-term basis at one mine and, therefore, the mine operator will have to provide them with SCSR training.



Typically, trainers are mine supervisors, earning the same amount of compensation —\$57.82. From MSHA’s experience, trainers provide 30 minutes of oral instructions on SCSR training during a staff meeting, per shift. Then the trainers will go to each section of the mine to provide 20 minutes of hands-on SCSR training with miners. MSHA estimates that half of the time miners will get one-on-one training, and the other half they will get one-on-five training. In other words, it will take, on average, 6 trainers to train 10 miners (or it will take 0.6 trainers to train 1 miner). Another related cost is the cost to disinfect the mouthpieces, which takes approximately 1 minute of a trainer’s time to disinfect a mouthpiece and \$0.25 worth of a chemical. Table IV-A11 summarizes the costs related to this paragraph.

**Table IV-A11: Costs for Mine Operators to Train Miners in Quarterly Drills with § 75.1504(b)(1)**

Mine Size	Underground Coal Mines						Total Annual Cost <sup>f</sup>
	# of Mines	# of Miners <sup>a</sup>	# of Contractors <sup>b</sup>	Annual Hours Needed for Each Miner to Receive Training <sup>c</sup>	Annual # of Hours for a Supervisor to Provide Oral Instructions <sup>d</sup>	# of Hours of a Trainer's Time to Train a Miner <sup>e</sup>	
1-19	237	2,110	47	3	2	0.60	\$281,849
20-500	389	27,159	600	3	4	0.60	\$3,365,011
501+	8	4,221	93	3	6	0.60	\$511,778
Total	634	33,490	739				\$4,158,637

<sup>a</sup> Source: Table IV-4.

<sup>b</sup> MSHA estimates about 20 percent of the total # of underground coal contractors (Table IV-4) are going to receive quarterly training alongside other miners.

<sup>c</sup> It takes a miner an average of 20 minutes to have hands-on training in donning and transferring from a self-rescue device to another self-rescue device used in the mine and inserting the mouthpiece; this training will occur four times a year. Although this drill is done 4 times a year, one of those times needs to be done in a smoke, simulated smoke, or an equivalent environment—annual expectations training. The cost for annual expectations is under § 75.1504(b)(6). Thus, the total annual amount of time for a miner to learn how to accomplish these tasks is 60 minutes (or 1.00 hour). In addition, all miners receive about 30 minutes of oral instruction each quarter before receiving SCSR training, including annual expectations training (or 2 hours a year).

<sup>d</sup> It takes a supervisor about 30 minutes, per shift, to provide oral instruction on SCSR training. MSHA estimates that mines with 1-19 employees operate 1 shift; mines with 20-500 employees operate 2 shifts; and mines with 501+ employees operate 3 shifts. The trainer has to provide it four times, per shift, a year.

<sup>e</sup> Trainer's time is 60% of a miner's time, and it takes one hour for a miner to receive hands-on training.

<sup>f</sup> Total annual cost = {[(# of miners + # of contractors) x annual hours needed for each miner to receive training] x average hourly wage rate for a miner—\$26.55} + {[(# of mines x annual # of hours for a supervisor to provide oral instruction) + [(# of miners + # of contractors) x (# of hours of a trainer's time to train a miner)] + [(# of miners + # of contractors) x (3/60— # of hours to disinfect a mouthpiece 3 times a year)] x average hourly wage rate for a supervisor—\$57.82} + [(# of miners + # of contractors) x (\$0.75—cost for the chemical to disinfect a mouthpiece 3 times a year)].

There are no additional costs for new mines to train miners in quarterly training because MSHA assumes that the new mines will train the same number of miners as would have been trained in those mines that close down.

Paragraph (b)(2) clarifies and strengthens the SCSR training by requiring that the training emphasize the importance of recognizing when the SCSR is not functioning

properly and demonstrating how to reinitiate the starting sequence. It also highlights the significance of not removing the mouthpiece until the miner is out of the mine and the effects of over-breathing the capability of the SCSR. There is no economic impact associated with this requirement.

The requirements of paragraph (b)(3) come from the ETS § 75.1502. Paragraph (b)(3) requires miners to participate in a drill using a different approved scenario each quarter; travel the primary or alternate escapeway to the surface or bottom of a shaft or slope; and locate the continuous directional lifelines, or equivalent devices, tethers, and the stored SCSRs as part of their quarterly mine emergency evacuation drills. MSHA estimates that it takes a miner 30 minutes in a mine with 1-19 employees; 45 minutes in a mine with 20-500 employees; and 1 hour in a mine with 501+ employees to fulfill all of the requirements in this paragraph. Table IV-A12 summarizes the costs related to this paragraph.

**Table IV-A12: Costs for Mine Operators to Train Miners in Quarterly Drills with § 75.1504(b)(3)**

Mine Size	Underground Coal Mines					Total Annual Cost <sup>c</sup>
	# of Miners	# of Contractors <sup>a</sup>	# of Miners & Contractors Needing Training	Time Needed to Travel Escapeway & Locate Lifelines, Tethers, Stored SCSRs	Annual # of Hours Needed for Each Miner to Receive Training <sup>b</sup>	
1-19	2,110	47	2,157	0.50	2	\$ 114,515
20-500	27,159	600	27,759	0.75	3	\$ 2,210,972
501+	4,221	93	4,314	1.00	4	\$ 458,168
Total	33,490	739	34,229			\$ 2,783,656

<sup>a</sup> MSHA estimates about 20 percent of the total # of underground contractors (Table IV-4) are going to receive quarterly training alongside other miners.

<sup>b</sup> Miners have to do this drill four times a year.

<sup>c</sup> Total annual cost = (# of miners & contractors needing training x annual # of hours needed for each miner to receive training x hourly wage rate for a miner—\$26.55).

Paragraph (b)(4) combines the requirements for a review of the mine map and escapeway maps, the firefighting plan, and the mine emergency evacuation plan in effect at the mine from existing §§ 48.5(b)(5), 48.6(b)(5), and 48.8(b)(4), 75.383(b)(4), and ETS § 75.1502(a) on a quarterly basis. MSHA estimates that it takes a supervisor approximately 5 minutes to go over the mine map, the escapeway system, and the escape, firefighting, and emergency evacuation plans. All miners are supposed to participate in the review of these plans. Table IV-A13 estimates the cost associated with this paragraph.

**Table IV-A13: Costs for Miners to Review Mine Map, Escapeways, and Emergency Evacuation Plans in Accordance with § 75.1504(b)(4)**

Mine Size	Underground Coal Mines					Total Annual Cost <sup>c</sup>
	# of Mines	# of Shifts	# of Miners	# of Contractors <sup>a</sup>	Annual # of Hours Needed to Review <sup>b</sup>	
1-19	237	1	2,110	47	0.3	\$ 23,654
20-500	389	2	27,159	600	0.3	\$ 260,658
501+	8	3	4,221	93	0.3	\$ 38,643
Total	634		33,490	739		\$ 322,955

<sup>a</sup> MSHA estimates that about 20 percent of the total # of underground contractors (Table IV-4) are going to receive this training alongside other miners.

<sup>b</sup> It takes a mine supervisor 5 minutes, per shift, to go over the mine map, the escapeway system, and the escape, firefighting, and emergency evacuation plans in a staff meeting; it has to be done 4 times a year.

<sup>c</sup> Total annual costs = {[(# of miners + # of contractors) x annual # of hours needed to review x hourly wage rate for a miner—\$26.55] + (# of mines x # of shifts x annual # of hours needed to review x hourly wage rate for a mine supervisor—\$57.82)}.

Paragraph (b)(5) combines the requirements for operation of the fire suppression equipment available in the mine and the location and use of firefighting equipment and materials from § 75.1502(a). There is no economic impact associated with this paragraph.

Paragraph (c) requires each miner to participate in annual expectations training. Expectations training must at least include “donning and transferring SCSRs in smoke, simulated smoke, or an equivalent environment, breathing through a device that provides the sensation of SCSR airflow resistance and heat.” From MSHA’s knowledge and experience, 75 percent of mines with 1-19 employees; 50 percent of mines with 20-500 employees; and 25 percent of mines with 501+ employees are going to hire a training contractor to train miners. These percentages also apply to those contractors who work on a long-term basis at one mine and receive expectations training at that mine. MSHA

estimates that it will cost approximately \$110 to train a miner in-house plus the cost associated with the time the miners are receiving training. The \$110 estimated cost per miner includes a trainer’s time and equipment (i.e., a “realistic” training unit, an oxygen-chemical generating canister, a smoke generator, a mouthpiece, and disinfectant.) MSHA estimates that it will take approximately 40 minutes to train miners in providing donning and transferring SCSRs in a smoke or an equivalent environment, and in breathing through a "realistic" training unit. The cost for mine operators to train miners in-house is summarized in Table IV-A14.

**Table IV-A14: Costs for Underground Coal Mine Operators to Train Miners In-House to Comply with § 75.1504(c)**

Mine Size	Underground Coal Mines					Total Annual Cost <sup>b</sup>
	# of Miners	# of Contractors <sup>a</sup>	Cost to Train a Miner In-House	Miner's Time Needed for Training	Average Hourly Wage Rate for a Miner	
1-19	2,110	47	\$ 110	0.67	\$26.55	\$68,849
20-500	27,159	600	\$ 110	0.67	\$26.55	\$1,772,387
501+	4,221	93	\$ 110	0.67	\$26.55	\$413,193
Total	33,490	739				\$2,254,429

<sup>a</sup> MSHA estimates that about 20 percent of the total # of underground contractors (Table IV-4) are going to receive quarterly training alongside other miners.

<sup>b</sup> Total annual cost = {[(# of miners + # of contractors) x (1 - p) x cost to train a miner in-house] + [(# of miners + # of contractors) x (1 - p) x miner's time needed for training x miner's hourly wage rate]}, where p is the percentage of mines that are going to hire a training contractor to conduct annual expectations training [75 percent for mines with 1-19 employees; 50 percent for mines with 20-500 employees; and 25 percent for mines with 501+ employees].

From MSHA’s knowledge and experience, 75 percent of mines with 1-19 employees; 50 percent of mines with 20-500 employees; and 25 percent of mines with 501+ employees are going to hire a training contractor to train miners. These percentages also apply to those contractors who are supposed to receive quarterly training alongside other miners. MSHA estimates that a training contractor will charge approximately \$150 per miner for training, which includes a trainer’s time, the facility, and equipment (i.e., a “live” training unit, an oxygen-chemical generating canister, a smoke generator, a mouthpiece, and disinfectant.)

Also under § 75.1504(c)(2), miners must participate in expectations training within one quarter of being employed at the mine. MSHA expects that 25 percent of these miners will be newly employed at the mine within one quarter of the mine’s next scheduled annual expectations training. MSHA assumes that the remaining 75 percent of these miners will all receive separate annual expectations training from a training

contractor at a cost of \$200 per miner. MSHA estimates the annual coal miner turnover rate is 7 percent.

Table IV-A15 summarizes mine operator costs for annual expectations training.

**Table IV-A15: Costs for Mine Operators to Train Miners Using a Contractor to Comply with § 75.1504(c)**

Mine Size	Underground Coal Mines							Total Annual Cost <sup>d</sup>
	# of Miners	# of Contractors <sup>a</sup>	# of New Exp. Miners <sup>b</sup>	Cost to Train a Miner	Cost to Train New Exp. Miners	Time Needed for Training <sup>c</sup>	Hourly Wage Rate for a Miner	
1-19	2,110	47	113	\$150	\$200	0.67	\$26.55	\$295,895
20-500	27,159	600	1,457	\$150	\$200	0.67	\$26.55	\$2,644,819
501+	4,221	93	226	\$150	\$200	0.67	\$26.55	\$230,181
<b>Total</b>	<b>33,490</b>	<b>739</b>	<b>1,797</b>					<b>\$3,170,894</b>

<sup>a</sup> MSHA estimates that about 20 percent of the total # of underground contractors (Table IV-4) are going to receive annual expectations training alongside other miners.

<sup>b</sup> No. of new experienced miners equals ((# of Miners + # of Contractors) x 0.07) x 0.75, where 0.07 is the annual miner turnover rate, and 0.75 is the likelihood that the operator's next scheduled annual expectations training would not fall within one quarter of a new experienced miner's being employed.

<sup>c</sup> MSHA estimates that it takes 40 minutes (or 0.67 hours) to train miners in donning and transferring SCSRs in a smoke, simulated smoke, or an equivalent environment, and in breathing through a "realistic" training unit along with an oxygen canister that provides the sensation of SCSR airflow resistance.

<sup>d</sup> Total annual cost = {[(# of miners + # of contractors) x p x cost to train a miner] + [(# of miners + # of contractors) x p x time needed for training x hourly wage rate for a miner]} + [# of new experienced miners x (cost to train new experienced miner + (time needed for training x hourly wage rate for a miner))], where p is the percentage of mines that are going to hire a contractor to conduct annual expectations training [75 percent for mines with 1-19 employees; 50 percent for mines with 20-500 employees; and 25 percent for mines with 501+ employees].

Paragraph (d) modifies § 75.1502(c) of the ETS and renumbers it as § 75.1504(d). This standard retains the requirement that the mine operator certify, by signature and date, that the mine emergency evacuation drills were held in accordance with the requirements. Section 75.1504(d) expands the certification to include foremen traveling both escapeways prior to assuming their duties, initial drills for newly hired miners, and annual expectations training for all miners. The certification must identify miners, by name, who participated in each emergency evacuation drill or other training. For each

miner, the certification must list the content of the drill completed, including the scenario used, as required in paragraph (b) of this section. Existing § 75.1502(c)(1) requires operators to certify mine emergency evacuation drills and initial drills for newly hired miners. The only additional requirement in this paragraph is for mine operators to certify that foremen traveled escapeways prior to assuming new duties and performed annual expectations training. MSHA estimates that a safety director would take approximately 9 seconds to certify each miner's training. Table IV-A16 summarizes certification costs.

**Table IV-A16: Annual Costs to Certify Training Under § 75.1504(d)(1)**

Mine Size	Underground Coal Mines						Total Annual Costs <sup>c</sup>
	# of New Foremen & Current Section Foremen Traveling Escapeways <sup>a</sup>	# of Current Outby Foremen Travelling Escapeways <sup>b</sup>	Annual # of Times New Foremen & Current Section Foremen Certified	Annual # of Times Current Outby Foremen Certified	Time to Certify (in Hrs.)	Hourly Wage Rate for a Supervisor	
1-19	332	237	1	8	0.0025	\$57.82	\$322
20-500	745	287	1	8	0.0025	\$57.82	\$440
501+	50	50	1	8	0.0025	\$57.82	\$65
Total	1,126	574					\$827

<sup>a</sup> Source: Table IV-A7 and Table IV-A8.

<sup>b</sup> Source: Table IV-A8.

<sup>c</sup> Total annual costs = ((# of new foremen & current section foremen traveling escapeways x annual # of times new foremen & current section foremen certified) + (# of current outby foremen travelling escapeways x annual # of times current outby foremen certified)) x time to certify x hourly wage rate for a supervisor.

Paragraph (d)(4) requires mine operators, upon request, to provide a copy of the training record to miners. MSHA estimates that approximately 5 percent of miners and 20 percent of contractors will request a copy of their records annually. It takes a clerical employee one and a half minutes to photocopy a record and the cost for photocopying is \$0.15. Table IV-A17 shows costs to provide training records to miners.

**Table IV-A17: Costs to Provide Training Records to Miners  
Under § 75.1504(d)(4)**

Mine Size	Underground Coal Mines			Total Annual Cost <sup>d</sup>
	# of Miners <sup>a</sup>	#of Contractors <sup>b</sup>	Cost to Produce a Training Record <sup>c</sup>	
1-19	106	47	\$0.67	\$103
20-500	1,358	600	\$0.67	\$1,319
501+	211	93	\$0.67	\$205
<b>Total</b>	<b>1,675</b>	<b>739</b>		<b>\$1,627</b>

<sup>a</sup> MSHA estimates that approximately 5 percent of underground coal miners will request a copy of their records yearly.

<sup>b</sup> MSHA estimates that approximately 20 percent of underground coal contractors will request a copy of their records yearly.

<sup>c</sup> Cost to produce a training record = (h x W<sub>c</sub>) + C, where h is the # of hours to locate a training record and photocopy it (0.025 hours or 1.5 minutes); W<sub>c</sub> is the hourly wage rate for a clerical employee (W<sub>c</sub>=\$20.96); and C is the photocopying cost (C=\$0.15).

<sup>d</sup> Total annual costs = (# of miners + # of contractors) x cost to produce a training record.

§ 75.1505 Escapeway maps.

Paragraphs (a), (b), and (c) of the final rule come from existing § 75.383. This is an administrative change and there will be no additional costs associated with it.

§ 75.1714 Availability of approved self-rescue devices; instruction in use and location.

The final rule revises § 75.1714(b) to clarify that all persons must have SCSR donning and transferring training before going underground. This administrative change eliminates duplication of requirements and potential confusion. This change has no economic impact.



Table IV-A18 summarizes the total yearly costs related to training. Table IV-A19 summarizes yearly training costs according to whether they are associated with the ETS. The only yearly cost associated with the ETS is the purchase of extra SCSR training units (from Table IV-A2).

**Table IV-A18: Summary of Yearly Costs Related to Training**

Section	Underground Coal Mines			Total Yearly Costs
	1-19	20-500	501+	
§ 48.3 <sup>a</sup>	\$526	\$1,320	\$27	\$1,873
§ 48.5 <sup>b</sup>	\$30,445	\$299,748	\$3,360	\$333,553
§ 48.11 <sup>c</sup>	\$263,277	\$896,908	\$36,053	\$1,196,238
§ 75.1502 <sup>d</sup>	\$1,498	\$4,072	\$116	\$5,686
§ 75.1504 <sup>e</sup>	\$686,168	\$9,825,769	\$1,657,120	\$12,169,057
Total	\$981,914	\$11,027,817	\$1,696,676	\$13,706,406

<sup>a</sup> Source: Table IV-A1.

<sup>b</sup> Source: Table IV-A2 and Table IV-A3.

<sup>c</sup> Source: Table IV-A4.

<sup>d</sup> Source: Table IV-A5.

<sup>e</sup> Source: Table IV-A7 through Table IV-A17.

**Table IV-A19: Yearly Costs Associated With ETS**

Mine Size	Underground Coal Mines		Total Yearly Costs of Final Rule
	Yearly Costs Associated With ETS <sup>a</sup>	Future Yearly Costs of Final Rule	
1-19	\$8,295	\$973,619	\$981,914
20-500	\$136,150	\$10,891,667	\$11,027,817
501+	\$3,360	\$1,693,316	\$1,696,676
Total	\$147,805	\$13,558,601	\$13,706,406

<sup>a</sup> Source: Table IV-A2.

## **Compliance Costs for Section IV-B**

### § 50.2 Definitions.

The final rule broadens the definition of reportable fires in § 50.2(h)(6) to include all unplanned underground fires that are not extinguished within ten minutes of discovery. The definition of reportable fires remains the same for surface mine operators. The increase in the number of reportable fires will affect mine operator costs of immediately notifying MSHA under § 50.10(b), including those associated with investigating and reporting these fires under existing § 50.11(b).

### § 50.10 Immediate Notification.

This provision applies to all mine operators and, like the ETS, requires that, if an accident occurs, the operator must contact MSHA at once without delay and within 15 minutes once the operator knows or should know that an accident has occurred.

The final rule clarifies existing requirements in § 50.10. Although the Agency assigns no additional costs specifically to § 50.10, the change in the definition of accident in § 50.2 will increase the number of accidents that are subject to the provisions of § 50.10. An increased number of underground fires that are reported to MSHA will generate additional costs with respect to investigating and reporting fires under existing § 50.11(b).

Based on MSHA's experience and a 2003 survey of underground coal mines that have an atmospheric monitoring system (AMS), the Agency estimates that there are as many as six times the number of fires of fewer than thirty minutes as those that are currently reportable. (This may be an overestimate since mines with an AMS are better able to detect fires.)

In order to estimate the number of additional fires for which underground coal mines will have to notify the Agency, MSHA calculated that these mines reported an average of 7.2 fires per year under 50.2(h)(6) from February 1, 1996 to February 1, 2006. This was multiplied by MSHA's estimated ratio of six currently nonreportable fires to each currently reportable fire, to get an estimated total of 43.2 fires annually of less than thirty minutes.

MSHA examined the narratives for all underground coal fires reported for 2000 through 2004 under § 50.2(h) in categories other than 50.2(h)(5) and 50.2(h)(6) – for example, fires that were reported because they had resulted in injuries. All of those that were fewer than thirty minutes were either under ten minutes or their duration was unknown. MSHA has assumed that every fire of fewer than thirty minutes whose duration was unknown was between ten and thirty minutes of duration and, thus, will be addressed by the final rule.

MSHA calculated the ratio of fires of unknown duration to all fires of less than thirty minutes for each mine size category. In underground coal mines these ratios varied from 38% for fires in mines with 20-500 employees to 67% for fires in mines with 501+ employees. MSHA applied the ratios to the estimated total number of fires of less than thirty minutes, resulting in an estimate of 20.9 additional underground coal fires under

the final rule. MSHA took a similar approach in order to estimate that 25.3 additional fires in underground M/NM mines will require immediate notification.

§ 50.11(b) Investigation.

MSHA estimates that each additional reportable fire will require one hour of a supervisor’s time to investigate. At mines with 20 or more employees, another hour of supervisory time will be required to develop a report of each investigation. Mines with 1-19 employees do not have any additional investigation report requirements arising from the final rule because they are permitted to use existing Form 7001 as an investigation report. In addition, each notification is estimated to take six minutes (0.1 hours) of a supervisor’s time. The hourly wage rate for a supervisor is \$57.82 in coal mines and \$52.31 in M/NM mines.

Table IV-B1 presents the annual costs for reporting fires.

**Table IV-B1: Annual Costs for Additional Reportable Fires under Final § 50.10 and § 50.11(b)**

Mine Size	Additional Fires	Hours to Notify, Investigate, and Report per Fire <sup>a</sup>	Supervisor's Hourly Wage	Annual Cost
Underground Coal				
1-19	2.6	1.1	\$ 57.82	\$165
20-500	9.7	2.1	\$ 57.82	\$1,178
501+	8.6	2.1	\$ 57.82	\$1,044
Total	20.9			\$2,387
Underground Metal/NonMetal				
1-19	0	1.1	\$ 52.31	\$0
20-500	15.6	2.1	\$ 52.31	\$1,714
501+	9.7	2.1	\$ 52.31	\$1,066
Total	25.3			\$2,779
Grand Total				
1-19	2.6			\$165
20-500	25.3			\$2,891
501+	18.3			\$2,110
Total	46.2			\$5,167

<sup>a</sup> Hours = 0.1 hours to notify + 1 hour to investigate, for mines with 1-19 employees.

Hours = 0.1 hours to notify + 1 hour to investigate + 1 hour to report, for mines with 20 or more employees.

## Compliance Costs for Section IV-C

### § 75.380 Escapeways; bituminous and lignite mines and § 75.381 Escapeways; anthracite mines.

Final rule § 75.380(d)(7) and § 75.381(c)(5) require that directional lifelines be installed in escapeways. Prior to the ETS, lifelines had to be installed only if a mine was using belt air to ventilate the production area (face) and also using the return as an alternate escapeway (§ 75.372(n)). Two states, Kentucky and West Virginia, require lifelines in returns used as alternate escapeways. Virginia requires lifelines in all primary escapeways.

The analysis of lifeline requirements is divided into four sections. The first section analyzes requirements that were included in the ETS. The second section analyzes the new requirement that lifelines be flame resistant. The third section analyzes the new requirement that the tapered section of directional cones be pointed inby. The fourth section summarizes the costs for all lifeline requirements of the final rule.

### **Lifeline Requirements of Both the Final Rule and the ETS**

For the ETS, MSHA estimated that an average of 18,785 feet of lifeline per mine is needed to comply with the lifeline provisions.<sup>28</sup> After deducting for lifelines in place, MSHA estimated an average additional 15,494 feet of lifeline per mine would be needed. MSHA assumed that lifelines had been installed in all escapeways in compliance with federal or state laws and regulations. In addition, MSHA assumed that, for 5% of the remaining escapeway footage, operators had voluntarily installed lifelines. Table IV-C1 shows more detail for these estimates.

**Table IV-C1: Required and Additional Lifelines, Feet Per Mine**

(1) Mine Size	(2) Total Required Lifelines, Feet Per Mine <sup>1</sup>	(3) Additional Required Lifelines, Feet Per Mine <sup>2</sup>	(4) Ratio of Additional Required to Total Required <sup>3</sup>
1-19	8,631	7,034	81%
20-500	24,170	19,951	83%
501+	57,731	49,410	86%
All Mines	18,785	15,494	82%

<sup>1</sup>All required lifelines under ETS and final rule, including lifelines already installed.

<sup>2</sup>Excludes lifelines already installed in mines prior to ETS, either voluntarily or in accordance with federal or state laws and regulations.

<sup>3</sup>(Column 3) / (Column 2).

<sup>28</sup> Escapeway footage estimates are based on a 1999 survey of maximum penetration depth for mines and are an inflated estimate of lifeline lengths, since most working sections are not at the maximum penetration depth.

The costs of material for lifelines are estimated at \$180 for 1,000 feet. This includes the cost of directional cones, reflective material, and hangers, for an average materials cost of \$2,789 per mine. The first-year installation time is assumed to be 5 minutes per 150 feet (or one hour per 1,800 feet) at the miner’s wage rate, for a total time cost of \$229 per mine. MSHA assumes annual maintenance cost of 10% of material cost plus 10% of original labor cost. These estimated costs per mine for lifeline provisions in the final rule (also included in ETS) are shown in Table IV-C2.

**Table IV-C2: Lifeline Costs Per Mine Due to ETS/Final Rule**

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mine Size	Additional Lifeline Feet <sup>1</sup>	ETS First Year Materials Cost <sup>2</sup>	ETS First Year Labor Cost <sup>3</sup>	Annual Maintenance Materials Cost <sup>4</sup>	Annual Maintenance Labor Cost <sup>5</sup>	ETS First Year Cost <sup>6</sup>	Annual Cost <sup>7</sup>
1-19	7,034	\$1,266	\$104	\$127	\$10	\$1,370	\$137
20-500	19,951	\$3,591	\$294	\$359	\$29	\$3,885	\$389
501+	49,410	\$8,894	\$729	\$889	\$73	\$9,623	\$962
All Mines	15,494	\$2,789	\$229	\$279	\$23	\$3,017	\$302

<sup>1</sup>From Table IV-C1, Column 3.

<sup>2</sup>(Column 2) x (\$0.18 per foot lifeline material, including directional cones, reflective material, and hangers).

<sup>3</sup>(Column 2) x (1 hour / 1800 feet) x (\$26.55/hour).

<sup>4</sup>(Column 3) x (10%).

<sup>5</sup>(Column 4) x (10%).

<sup>6</sup>(Columns 3 + 4).

<sup>7</sup>(Columns 5 + 6).

The costs per mine in Table IV-C2 are multiplied by the number of mines to obtain the total costs for all underground mines to comply with lifeline provisions of the final rule that were included in the ETS. Also included are the initial costs for new mines. The total yearly cost for those lifeline requirements that are unchanged from the ETS is estimated as \$513,039 and shown in Table IV-C3.

**Table IV-C3: Total Costs for All Underground Coal Mines for Lifeline Requirements That Were Included in the ETS**

(1)	Costs Per Mine		(4)	Costs for Industry			
	(2)	(3)		(5)	(6)	(7)	(8)
Mine Size	ETS First Year Cost <sup>1</sup>	Annual Cost <sup>2</sup>	Number of Mines <sup>3</sup>	Total First Year Cost <sup>4</sup>	Annual Cost <sup>5</sup>	Costs for New Mines <sup>6</sup>	Total Yearly Cost <sup>7</sup>
1-19	\$1,370	\$137	237	\$324,667	\$32,467	\$64,933	\$115,879
20-500	\$3,885	\$389	389	\$1,511,430	\$151,143	\$136,029	\$384,073
501+	\$9,623	\$962	8	\$76,982	\$7,698	\$0	\$13,087
All Mines	\$3,017	\$302	634	\$1,913,079	\$191,308	\$200,962	\$513,039

<sup>1</sup>From Table IV-C2, Column 7.

<sup>2</sup>From Table IV-C2, Column 8.

<sup>3</sup>From Table II-1.

<sup>4</sup>(Column 2) x (Column 4).

<sup>5</sup>(Column 3) x (Column 4).

<sup>6</sup>The number of new mines each year is assumed to be a percentage of existing mines in each mine size category. These percentages are 20%, 9%, and 0%, for mines with 1-19 employees, 20-500 employees, and 501+ employees, respectively. These percentages are multiplied by Column 5.

<sup>7</sup>(Column 5) x 0.07 + (Column 6) + (Column 7) / 1.07. Column 5 is multiplied by the 7% annualization factor so as to annualize the initial costs. Column 7 is divided by 1.07 to discount the future annual cost of lifelines in new mines, because the new mines appear only in the second and subsequent years.

### **New Requirement for Flame-Resistant Lifelines**

Section 75.380(d)(7)(ii) and § 75.381(c)(5)(ii) of the final rule require that lifelines be flame-resistant. If existing lifelines are not already flame-resistant, then they must be flame-resistant upon replacement, but no later than June 15, 2009. These final rule requirements are consistent with the MINER Act.

The installation of flame-resistant lifelines is generally accepted industry practice. MSHA expects that only a small fraction of small mines may have installed lifelines that do not meet this requirement. These would be mine operators that may have constructed lifelines on their own, rather than purchasing from major vendors. MSHA estimates that 5% of mines with 1-19 employees, 3% of mines with 20-49 employees, and 1% of mines with 50-99 employees may have installed lifelines with material that is not flame-resistant. Using these estimates, approximately 1.7% of all underground lifeline material must be replaced.

Material costs to replace lifelines are estimated at \$180 for 1,000 feet. The time needed to remove existing lifelines and install replacements is assumed to be 5 minutes per 300 feet (or one hour per 3,600 feet) at the miner's wage rate. Because it is not necessary to reinstall the hangers when installing replacement lifelines, replacing the

lifelines is expected to take half as much labor time per foot of lifeline as would an initial installation. Table IV-C4 presents the total yearly costs to install flame-resistant lifelines.

**Table IV-C4: Yearly Costs for Underground Coal Mines to Install Flame-Resistant Lifelines**

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mine Size	Mines That Must Reinstall Lifelines <sup>1</sup>	Lifeline Feet That Must Be Reinstalled <sup>2</sup>	First Year Materials Cost <sup>3</sup>	First Year Labor Cost <sup>4</sup>	Total First Year Cost <sup>5</sup>	Total Yearly Cost <sup>6</sup>
1-19	11.9	102,277	\$18,410	\$754	\$15,644	\$1,095
20-500	7.8	96,408	\$17,354	\$711	\$14,746	\$1,032
501+	0.0	0	\$0	\$0	\$0	\$0
All Mines	19.7	198,686	\$35,763	\$2,931	\$30,390	\$2,127

<sup>1</sup>MSHA estimates that 5% of mines with 1-19 employees, 3% of mines with 20-49 employees, and 1% of mines with 50-99 employees must reinstall lifelines. For mines with 1-19 employees, this is  $237 \times 5\% = 11.9$  mines. For mines with 20-500 employees, this is  $235 \times 3\% + 75 \times 1\% = 7.8$  mines.

<sup>2</sup>For mines with 1-19 employees, this is  $237 \times (8,631 \text{ feet}) \times 5\% = 102,277$  feet. For mines with 20-500 employees, this is  $235 \times (8,960 \text{ feet}) \times 3\% + 75 \times (44,322 \text{ feet}) \times 1\% = 96,408$  feet.

<sup>3</sup>(Column 3) x (\$0.18 per foot lifeline material, including directional cones, reflective material, and hangers).

<sup>4</sup>(Column 3) x (0.5 hour / 1800 feet) x (\$26.55/hour).

<sup>5</sup>(Columns 4 + 5) /  $(1.07)^3$ . The sum is divided by  $(1.07)^3$  to discount by three years, because the requirement does not take effect until three years after passage of the MINER Act.

### **New Requirement That Directional Cones Point Inby**

Section 75.380(d)(7)(v) and § 75.381(c)(5)(v) of the final rule require that the tapered section of the directional cones be pointed inby. The ETS required that all lifelines be equipped with directional indicators. The final rule additionally requires that “When cones are used as directional indicators, they shall be installed so that the tapered section points inby.” The final rule is consistent with standard industry practice. The National Institute of Safety and Health (NIOSH) also recommends this as a safe practice.

MSHA believes that only a small fraction of small mines may have installed lifelines with directional cones that point outby rather than inby. MSHA estimates that 5% of mines with 1-19 employees, 3% of mines with 20-49 employees, and 1% of mines with 50-99 employees may have installed lifelines with the directional cones facing

outby. Using these estimates, directional cones on approximately 1.7% of all underground lifelines must be reversed.

MSHA estimates no material cost to reverse the direction of cones. The installation time to reverse the direction of the cones is assumed to be 5 minutes per 300 feet (or one hour per 3,600 feet) at the miner’s wage rate. Table IV-C5 presents costs to reverse the direction of cones.

**Table IV-C5: Yearly Costs for Underground Coal Mines to Reverse Direction of Cones**

(1)	(2)	(3)	(4)	(5)
Mine Size	Mines That Must Reverse Cone Direction <sup>1</sup>	Lifeline Feet That Must Be Reversed <sup>2</sup>	First Year Labor Cost <sup>3</sup>	Yearly Cost <sup>4</sup>
1-19	11.9	102,277	\$754	\$53
20-500	7.8	96,408	\$711	\$50
501+	0.0	0	\$0	\$0
All Mines	19.7	198,686	\$2,931	\$103

<sup>1</sup>MSHA estimates that 5% of mines with 1-19 employees, 3% of mines with 20-49 employees, and 1% of mines with 50-99 employees must reverse the cone direction on lifelines. For mines with 1-19 employees, this is 237x5%=11.9 mines. For mines with 20-500 employees, this is 235x3% + 75x1% = 7.8 mines.

<sup>2</sup>For mines with 1-19 employees, this is 237x(8,631 feet)x5%=102,277 feet. For mines with 20-500 employees, this is 235x(8,960 feet)x3% + 75x(44,322 feet)x1% = 96,408 feet.

<sup>3</sup>(Column 3) x (0.5 hour / 1800 feet) x (\$26.55/hour).

<sup>4</sup>(Column 4) x 0.07. Column 4 is multiplied by the 7% annualization factor so as to annualize the initial costs.

### Summary of Yearly Lifeline Costs

The total yearly cost for lifeline requirements in the final rule is estimated to be \$515,268. Table IV-C6 summarizes the lifeline costs of the final rule according to whether they are first-year costs for existing mines, annual costs for all mines, or initial costs for new mines (which recur each year for a new set of new mines). MSHA anticipates that mine operators will have already expended some of these costs to achieve compliance with the ETS. Table IV-C7 summarizes net yearly costs after deducting costs associated with the ETS.



**Table IV-C6: Yearly Costs for Underground Coal Mines to Comply With Lifeline Requirements of the Final Rule**

(1)	(2)	(3)	(4)	(5)
Mine Size	First Year Cost for Existing Mines <sup>1</sup>	Annual Cost <sup>2</sup>	Costs for New Mines <sup>3</sup>	Total Yearly Cost <sup>4</sup>
1-19	\$341,065	\$32,467	\$64,933	\$117,027
20-500	\$1,526,887	\$151,143	\$136,029	\$385,155
501+	\$76,982	\$7,698	\$0	\$13,087
All Mines	\$1,944,935	\$191,308	\$200,962	\$515,268

<sup>1</sup> (Table IV-C3, Column 5) + (Table IV-C4, Column 6) + (Table IV-C5, Column 4).

<sup>2</sup> (Table IV-C3, Column 6).

<sup>3</sup> (Table IV-C3, Column 7).

<sup>4</sup> (Columns 2) x 0.07 + (Column 3) + (Column 4) / 1.07. Column 2 is multiplied by the 7% annualization factor so as to annualize the initial costs. Column 4 is divided by 1.07 to discount the future annual cost of lifelines in new mines, because the new mines appear only in the second and subsequent years.

**Table IV-C7: Yearly Costs to Comply with Lifeline Requirements of Final Rule: Those Associated with ETS vs. Future Yearly Costs**

(1)	(2)	(3)	(4)
Mine Size	Portion of Final Rule Yearly Costs Associated with ETS <sup>1</sup>	Future Yearly Costs of Final Rule <sup>2</sup>	Total Yearly Costs of Final Rule <sup>3</sup>
1-19	\$22,727	\$94,300	\$117,027
20-500	\$105,800	\$279,355	\$385,155
501+	\$5,389	\$7,698	\$13,087
All Mines	\$133,916	\$381,353	\$515,268

<sup>1</sup>(Table IV-C3, Column 5) x 0.07.

<sup>2</sup>(Table IV-C3, Column 6) + (Table IV-C3, Column 7) / 1.07 + (Table IV-C4, Column 7) + (Table IV-C5, Column 5).

<sup>3</sup>(Columns 2 + 3)

## Compliance Costs for Section IV-D

### Discussion of Comments on SCSR Costs Derived for the ETS

One commenter stated that to “...provide each Kentucky underground coal miner with one additional SCSR would cost \$8.35 million. And, yet MSHA states that ‘\$10.5 million will be associated with additional SCSR devices.’ Kentucky alone will account for this amount for only one additional SCSR device per underground coal miner.”

Another commenter stated “Based on the figures quoted by MSHA, the ETS applies to 33,490 miners and 3,697 contractors who work underground at coal mines. Using these employment figures which total 37,187 underground workers requiring purchase of 2.5 SCSRs per worker at a price of \$650 per SCSR, a total of \$60,428,875 would be the initial expenditure. This figure is \$6,000,000 higher than the total initial cost estimated by MSHA, which also includes lifeline costs and costs associated with training requirements.”

These commenters assumed that every miner employed at an underground coal mine will need to have an additional SCSR to be used only by that miner. However, the ETS required only that an additional SCSR be available, at certain intervals, to miners in an underground coal mine during any particular shift. In the REA for the ETS, MSHA assumed that miners on the second or third shifts could use SCSRs available to miners on the first shift. This assumption applies to underground coal mines that run two or three shifts. The number of SCSRs required by the final rule, like the ETS, is based on intervals and the number of persons in the mine on any particular shift, not the number of miners employed at the mine.

Further, it is inappropriate to compare MSHA’s estimated \$10.5 million “yearly” costs to \$8.35 million initial costs for Kentucky. MSHA’s \$10.5 million costs include initial or first-year costs that have an equivalent annualized value of \$5.9 million plus \$4.6 million annual costs. MSHA’s estimate of initial costs, prior to annualization, is approximately \$41.6 million. If the commenter wants to compare Kentucky’s cost to purchase additional SCSRs to MSHA’s estimate for the entire country for the ETS, then the commenter’s \$8.35 million cost estimate for Kentucky should be compared to MSHA’s \$41.6 million initial cost estimate.

In addition, the commenter’s \$8.35 million was based on an average cost per SCSR of \$815. The average cost per SCSR used in the REA was \$582. MSHA has updated this average cost in the final rule to \$665, which comports with Agency information.

Another commenter stated: “The cost estimate listed in the Federal Register suggests that the total SCSR costs for all underground mines would reach \$10.5 million. After reviewing the Compliance Guides and applying that information we have determined that the cost of implementing at San Juan Coal Company will exceed \$1.2 million just for additional SCSR devices and just for this one underground mine.”

Again this commenter was comparing \$1.2 million of first-year costs with \$10.5 million of “yearly” costs. The commenter noted the SCSR costs in the Federal

Register of \$10.5 million. The Federal Register, stated that the \$10.5 million was a “yearly” cost (71 FR 12266). It would be more appropriate to compare the commenter’s first-year costs with MSHA’s first-year SCSR costs, that is, \$1.2 million to \$41.6 million, not \$10.5 million. In addition, the commenter stated that the costs for SCSRs for San Juan Coal Company alone will exceed \$1.2 million. The commenter provided no detailed information as to how the \$1.2 million was computed. The Agency does not have enough information to question the figure. However, the underground coal mine named San Juan South reported 272 employees in 2004. For these employees, a \$1.2 million cost for SCSRs would yield an average cost of \$4,412 ( $\$1,200,000 / 272$ ), an unrealistically high average cost for an SCSR. Further, this cost assumed that each miner employed by the mine would need an additional SCSR.<sup>29</sup>

MSHA did underestimate the number of SCSRs required by the ETS by failing to account for those mines that have hot-seat practices. In addition, the Agency has also increased the cost of an SCSR device. As discussed below, the Agency has revised costs to take account of these factors.

#### **Final § 75.1714-4: Additional Self-Contained Self-Rescuers**

Currently, underground coal miners are required to have one SCSR device under § 75.1714-1. Section 75.1714-4(a)(1) requires that, in addition to the SCSR device required under § 75.1714-1, each miner and visitor authorized by the mine operator have at least one additional SCSR device at all times in the mine. For this part of the cost analysis, the term “miners” refers to both miners and visitors authorized by the mine operator to enter the mine.

In order to determine how many additional SCSRs are needed to assure that all miners working on any shift will have at least two SCSRs, the peak number of miners working on a shift during the year must be estimated. MSHA has data on the average number of miners per shift, which are based on quarterly data. Since the average number of miners working on a shift will be below the peak due to production variations throughout the year and differences in the number of miners working on a production or maintenance shift, the estimated average number of miners on a shift has been adjusted upward to account for seasonal and shift variations. Visitors are assumed to be scheduled to visit the mine during non-peak production shifts. To estimate peak shift size, the average shift size was increased by 3 percent to account for seasonal variations (which are small in underground coal mines) and by another 12 percent to account for shift variations during the day (for mines with more than one shift).

Some mine operators conduct “hot-seat” practices in their mines. Hot-seat practices occur when one shift enters the mine while the prior shift is still working. When the replacement crew gets to the working section, they switch places with the prior crew, which then begins to exit the mine. A mine that engages in this work practice can have two crews in the mine at the same time. The REA for the ETS did not incorporate

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<sup>29</sup> Three other commenters stated the following: (1) “...that the company alone will spend at least \$236,250 for SCSRs to comply with the ETS,” (2) “...we estimate our two mining companies combined will spend at least \$412,950 for SCSRs to comply with the ETS,” and (3) “...we estimate that this company alone will spend at least \$176,700 for SCSRs to comply with the ETS.” The commenters did not provide the MSHA mine ID, nor any details of how their total figures were derived.

this practice. The cost analysis for the final rule addresses this practice by doubling the number of miners in the mine on a peak shift.

In the REA for the ETS, the Agency used \$582 as the average price of an SCSR. Since that time the Agency has contacted SCSR manufacturers and is updating the average price of an SCSR to \$665. This cost analysis, like the REA for the ETS, reflects an SCSR ten-year service life. Therefore, an annualization factor of 0.142 is used in calculating the annualized cost of SCSRs.

Row 7 of Table IV-D1 shows, by mine size, the peak number of miners per shift, after seasonal and shift adjustments have been made, for mines that do not engage in hot-seat practices.<sup>30</sup> As noted earlier, MSHA assumes that the number of miners on the peak shift doubles in those mines with hot-seat practices. Row 9 of Table IV-D1 shows, by mine size, the peak number of miners per shift for mines that do engage in this practice.

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<sup>30</sup> For purposes of estimating the cost of SCSR requirements in the final rule, the mine size category of 20-500 employees was separated into: 20-49 employees; 50-99 employees; and 100-500 employees. These distinctions were needed to account for differences in the number of shifts and other factors relevant to estimating SCSR costs arising from the final rule.

**Table IV-D1: Peak Number of Miners  
per Shift per Mine that Needs Additional SCSRs**

<b>Row No.</b>	<b>Underground Coal</b>	<b>1-19</b>	<b>20-49</b>	<b>50-99</b>	<b>100-500</b>	<b>501+</b>
1	No. of Miners <sup>a</sup>	2,343	7,267	4,818	18,072	4,687
2	No. of Mines	237	235	75	79	8
3	Avg. No. of Miners per Mine	10	31	64	229	586
4	Avg. No. of Shift per Mine	1	1	2	3	3
5	Avg. No. of Miners per Shift	10	31	32	76	195
6	Adj. Factor for Seasonal and Shift Variations	1.03	1.03	1.15	1.15	1.15
7	Peak No. of Miners per Shift for Mines w/o Hot-Seat Practices <sup>b</sup>	11	32	37	88	225
8	Adj. Factor for Mines that Practice Hot-Seat Practices	0%	0%	100%	100%	100%
9	Peak No. of Miners per Shift for Mines with Hot-Seat Practices <sup>c</sup>	11	32	74	176	450

<sup>a</sup> No. of miners includes contractors who work in underground mines.

<sup>b</sup> Row 7 = Row 5 (x) Row 6.

<sup>c</sup> Row 9 =(Row 7 x Row 8) + Row 7.

Since the number of miners in the mine on a peak shift is assumed to double if the mine operator engages in hot-seat practices, for cost purposes it is important to identify how many mines in each size engage in this practice. MSHA assumes that mines with 1-19 employees and mines with 20-49 employees do not engage in this practice. For mines with 50-99 and 100-500 employees, approximately 50 percent are assumed to engage in this practice. For mines with 501+ employees, 25 percent are assumed to engage in this practice. The numbers of mines are reflected in Table IV-D2.

**Table IV-D2: Mines with Hot-Seat Practices and Mines without Hot-Seat Practices**

<b>Detail</b>	<b>1-19</b>	<b>20-49</b>	<b>50-99</b>	<b>100-500</b>	<b>501+</b>
No. of Mines	237	235	75	79	8
Percent of Mines with Hot-Seat Practices	0%	0%	50%	50%	25%
No. of Mines with Hot-Seat Practices	0	0	38	40	2
No. of Mines without Hot-Seat Practices	237	235	37	39	6

Costs of SCSRs Stored on Mantrips

*Mines without Hot-Seat Practices*

Paragraph (b) of § 75.1714-4 requires that if a mantrip or mobile equipment is used to enter or exit the mine, at least one additional SCSR, which provides protection for a period of one hour or longer, shall be available for each person who uses such transportation from portal to portal. The additional SCSRs will be stored in a storage box on the mantrip or other mobile equipment that transports miners in and out of the mine.<sup>31</sup> In this REA, the term “mantrips” will encompass mantrips and other mobile equipment that bring miners in and out of a mine. MSHA assumes that for mines with more than one shift per day that do not engage in hot-seat practices, the crew on one shift will not enter the mine until the crew from the other shift has exited. Thus, the same mantrip would be used for all crews. In order to determine how many additional SCSRs are needed, the peak number of miners on a shift was used, after adjusting for seasonal and shift variations. Table IV-D3 shows, by mine size, the first-year and annualized costs of SCSRs for mantrips in mines that do not engage in hot-seat practices.

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<sup>31</sup> MSHA assumes that no stored SCSRs will be needed at the working section as long as the mantrip stays at the working section. If the mantrip leaves the working section before the shift is over, MSHA assumes that the box on the mantrip containing the stored SCSRs will be taken off the mantrip and kept at the working section, while a smaller box, with an appropriate number of SCSRs, will be placed on the mantrip.

**Table IV-D3: First-Year and Annualized Costs of SCSRs on Mantrips  
(for Mines without Hot-Seat Practices)**

<b>Detail</b>	<b>1-19</b>	<b>20-49</b>	<b>50-99</b>	<b>100-500</b>	<b>501+</b>	<b>Total</b>
Peak No. of Miners per Shift <sup>a</sup>	11	32	37	88	225	
No. of Mantrips	1	1	1	1	1	
No. of Mines w/o Hot Seat Practices <sup>b</sup>	237	235	37	39	6	554
Total No. of SCSRs for Mantrips	2,607	7,520	1,369	3,432	1,350	16,278
Cost Per SCSR	\$665	\$665	\$665	\$665	\$665	
First-Yr. Costs for SCSRs Needed on Mantrips	\$1,733,655	\$5,000,800	\$910,385	\$2,282,280	\$897,750	\$10,824,870
Factor to Annualize First-Yr. Costs	0.1423	0.1423	0.1423	0.1423	0.1423	
First-Yr. Costs Annualized	\$246,699	\$711,614	\$129,548	\$324,768	\$127,750	\$1,540,379

<sup>a</sup> Source: Table IV-D1, Row 7.

<sup>b</sup> Source: Table IV-D2.

*Mines with Hot-Seat Practices*

Mines that engage in “hot-seat” practices will have two mantrips in the mine at the same time. The crew on one shift will enter the mine and replace the prior crew, which will begin to exit the mine. Table IV-D4 shows, by mine size, the first-year and annualized costs of SCSRs for mantrips in mines that engage in “hot-seat” practices.

**Table IV-D4: First-Year and Annualized Cost of SCSRs on Mantrips  
(for Mines with Hot-Seat Practices)**

<b>Detail</b>	<b>1-19</b>	<b>20-49</b>	<b>50-99</b>	<b>100-500</b>	<b>501+</b>	<b>Total</b>
Peak No. of Miners per Shift <sup>a</sup>	11	32	37	88	225	
No. of Mantrips	2	2	2	2	2	
No. of Mines with Hot-Seat Practices <sup>b</sup>	0	0	38	40	2	80
Total No. of SCSRs for Mantrips	0	0	2,812	7,040	900	10,752
Cost Per SCSR	\$665	\$665	\$665	\$665	\$665	
First-Yr. Costs for SCSRs Needed on Mantrips	\$0	\$0	\$1,869,980	\$4,681,600	\$598,500	\$7,150,080
Factor to Annualize First-Yr. Costs	0.1423	0.1423	0.1423	0.1423	0.1423	
First-Yr. Costs Annualized	\$0	\$0	\$266,098	\$666,192	\$85,167	\$1,017,456

<sup>a</sup> Source: Table IV-D1, Row 7.

<sup>b</sup> Source: Table IV-D2.

Costs of SCSRs in Escapeways

Paragraph (c) of § 75.1714-4 requires mine operators to provide additional SCSRs in storage locations spaced along each escapeway at 30 minute travel distances.<sup>32</sup> This is consistent with the MINER Act. Paragraph (c)(1) of § 75.1714-4 states that each storage location must contain at least one SCSR, which provides protection for a period of one hour or longer, for every person who will be in by that location.

*SCSR Costs in Escapeways in Mines that Take Less Than 1 Hour to Evacuate*

MSHA assumes that all of the 237 mines with 1-19 employees take less than 1 hour to evacuate the mine. Of the 235 mines with 20-49 employees, 202 mines are assumed to take less than 1 hour to evacuate the mine. No mines in the 50-99, 100-500, and 501+ employee size categories are assumed to take less than 1 hour to evacuate the mine.

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<sup>32</sup> The final rule adds an alternative in § 75.1714-4(d) to allow mine operators to store SCSRs between adjacent escapeways in a hardened room. In this REA, MSHA has not estimated the cost of this alternative or how many mine operators would take advantage of it. The Agency expects that, on balance, hardened rooms would not usually be a less costly alternative. MSHA does believe that this alternative provides improved safety.



For mines that take less than 30 minutes to evacuate the mine, no storage locations for SCSRs are required by the final rule because stored SCSRs are required to be 30 minutes apart. For mines that take 30 minutes to less than 1 hour to evacuate the mine, a total of 2 storage locations for SCSRs for each mine will be needed in the escapeways (1 storage location in each escapeway).

*Mines without Hot-Seat Practices*

MSHA estimates that approximately half of the mines with 1-19 employees (118 mines) will take less than 30 minutes to evacuate, and the remaining half (119 mines) will take 30 minutes to less than 1 hour to evacuate. MSHA estimates that approximately half of the mines with 20-49 employees will take less than 30 minutes to evacuate, and the remaining half (101 mines) will take 30 minutes to less than 1 hour to evacuate.

The number of SCSRs needed at each storage location will be equal to the peak number of miners in the mine after adjustment for seasonal and shift variations. Table IV-D5 shows, by mine size, the first-year and annualized costs to purchase SCSRs for escapeways in mines that do not engage in hot-seat practices and take 30 minutes to less than 1 hour to evacuate the mine.

**Table IV-D5: First-Year and Annualized Costs for SCSRs Stored at Locations in the Primary & Alternate Escapeways in Mines that Take Miners 30 Minutes to Less Than 1 Hour to Evacuate the Mine (For Mines without Hot-Seat Practices)**

<b>Detail</b>	<b>1-19</b>	<b>20-49</b>	<b>50-99</b>	<b>100-500</b>	<b>501+</b>	<b>Total</b>
Mines w/o Hot-Seat Practices That Take 30 Minutes to Less Than 1 Hour to Escape	119	101	0	0	0	220
Storage Locations Needed in Primary & Alternate Escapeways (per Mine)	2	2	2	2	2	
No. of Storage Locations Needed in Escapeways in All Affected Mines	238	202	0	0	0	440
No. of SCSRs Needed in Each Storage Location <sup>a</sup>	11	32	37	88	225	
No. of SCSRs in Storage Locations in Escapeways in All Affected Mines	2,618	6,464	0	0	0	9,082
Avg. Cost per SCSR	\$665	\$665	\$665	\$665	\$665	
First-Yr. Costs for SCSRs	\$1,740,970	\$4,298,560	\$0	\$0	\$0	\$6,039,530
Factor to Annualize First Yr. Costs	0.1423	0.1423	0.1423	0.1423	0.1423	
First-Yr. Costs Annualized	\$247,740	\$611,685	\$0	\$0	\$0	\$859,425

<sup>a</sup> Source: Table IV-D1. The number of SCSRs needed at each location is assumed to be the same as the peak number of miners adjusted for seasonal and shift variations.

*Mines with Hot-Seat Practices*

MSHA estimates that mines with 1-19 employee and 20-49 employees that do not engage in hot-seat practices take less than 1 hour to evacuate.

*SCSR Costs in Escapeways for Mines that Take 1 Hour to Less Than 2 Hours to Evacuate*

The number of mines that take 1 hour to less than 2 hours to evacuate the mine is estimated to be: 33 mines with 20-49 employees; all 75 mines with 50-99 employees; and 18 mines with 100-500 employees.

Half of the mines that take 1 hour to less than 2 hours to evacuate the mine are assumed to take 1 hour to less than 1.5 hours to evacuate. MSHA estimates that each will need a total of 4 storage locations for SCSRs (2 storage locations in each escapeway).

The remaining half are assumed to take 1.5 hours to less than 2 hours to evacuate. Each of the remaining mines will need a total of 6 storage locations for SCSRs (3 storage locations in each escapeway). Thus, on average, a total of 5 storage locations for SCSRs ((4 storage locations + 6 storage locations) / 2) is needed in both escapeways for each mine where it takes 1 hour to less than 2 hours to evacuate.

*Mines without Hot-Seat Practices*

MSHA estimates that the following mines do not engage in hot-seat practices and take 1 hour to less than 2 hours to evacuate the mine: 33 mines with 20-49 employees; 38 mines with 50-99 employees; and 9 mines with 100-500 employees.

For mines that do not engage in hot-seat practices, the number of SCSRs needed at each storage location will be equal to the peak number of miners in the mine after adjustment for seasonal and shift variations. Table IV-D6 shows, by mine size, the first-year and annualized costs to purchase SCSRs for escapeways in mines that do not engage in hot-seat practices and take 1 hour to less than 2 hours to evacuate the mine.

**Table IV-D6: First-Year and Annualized Costs for SCSRs Stored at Locations along the Primary & Alternate Escapeways in Mines that Take Miners 1 Hour to Less Than 2 Hours to Evacuate the Mine (For Mines without Hot-Seat Practices)**

<b>Detail</b>	<b>1-19</b>	<b>20-49</b>	<b>50-99</b>	<b>100-500</b>	<b>501+</b>	<b>Total</b>
Mines w/o Hot-Seat Practices and Take 1 Hour to Less Than 2 Hours to Escape	0	33	38	9	0	80
Storage Locations Needed in Primary & Alternate Escapeways (per Mine)	5	5	5	5	5	
No. of Storage Locations Needed in Escapeways in All Affected Mines	0	165	190	45	0	400
No. of SCSRs Needed at Each Location <sup>a</sup>	11	32	37	88	225	
No. of SCSRs in Storage Locations in Escapeways in All Affected Mines	0	5,280	7,030	3,960	0	16,270
Avg. Cost per SCSR	\$665	\$665	\$665	\$665	\$665	
First Yr. Costs for SCSRs	\$0	\$3,511,200	\$4,674,950	\$2,633,400	\$0	\$10,819,550
Factor to Annualize First-Yr. Costs	0.1423	0.1423	0.1423	0.1423	0.1423	
First-Yr. Costs Annualized	\$0	\$499,644	\$665,245	\$374,733	\$0	\$1,539,622

<sup>a</sup> Source: Table IV-D1, Row 7.

*Mines with Hot-Seat Practices*

MSHA estimates that the following mines that take 1 hour to less than 2 hours to evacuate the mine and engage in hot-seat practices: 37 mines with 50-99 employees; and 9 mines with 100-500 employees.

For mines that engage in hot-seat practices, the number of SCSRs needed at each storage location will be double the peak number of miners in the mine after adjustment for seasonal and shift variations. Table IV-D7 shows, by mine size, the first-year and annualized costs to purchase SCSRs for escapeways in mines that engage in hot-seat practices and take 1 hour to less than 2 hours to evacuate the mine.

**Table IV-D7: First-Year and Annualized Costs for SCSRs Stored at Locations along the Primary & Alternate Escapeways in Mines that Take Miners 1 Hr. to Less Than 2 Hours to Evacuate the Mine (For Mines with Hot-Seat Practices)**

Detail	1-19	20-49	50-99	100-500	501+	Total
Mines with Hot-Seat Practices that Take 1 Hour to Less Than 2 Hours to Escape	0	0	37	9	0	46
Storage Locations Needed in Primary & Alternate Escapeways (per Mine)	5	5	5	5	5	
No. of Storage Locations Needed in Escapeways in All Affected Mines	0	0	185	45	0	230
No. of SCSRs Needed at Each Location <sup>a</sup>	11	32	74	176	450	
No. of SCSRs in Storage Locations in Escapeways in All Affected Mines	0	0	13,690	7,920	0	21,610
Avg. Cost per SCSR	\$665	\$665	\$665	\$665	\$665	
First-Yr. Costs for SCSRs	\$0	\$0	\$9,103,850	\$5,266,800	\$0	\$14,370,650
Factor to Annualize First-Yr. Costs	0.1423	0.1423	0.1423	0.1423	0.1423	
First-Yr. Costs Annualized	\$0	\$0	\$1,295,478	\$749,466	\$0	\$2,044,943

<sup>a</sup> Source: Table IV-D1, Row 9.

*SCSR Costs in Escapeways in Mines that Take 2 Hours to Less Than 3 Hours to Evacuate*

No mine is assumed to take 3 hours or more to evacuate. MSHA estimates that the number of following mines take 2 hours to less than 3 hours to evacuate: 61 mines with 100-500 employees; and all 8 mines with 501+ employees.

Half of the mines that take at least 2 hours to evacuate the mine are assumed to take less than 2.5 hours to evacuate. MSHA estimates that each of these mines will need a total of 8 storage locations for SCSRs (4 storage locations in each escapeway). The remaining half of these mines are assumed to take 2.5 hours to less than 3 hours to evacuate. Each of these remaining mines will need a total of 10 storage locations for SCSRs in the escapeways (5 storage locations in each escapeway). Thus, on average, a total of 9 storage locations for SCSRs  $((8 \text{ storage locations} + 10 \text{ storage locations}) / 2)$  is needed in both escapeways for each mine where it takes at least 2 hours to evacuate.

#### *Mines without Hot-Seat Practices*

MSHA estimates that the following mines take at least 2 hours to evacuate the mine and do not engage in hot-seat practices: 31 mines with 100 – 500 employees; and 6 mines with 501+ employees.

For mines that do not engage in hot-seat practices, the number of SCSRs needed at each storage location will be equal to the peak number of miners in the mine after adjustment for seasonal and shift variations. Table IV-D8 shows, by mine size, the first-year and annualized costs to purchase SCSRs for escapeways in mines that do not engage in hot-seat practices and take at least 2 hours to evacuate the mine.

**Table IV-D8: First-Year and Annualized Costs for SCSRs Stored at Locations along the Primary & Alternate Escapeways in Mines that Take Miners at Least 2 Hours to Evacuate (For Mines without Hot-Seat Practices)**

<b>Detail</b>	<b>1-19</b>	<b>20-49</b>	<b>50-99</b>	<b>100-500</b>	<b>501+</b>	<b>Total</b>
Mines without Hot-Seat Practices that Take at Least 2 Hours to Escape	0	0	0	31	6	37
Storage Locations Needed in Primary & Alternate Escapeways (per Mine)	9	9	9	9	9	
No. of Storage Locations Needed in Escapeways in All Affected Mines	0	0	0	279	54	333
No. of SCSRs Needed at Each Location <sup>a</sup>	11	32	37	88	225	
No. of SCSRs in Storage Locations in Escapeways in All Affected Mines	0	0	0	24,552	12,150	36,702
Avg. Cost per SCSR	\$665	\$665	\$665	\$665	\$665	
First-Yr. Costs for SCSRs	\$0	\$0	\$0	\$16,327,080	\$8,079,750	\$24,406,830
Factor to Annualize First-Yr. Costs	0.1423	0.1423	0.1423	0.1423	0.1423	
First-Yr. Costs Annualized	\$0	\$0	\$0	\$2,323,343	\$1,149,748	\$3,473,092

<sup>a</sup> Source: Table IV-D1, Row 7.

*Mines with Hot-Seat Practices*

MSHA estimates that the following mines take at least 2 hours to evacuate the mine and engage in hot-seat practices: 30 mines with 100 – 500 employees; and 2 mines with 501+ employees.

For mines that engage in hot-seat practices, the number of SCSRs needed at each storage location will be double the peak number of miners in the mine after adjustment for seasonal and shift variations. Table IV-D9 shows, by mine size, the first-year and annualized costs to purchase SCSRs for escapeways in mines that engage in hot-seat practices and take at least 2 hours to evacuate the mine.

**Table IV-D9: First-Year and Annualized Costs for SCSRs Stored  
at Locations along the Primary & Alternate Escapeways in Mines  
that Take Miners at Least 2 Hours to Evacuate  
(For Mines with Hot-Seat Practices)**

<b>Detail</b>	<b>1-19</b>	<b>20-49</b>	<b>50-99</b>	<b>100-500</b>	<b>501+</b>	<b>Total</b>
Mines with Hot-Seat Practices that Take at Least 2 Hours to Escape	0	0	0	30	2	32
Storage Locations Needed in Primary & Alternate Escapeways (per Mine)	9	9	9	9	9	
No. of Storage Locations Needed in Escapeways in All Affected Mines	0	0	0	270	18	288
No. of SCSRs Needed at Each Location <sup>a</sup>	11	32	74	176	450	
No. of SCSRs in Storage Locations in Escapeways in All Affected Mines	0	0	0	47,520	8,100	55,620
Avg. Cost per SCSR	\$665	\$665	\$665	\$665	\$665	
First-Yr. Costs for SCSRs	\$0	\$0	\$0	\$31,600,800	\$5,386,500	\$36,987,300
Factor to Annualize First-Yr. Costs	0.1423	0.1423	0.1423	0.1423	0.1423	
First-Yr. Costs Annualized	\$0	\$0	\$0	\$4,496,794	\$766,499	\$5,263,293

<sup>a</sup> Source: Table IV-D1, Row 9.

SCSR Costs in Normal Travel Routes for Pumpers, Examiners, and Other Persons without a Fixed Work Location

Paragraph (a)(2) of § 75.1714-4 requires additional SCSRs along the normal travel routes for pumpers, examiners, and other persons who do not have a fixed work location to be stored at a distance an average miner could walk in 30 minutes.<sup>33</sup>

These travel routes are primarily bleeder systems but also could be other outby areas. When explaining these areas throughout this document, they will be noted as outby areas, to include bleeder systems. For purposes of this analysis, MSHA assumes that an outby area is approximately as long as an escapeway. Normally one or two miners travel an outby area; thus, it is assumed that 2 SCSRs are stored in each storage location in an outby area.

*SCSR Costs in Outby Areas that Take Less Than 1 Hour to Evacuate*

MSHA estimates that the following mines take less than 30 minutes to evacuate outby areas: 118 mines with 1-19 employees; and 101 mines with 20-49 employees. MSHA estimates that the following mines take 30 minutes to less than 1 hour to evacuate outby areas: 119 mines with 1-19 employees; and 101 mines with 20-49 employees. For those mines that take less than 30 minutes to evacuate outby areas, no storage locations for SCSRs are needed. However, 1 storage location is needed for each of the mines that take 30 minutes to less than 1 hour to evacuate outby areas.

Table IV-10 shows, by mine size, the first-year and annualized costs of SCSRs for outby areas in mines that take 30 minutes to less than 1 hour to evacuate.

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<sup>33</sup> The requirement that mine operators provide additional SCSRs along routes normally traveled by pumpers, examiners and other persons who do not have a fixed work location was not included in the ETS. Therefore, costs for this new requirement were not included in the REA for the ETS.



**Table IV-D10: First-Year & Annualized Costs for SCSRs Stored  
at Outby Areas that Take Miners  
30 Minutes to Less Than 1 Hour to Evacuate**

<b>Detail</b>	<b>1-19</b>	<b>20-49</b>	<b>50-99</b>	<b>100-500</b>	<b>501+</b>	<b>Total</b>
Mines that Take 30 Minutes to Less Than 1 Hour to Escape	119	101	0	0	0	220
Storage Locations Needed in Outby Areas (per Mine)	1	1	1	1	1	
No. of Storage Locations Needed in Outby Areas in All Affected Mines	119	101	0	0	0	220
No. of SCSRs Needed in Each Storage Location	2	2	2	2	2	
No. of SCSRs in Storage Locations in Outby Areas in All Affected Mines	238	202	0	0	0	440
Avg. Cost per SCSR	\$665	\$665	\$665	\$665	\$665	
First-Yr. Costs for SCSRs	\$158,270	\$134,330	\$0	\$0	\$0	\$292,600
Factor to Annualize First-Yr. Costs	0.1423	0.1423	0.1423	0.1423	0.1423	
First-Yr. Costs Annualized	\$22,522	\$19,115	\$0	\$0	\$0	\$41,637

*SCSR Costs in Outby Areas in Mines that Take 1 Hour to Less Than 2 Hours to Evacuate*

MSHA estimates that the following mines take 1 hour to less than 2 hours to evacuate outby areas: 33 mines with 20-49 employees; 75 mines with 50-99 employees; and 18 mines with 100-500 employees.

Half of the mines that take 1 hour to less than 2 hours to evacuate outby areas are assumed to take 1 hour to less than 1.5 hours to evacuate. Each of these mines will need 2 storage locations. The remaining half of these mines are assumed to take 1.5 hours to less than 2 hours to evacuate. Each of these remaining mines will need 3 storage locations. Thus, on average, 2.5 storage locations ((2 storage locations + 3 storage locations) / 2) are needed in outby areas for each mine where it takes 1 hour to less than 2 hours to evacuate.

Table IV-11 shows, by mine size, the first-year and annualized costs for SCSRs for outby areas in mines that take between one and two hours to evacuate.

**Table IV-D11: First-Year and Annualized Costs for SCSRs Stored  
at Outby Areas that Take Miners  
1 Hour to Less Than 2 Hours to Evacuate**

<b>Detail</b>	<b>1-19</b>	<b>20-49</b>	<b>50-99</b>	<b>100-500</b>	<b>501+</b>	<b>Total</b>
Mines that Take 1 Hour to Less Than 2 Hours to Escape	0	33	75	18	0	126
Storage Locations Needed in Outby Areas (per Mine)	2.5	2.5	2.5	2.5	2.5	
No. of Storage Locations Needed in Outby Areas in All Affected Mines	0	82.5	187.5	45	0	315.0
No. of SCSRs Needed at Each Location	2	2	2	2	2	
No. of SCSRs in Storage Locations in Outby Areas in All Affected Mines	0	165.0	375.0	90.0	0	630.0
Avg. Cost per SCSR	\$665	\$665	\$665	\$665	\$665	
First-Yr. Costs for SCSRs	\$0	\$109,725	\$249,375	\$59,850	\$0	\$418,950
Factor to Annualize First-Yr. Costs	0.1423	0.1423	0.1423	0.1423	0.1423	
First-Yr. Costs Annualized	\$0	\$15,614	\$35,486	\$8,517	\$0	\$59,617

*SCSR Costs for Mines for which Evacuation from Outby Area is Between 2 and 3 Hours*

MSHA assumes that it takes no more than 3 hours to evacuate outby areas of any mine. MSHA estimates that the following mines take between 2 to 3 hours to evacuate outby areas: 61 mines with 100-500 employees; and all 8 mines with 501+ employees.

MSHA estimates that for mines for which evacuation from outby areas takes at least two hours, approximately half would take less than 2.5 hours. They will need 4 storage locations for SCSRs. Evacuation time for the remaining half would be between 2.5 hours and 3 hours. These mines will need 5 storage locations for SCSRs. On average, a total of 4.5 storage locations for SCSRs ((4 storage locations + 5 storage locations) / 2) would be needed in outby areas for each mine where the evacuation time is at least 2 hours.

Table IV-12 shows, by mine size, the first-year and annualized costs of SCSRs for outby areas in mines for which evacuation from these areas takes at least 2 hours.

**Table IV-D12: First-Year and Annualized Costs for SCSRs Stored  
at Outby Areas that Take Miners  
at Least 2 Hours to Evacuate**

<b>Detail</b>	<b>1-19</b>	<b>20-49</b>	<b>50-99</b>	<b>100-500</b>	<b>501+</b>	<b>Total</b>
Mines That Take at Least 2 Hours to Escape	0	0	0	61	8	69
Storage Locations Needed in Outby Areas (per Mine)	4.5	4.5	4.5	4.5	4.5	
No. of Storage Locations Needed in Outby Areas in All Affected Mines	0	0	0	274.5	36.0	310.5
No. of SCSRs Needed at Each Location	2	2	2	2	2	
No. of SCSRs in Storage Locations in Outby Areas in All Affected Mines	0	0	0	549.0	72.0	621.0
Avg. Cost per SCSR	\$665	\$665	\$665	\$665	\$665	
First-Yr. Costs for SCSRs	\$0	\$0	\$0	\$365,085	\$47,880	\$412,965
Factor to Annualize First-Yr. Costs	0.1423	0.1423	0.1423	0.1423	0.1423	
First-Yr. Costs Annualized	\$0	\$0	\$0	\$51,952	\$6,813	\$58,765

Table IV-D13 shows the total number of SCSRs and the first-year and annualized costs for mine operators to purchase SCSRs that are stored on mantrips; in the primary and alternate escapeway; and in outby areas of the mine.

**Table IV-D13: First-Year and Annualized Costs  
to Purchase SCSRs**

Details	1-19	20-49	50-99	100-500	501+	Total
Number of SCSRs						
On Mantrips	2,607	7,520	4,181	10,472	2,250	27,030
In Escapeways	2,618	11,744	20,720	83,952	20,250	139,284
In Outby Areas	238	367	375	639	72	1,691
<b>Total</b>	<b>5,463</b>	<b>19,631</b>	<b>25,276</b>	<b>95,063</b>	<b>22,572</b>	<b>168,005</b>
First Year Costs to Purchase SCSRs						
On Mantrips	\$1,733,655	\$5,000,800	\$2,780,365	\$6,963,880	\$1,496,250	\$17,974,950
In Escapeways	\$1,740,970	\$7,809,760	\$13,778,800	\$55,828,080	\$13,466,250	\$92,623,860
In Outby Areas	\$158,270	\$244,055	\$249,375	\$424,935	\$47,880	\$1,124,515
<b>Total</b>	<b>\$3,632,895</b>	<b>\$13,054,615</b>	<b>\$16,808,540</b>	<b>\$63,216,895</b>	<b>\$15,010,380</b>	<b>\$111,723,325</b>
Annualized Costs to Purchase SCSRs						
On Mantrips	\$246,699	\$711,614	\$395,646	\$990,960	\$212,916	\$2,557,835
In Escapeways	\$247,740	\$1,111,329	\$1,960,723	\$7,944,336	\$1,916,247	\$13,180,375
In Outby Areas	\$22,522	\$34,729	\$35,486	\$60,468	\$6,813	\$160,018
<b>Total</b>	<b>\$516,961</b>	<b>\$1,857,672</b>	<b>\$2,391,855</b>	<b>\$8,995,764</b>	<b>\$2,135,977</b>	<b>\$15,898,229</b>

<sup>a</sup> Source: mantrip data from Tables IV-D3 and IV-D4; escapeway data from Tables IV-D5, IV-D6, IV-D7, IV-D8, and IV-D9; and outby area data from Tables IV-D10, IV-D11, and IV-D12.

Cost to Purchase Boxes for SCSRs on Mantrips

MSHA assumes that a large storage box can hold 12 SCSRs. Table IV-D14 shows, by mine size, the number of storage boxes that mine operators need to place on mantrips.

**Table IV-D14: No. of Storage Boxes on Mantrips**

Details	1-19	20-49	50-99	100-500	501+	Total
Mines without Hot-Seat Practices						
Peak No. of Miners per shift <sup>a</sup>	11	32	37	88	225	
No. of SCSRs That Fit into a Storage Box on a Mantrip	12	12	12	12	12	
No. of Storage Boxes Needed on Mantrips per shift	1	3	4	8	19	
No. of Mines <sup>b</sup>	237	235	37	39	6	
Sub-total for No. of Boxes Needed for Mines in Each Mine Size	237	705	148	312	114	1,516
Mines with Hot-Seat Practices						
Peak No. of Miners per shift <sup>c</sup>	11	32	74	176	450	
No. of SCSRs That Fit into a Storage Box on a Mantrip	12	12	12	12	12	
No. of Storage Boxes Needed on Mantrips per shift	1	3	7	15	38	
No. of Mines <sup>b</sup>	0	0	38	40	2	
Sub-total for No. of Boxes Needed for Mines in Each Mine Size	0	0	266	600	76	942
Total No. of Storage Boxes Needed on Mantrips	237	705	414	912	190	2,458

<sup>a</sup> Source: Table IV-D1, Row 7.

<sup>b</sup> Source: Table IV-D2.

<sup>c</sup> Source: Table IV-D1, Row 9.

MSHA assumes that if a mantrip leaves a working section for another area of the mine during the shift, the storage box will be taken off the mantrip and left on the working section. Some SCSRs may be taken out of the larger box and placed in a smaller two-SCSR box, which would be put on the mantrip. MSHA assumes that mantrips will leave approximately 50 percent of the Mechanized Mining Units (MMUs) sometime during the shift.<sup>34</sup> Based on new data, the number of MMUs has been revised from 931 MMUs in the ETS to 843 MMUs. Table IV-D15 shows, by mine size, the number of smaller storage boxes that mine operators need to place on mantrips that go to other areas of the mine during the shift.

<sup>34</sup> A Mechanized Mining Unit (MMU) means: (1) a unit of mining equipment including hand loading equipment used for the production of material; or (2) a specialized unit which utilizes mining equipment other than specified in §70.207(e) (Bimonthly sampling; mechanized mining units).

**Table IV-D15: No. of Smaller Storage Boxes on Mantrips**

Mine Size	No. of MMUs	No. of Mantrips With Smaller Boxes <sup>a</sup>	No. of Smaller Boxes per Mantrip	No. of Smaller Boxes on Mantrips
1-19	237	118.5	1	118.5
20-49	235	117.5	1	117.5
50-99	126	63	1	63
100-500	212	106	1	106
501+	33	16.5	1	16.5
Total	843	421.5		421.5

<sup>a</sup> The number of mantrips equals the number of MMUs. MSHA estimates that about 50 percent of mantrips will need an additional smaller box when the mantrip is moved to another area during the shift.

MSHA estimates that the cost of a large storage box is \$900 and the cost of a small storage box, which can hold two SCSRs, is \$100. All storage boxes are assumed to last for 10 years. Table IV-D16 shows, by mine size, the first-year and annualized costs for storage boxes on mantrips.

**Table IV-D16: First-Year and Annualized Costs for Storage Boxes on Mantrips**

Mine Size	No. of Large Storage Boxes on Mantrips <sup>a</sup>	No. of Small Storage Boxes on Mantrips <sup>b</sup>	Cost per Large Box for Mantrip	Cost of Small Box for Mantrip	First-Year Costs	Annualized Costs <sup>c</sup>
1-19	237	118.5	\$900	\$100	\$225,150	\$32,039
20-49	705	117.5	\$900	\$100	\$646,250	\$91,961
50-99	414	63.0	\$900	\$100	\$378,900	\$53,917
100-500	912	106.0	\$900	\$100	\$831,400	\$118,308
501+	190	16.5	\$900	\$100	\$172,650	\$24,568
Total	2,458	421.5			\$2,254,350	\$320,794

<sup>a</sup> Source: Table IV-D14.

<sup>b</sup> Source: Table IV-D15.

<sup>c</sup> Annualized costs = first year costs x 0.1423, where 0.1423 is the annualization factor.

Cost to Purchase Storage Boxes for SCSRs at Storage Locations in Escapeways

MSHA estimates that medium storage boxes will be used to store SCSRs in escapeways and that a medium storage box will hold 6 SCSRs. Medium storage boxes cost approximately \$450. The storage boxes are assumed to have a life of 10 years. Table IV-D17 shows, by mine size, the number of storage boxes for storage locations in

escapeways. Table IV-D18 shows, by mine size, the first-year and annualized costs for storage boxes in escapeways.

**Table IV-D17: Number of Storage Boxes in Escapeways**

Details	1-19	20-49	50-99	100-500	501+	Total
Mines without Hot-Seat Practices						
Peak No. of Miners per shift <sup>a</sup>	11	32	37	88	225	
No. of SCSRs That Fit into a Storage Box at Storage Location	6	6	6	6	6	
No. of Storage Boxes Needed per Storage Location	2	6	7	15	38	
No. of Locations Needed in Escapeways <sup>b</sup>	238	367	190	324	54	
Sub-total for No. of Boxes Needed for Mines in Each Mine Size	476	2,202	1,330	4,860	2,052	10,920
Mines with Hot-Seat Practices						
Peak No. of Miners per shift <sup>c</sup>	11	32	74	176	450	
No. of SCSRs That Fit into a Storage Box at Storage Location	6	6	6	6	6	
No. of Storage Boxes Needed per Storage Location	2	6	13	30	75	
No. of Locations Needed in Escapeways <sup>d</sup>	0	0	185	315	18	
Sub-total for No. of Boxes Needed for Mines in Each Mine Size	0	0	2,405	9,450	1,350	13,205
Total No. of Storage Boxes Needed on Mantrips	476	2,202	3,735	14,310	3,402	24,125

<sup>a</sup> Source: Table IV-D1, Row 7.

<sup>b</sup> Source: Source: 238 for 1-19 size from Table IV-D5; 367 for 20-49 size = 202 from Table IV-D5 + 165 from Table IV-D6; 190 for 50-99 size from Table IV-D6; 324 for 100-500 size = 45 from Table IV-D6 + 279 from Table IV-D8; and 54 for 501+ size from Table IV-D8.

<sup>c</sup> Source: Table IV-D1, Row 9.

<sup>d</sup> Source: 185 for 50-99 size from Table IV-D7; 315 for 100-500 size = 45 from Table IV-D7 + 270 from Table IV-D9; and 18 for 501+ size from Table IV-D9.

**Table IV-D18: First-Year and Annualized Costs  
for Storage Boxes in Escapeways**

Mine Size	No. of Storage Boxes at Storage Locations in Escapeways <sup>a</sup>	Cost per Box	First-Year Costs	Annualized Costs <sup>b</sup>
1-19	476	\$450	\$214,200	\$30,481
20-49	2,202	\$450	\$990,900	\$141,005
50-99	3,735	\$450	\$1,680,750	\$239,171
100-500	14,310	\$450	\$6,439,500	\$916,341
501+	3,402	\$450	\$1,530,900	\$217,847
<b>Total</b>	<b>24,125</b>		<b>\$10,856,250</b>	<b>\$1,544,844</b>

<sup>a</sup> Source: Table IV-D17.

<sup>b</sup> Annualized costs = first year costs x 0.1423, where 0.1423 is the annualization factor.

Cost to Purchase Storage Boxes for SCSRs in Outby Areas

As noted earlier, MSHA did not include costs for SCSR storage in outby areas in the ETS. The final rule requires mine operators to provide additional SCSRs along routes normally traveled by pumpers, examiners, and other persons who do not have a fixed work location. MSHA estimates the following cost for storage boxes for SCSRs in these outby locations.

For storage locations in outby areas, MSHA estimates that a small storage box, costing on average \$100, will be used. The storage boxes are assumed to have a life of 10 years. MSHA assumes that each storage box will contain two SCSRs. Table IV-D19 shows, by mine size, the number of storage boxes and the first-year and annualized costs for storage boxes in outby areas of the mine.



**Table IV-D19: First-Year and Annualized Costs  
for Storage Boxes in Outby Areas**

Mine Size	No. of Storage Boxes at Storage Locations in Outby Areas <sup>a</sup>	Cost per Box	First-Year Costs	Annualized Costs <sup>b</sup>
1-19	119.0	\$100	\$11,900	\$1,693
20-49	183.5	\$100	\$18,350	\$2,611
50-99	187.5	\$100	\$18,750	\$2,668
100-500	319.5	\$100	\$31,950	\$4,546
501+	36.0	\$100	\$3,600	\$512
Total	845.5		\$84,550	\$12,031

<sup>a</sup> Source: Table IV-D10; IV-D11; and IV-D12.

<sup>b</sup> Annualized costs = first year costs x 0.1423, where 0.1423 is the annualization factor.

Summary Costs for All Storage Boxes

Table IV-D20 summarizes, by mine size, the first-year and annualized costs for storage boxes: on mantrips; in the primary and alternate escapeway; and in outby areas. Table IV-D20 also shows, by mine size, the number of storage boxes needed in these locations.

**Table IV-D20: Summary of First-Year and Annualized Costs  
for Storage Boxes on Mantrips; in Escapeways;  
and Outby Locations <sup>a</sup>**

Details	1-19	20-49	50-99	100-500	501+	Total
Number of Storage Boxes						
On Mantrips	355.5	822.5	477.0	1,018.0	206.5	2,879.5
In Escapeways	476	2,202	3,735	14,310	3,402	24,125
In Outby Areas	119.0	183.5	187.5	319.5	36.0	845.5
<b>Total</b>	<b>951</b>	<b>3,208</b>	<b>4,400</b>	<b>15,648</b>	<b>3,645</b>	<b>27,850.0</b>
First Year Costs to Purchase Storage Boxes						
On Mantrips	\$225,150	\$646,250	\$378,900	\$831,400	\$172,650	\$2,254,350
In Escapeways	\$214,200	\$990,900	\$1,680,750	\$6,439,500	\$1,530,900	\$10,856,250
In Outby Areas	\$11,900	\$18,350	\$18,750	\$31,950	\$3,600	\$84,550
<b>Total</b>	<b>\$451,250</b>	<b>\$1,655,500</b>	<b>\$2,078,400</b>	<b>\$7,302,850</b>	<b>\$1,707,150</b>	<b>\$13,195,150</b>
Annualized Costs to Purchase Storage Boxes						
On Mantrips	\$32,039	\$91,961	\$53,917	\$118,308	\$24,568	\$320,794
In Escapeways	\$30,481	\$141,005	\$239,171	\$916,341	\$217,847	\$1,544,844
In Outby Areas	\$1,693	\$2,611	\$2,668	\$4,546	\$512	\$12,031
<b>Total</b>	<b>\$64,213</b>	<b>\$235,578</b>	<b>\$295,756</b>	<b>\$1,039,196</b>	<b>\$242,927</b>	<b>\$1,877,670</b>

<sup>a</sup> Source: mantrip data from Table IV-D16, escapeway data from Table IV-D18, and outby area data from Table IV-D19.

### Cost to Retrofit Mantrips

For mines that do not engage in hot-seat practices, MSHA assumes that, on average, there is one mantrip for each MMU. For mines that engage in hot-seat practices, the Agency assumes that, on average, there are two mantrips per MMU. A second mantrip brings the next crew into the mine to change out with the prior crew. Not all mantrips in the mines will be able to carry large SCSR storage boxes. Therefore, some mantrips must be retrofitted. MSHA assumes that 50 percent of all mantrips in mines will need to be retrofitted to hold larger storage boxes. Retrofit costs (including labor) are estimated to be \$500 per mantrip. The retrofit is assumed to last for 10 years. Table IV-D21 shows, by mine size, the number of mantrips needing retrofit. Table IV-D22 shows, by mine size, the first-year and annualized costs to retrofit mantrips.

**Table IV-D21: No. of MMUs to Retrofit**

<b>Details</b>	<b>1-19</b>	<b>20-49</b>	<b>50-99</b>	<b>100-500</b>	<b>501+</b>	<b>Total</b>
<b>MMUs at Mines That Do Not Engage in Hot-Seat Practices</b>						
MUUs <sup>a</sup>	237	235	63	106	25	
Mantrips per MMU	1	1	1	1	1	
Sub-total for No. of Mantrips in Mines w/o Hot-Seat Practices	237	235	63	106	25	666
<b>MMUs at Mines That Engage in Hot-Seat Practices</b>						
MUUs <sup>a</sup>	0	0	63	106	8	
Mantrips per MMU	2	2	2	2	2	
Sub-total for No. of Mantrips in Mines with Hot-Seat Practices	0	0	126	212	16	354
<b>All Mines</b>						
Total Mantrips <sup>b</sup>	237	235	189	318	41	1,020
Percentage of Mantrips To Retrofit	50%	50%	50%	50%	50%	
Mantrips to Retrofit <sup>c</sup>	118.5	117.5	94.5	159.0	20.5	510

<sup>a</sup> Source: Table IV-D15. MMUs in mines with 1-19 employees and mines with 20 to 49 employees do not engage in hot-seat practices. About half of MMUs in mines with 50 to 99 employees and 100 to 500 employees do not engage in hot-seat practices. About 75 percent of MMUs in mines with 501+ employees do not engage in hot-seat practices.

<sup>b</sup> Total MMUs = No. of Mantrips in Mines w/o Hot-Seat Practices + No. of Mantrips in Mines with Hot-Seat Practices.

<sup>c</sup> MMUs to Retrofit = Total Mantrips x Percentage of Mantrips to Retrofit.

**Table IV-D22: First-Year and Annualized Costs to Retrofit Mantrips**

Mine Size	No. of Mantrips to Retrofit <sup>a</sup>	Cost to Retrofit per Mantrip	First-Year Costs	Annualized Costs <sup>b</sup>
1-19	118.5	\$500	\$59,250	\$8,431
20-49	117.5	\$500	\$58,750	\$8,360
50-99	94.5	\$500	\$47,250	\$6,724
100-500	159.0	\$500	\$79,500	\$11,313
501+	20.5	\$500	\$10,250	\$1,459
<b>Total</b>	<b>510</b>		<b>\$255,000</b>	<b>\$36,287</b>

<sup>a</sup> Source: Table IV-D21.

<sup>b</sup> Annualized costs = first year costs x 0.1423, where 0.1423 is the annualization factor.

Section 75.1714-4(c) of the ETS required the mine operator to submit an outby SCSR storage plan to the District Manager for approval. The final rule does not include this requirement. Outby storage is addressed as part of the emergency response plan in MSHA's Program Policy Letter No. P06-V-09, August 4, 2006.

Paragraph (c)(2) requires that SCSR storage locations be spaced along each escapeway at 30 minute travel distances. Mine operators have the option of determining this distance by either: calculating the distance an average miner walks in 30 minutes by using a representative sample of miners; or using prescribed distances in the table in paragraph (c)(2)(ii). MSHA assumes that approximately half of the mines in each size category would choose the prescribed distances in the table, while the remaining half would choose a performance test using a representative number of miners.

MSHA assumes that 118 mines with 1-19 employees could evacuate the mine in less than 30 minutes and would not need to store SCSRs. Of the 119 remaining mines with 1-19 employees, MSHA assumes that approximately half (or 59 mines) would conduct a distance test. MSHA estimates that 101 mines with 20-49 employees would take less than 30 minutes to evacuate the mine and therefore have no need to store SCSRs. MSHA estimates that of the 134 remaining mines with 20-49 employees, 50 percent (or 67 mines) would conduct a distance test. MSHA further estimates that 50 percent of the remaining mines would conduct a distance test: 37 mines with 50-99 employees; 39 mines with 100-500 employees; and 4 mines with 501+ employees.

In the REA that accompanied the ETS, MSHA assumed that the distance test would take 1.5 hours. This assumption was based on SCSRs being placed 1 hour apart in escapeways. The final rule requires that SCSRs be stored in escapeways no more than 30 minutes apart. Therefore, the estimated time for conducting the distance test has been revised to 1 hour, which includes preparation for the test. Also, in the REA for the ETS, the Agency assumed that mine operators would conduct 3 tests with 1 miner for each test, and then average the results. Since the final rule requires that the distance test be based

on a representative sample of miners, MSHA assumes that mine operators will conduct one distance test with a representative sample of miners.

On average, MSHA assumes that the number of miners involved in the distance test will be: 10 miners for mines with 1-19 employees; 20 miners for mines with 20-49 employees and 50-99 employees; and 30 miners in mines with 100 or more employees. The Agency also assumes that the distance test will be monitored by a supervisor.

Since the test is performed once an annualization factor of 0.07 was used to annualize first-year costs. The hourly wage is \$26.55 for a miner and \$57.82 for a supervisor. Table IV-D23 shows, by mine size, the first-year and annualized costs for mine operators who choose the performance test.

**Table IV-D23: First-Year and Annualized Costs for Affected Mines to Conduct Distance Test**

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Mine Size	Mines That Test	Time to Conduct Test in Hrs.	No. of Miners Involved in Test	No. of Superv. Involved in Test	Miner Wage Rate per Hrs.	Superv. Wage Rate per Hrs.	First-Year Costs <sup>a</sup>	Annualized Costs <sup>b</sup>
1-19	59	1	10	1	\$26.55	\$57.82	\$19,076	\$1,335
20-49	67	1	20	1	\$26.55	\$57.82	\$39,451	\$2,762
50-99	37	1	20	1	\$26.55	\$57.82	\$21,786	\$1,525
100-500	39	1	30	1	\$26.55	\$57.82	\$33,318	\$2,332
501+	4	1	30	1	\$26.55	\$57.82	\$3,417	\$239
Total	206						\$117,049	\$8,193

<sup>a</sup> First-year costs = col. 2 x ((col. 3 x col. 4 x col. 6) + (col. 3 x col. 5 x col. 7)).

<sup>b</sup> Annualized costs = first year costs x 0.07, where 0.07 is the annualization factor.

Paragraph (f) of § 75.1714-4 requires that signs made of reflective material with the words “SCSRs” or “Self-Rescuers” be conspicuously posted at each storage location. MSHA estimates that the cost of a storage sign is \$50. The sign is estimated to last 10 years. Table IV-D24 shows, by mine size, the first-year and annualized costs to place signs at locations where SCSRs are stored.

**Table IV-D24: First-Year and Annualized Costs  
for Storage Signs at Storage Locations**

Details	1-19	20-49	50-99	100-500	501+	Total
<b>Stored Locations In Escapeways</b>						
Table IV-D5	238	202	0	0	0	440
Table IV-D6	0	165	190	45	0	400
Table IV-D7	0	0	185	45	0	230
Table IV-D8	0	0	0	279	54	333
Table IV-D9	0	0	0	270	18	288
Total in Escapeways	238	367	375	639	72	1,691
<b>Stored Locations In Outby Areas</b>						
Tables IV-10, IV-11, & IV-12	119	183.5	187.5	319.5	36	845.5
Total Locations	357	550.5	562.5	958.5	108	2,536.5
Cost per Sign	\$50	\$50	\$50	\$50	\$50	
First-Year Costs	\$17,850	\$27,525	\$28,125	\$47,925	\$5,400	\$126,825
Annualized Costs <sup>a</sup>	\$2,540	\$3,917	\$4,002	\$6,820	\$768	\$18,047

<sup>a</sup> Annualized costs = first-year costs x 0.1423, where 0.1423 is the annualization factor.

In addition, paragraph (f) of § 75.1714-4 requires that directional signs leading to the SCSR storage locations be posted. MSHA assumes that two directional signs will be needed for each SCSR storage location. MSHA estimates that the cost of a directional sign is \$25. The sign is estimated to last for 10 years. Table IV-D25 shows, by mine size, the first-year and annualized costs to place directional signs at locations where SCSRs are stored.

**Table IV-D25: First-Year and Annualized Costs  
for Directional Signs at Storage Locations**

Mine Size	Storage Locations <sup>a</sup>	No. of Directional Signs per Location	Cost per Sign	First-Year Costs	Annualized costs <sup>b</sup>
1-19	357	2	\$25	\$17,850	\$2,540
20-49	550.5	2	\$25	\$27,525	\$3,917
50-99	562.5	2	\$25	\$28,125	\$4,002
100-500	958.5	2	\$25	\$47,925	\$6,820
501+	108	2	\$25	\$5,400	\$768
<b>Total</b>	<b>2,536.5</b>			<b>\$126,825</b>	<b>\$18,047</b>

<sup>a</sup> Source: Table IV-D24.

<sup>b</sup> Annualized costs = first year costs x 0.1423, where 0.1423 is the annualization factor.

**Existing § 75.1714-3: Self-Rescue Devices; Inspection, Testing, Maintenance, Repair, and Recordkeeping**

All stored SCSRs required by the final rule must be inspected in accordance with existing § 75.1714-3(d). Accordingly, SCSRs will be inspected every 90 days (or 4 times per year). The inspection is estimated to take 0.025 hours (1.5 minutes) per SCSR. MSHA anticipates that a supervisor, earning \$57.82 per hour, will perform the SCSR inspections because this activity is a management responsibility. Table IV-D26 shows, by mine size, the annual costs to inspect the additional SCSRs required by the final rule.

**Table IV-D26: Annual Costs to Inspect SCSRs**

(1)	(2)	(3)	(4)	(5)	(6)
Mine Size	Total No. of SCSRs Required by the Rule <sup>a</sup>	Time to Inspect an SCSR	No. of Inspections per Year	Superv. Wage Rate per Hour	Annual Costs to Inspect SCSR <sup>b</sup>
1-19	5,463	0.025	4	\$57.82	\$31,587
20-49	19,631	0.025	4	\$57.82	\$113,506
50-99	25,276	0.025	4	\$57.82	\$146,146
100-500	95,063	0.025	4	\$57.82	\$549,654
501+	22,572	0.025	4	\$57.82	\$130,511
Total	168,005				\$971,405

<sup>a</sup> Source: Table IV-D13.

<sup>b</sup> Annual cost to inspect = col. 2 x col. 3 x col. 4 x col. 5.

MSHA estimates that annually 0.5 percent of all stored SCSRs that are inspected will be found to be defective and will need to be replaced. The average cost of an SCSR device is \$665. Table IV-D27 shows, by mine size, the annual cost to replace defective SCSRs found during inspection.

**Table IV-D27: Annual Costs to Replace Defective SCSRs Found During Inspections**

(1)	(2)	(3)	(4)	(5)
Mine Size	Total No. of SCSRs Required by the Rule <sup>a</sup>	No. of Defective SCSRs Found Annually <sup>b</sup>	SCSR Replacement Cost	Annual Costs to Replace SCSRs <sup>c</sup>
1-19	5,463	27	\$665	\$18,164
20-49	19,631	98	\$665	\$65,273
50-99	25,276	126	\$665	\$84,043
100-500	95,063	475	\$665	\$316,084
501+	22,572	113	\$665	\$75,052
Total	168,005	840		\$558,617

<sup>a</sup> Source: Table IV-D13.

<sup>b</sup> Source: col. 2 x 0.005.

<sup>c</sup> Annual costs to replace SCSRs = col. 3 x col. 4.



Existing § 75.1714-3(e) states that after each inspection the person making the inspection must certify by signature and date that the inspection was performed. Certifying by signature and date is estimated to take 0.0025 hours (9 seconds). Table IV-D28 shows, by mine size, the annual certification costs.

**Table IV-D28: Annual Costs to Certify that SCSR Inspections Were Performed**

(1)	(2)	(3)	(4)	(5)
Mine Size	Total No. of SCSRs Required by the Rule <sup>a</sup>	Time to Certify Inspection per Yr. (in hrs.) <sup>b</sup>	Superv. Wage Rate per hr.	Annual Costs to Inspect <sup>c</sup>
1-19	5,463	0.01	\$57.82	\$3,159
20-49	19,631	0.01	\$57.82	\$11,351
50-99	25,276	0.01	\$57.82	\$14,615
100-500	95,063	0.01	\$57.82	\$54,965
501+	22,572	0.01	\$57.82	\$13,051
Total	168,005			\$97,140

<sup>a</sup> Source: Table IV-D13.

<sup>b</sup> 0.01 = 0.0025 hrs. to certify an inspection x 4 times per yr.

<sup>c</sup> Annual costs to certify inspection of SCSRs = col. 2 x col. 3 x col. 4.

For the 0.5 percent of the inspections where a defective SCSR is found, a record has to be made of the corrective action taken in accordance with existing § 75.1714-3(e). MSHA estimates that it takes a supervisor, earning \$57.82 per hour, 0.05 hours (3 minutes) to make such a record. Table IV-D29 shows, by mine size, the annual costs to make a corrective action record.

**Table IV-D29: Annual Costs to Make Record of Corrective Actions**

(1)	(2)	(3)	(4)	(5)
Mine Size	No. of Defective SCSRs Found Annually <sup>a</sup>	Time to Make Each Record	Superv. Wage Rate per Hour	Annual Costs to Make Record <sup>b</sup>
1-19	27	0.05	\$57.82	\$79
20-49	98	0.05	\$57.82	\$284
50-99	126	0.05	\$57.82	\$365
100-500	475	0.05	\$57.82	\$1,374
501+	113	0.05	\$57.82	\$326
<b>Total</b>	<b>840</b>			<b>\$2,429</b>

<sup>a</sup> Source: Table IV-D27.

<sup>b</sup> Annual costs to make record = col. 2 x col. 3 x col. 4.

**Final § 75.1714-5: Map Locations of Self-Contained Self-Rescuers**

Mine Evacuation Map Required by § 75.1505

Section 75.1714-5 states that the operator must revise the mine evacuation map, required by final § 75.1505, to include the locations of stored SCSRs. The revised mine evacuation map required by § 75.1505 will need to be copied to post in each working section and in each area where mechanized mining is being installed or removed, and at a surface location of the mine where miners congregate, such as the mine bulletin board. On average, MSHA assumes the map will be posted at two locations for mines with fewer than 100 employees, and three locations for mines with 100 or more employees. The Agency estimates that it takes a supervisor, earning \$57.82 per hour, 0.25 hours (15 minutes) to revise the evacuation map. A clerical employee, earning \$20.96 per hour, is estimated to take, on average, 0.25 hours (15 minutes) to copy and post the mine evacuation map. The estimated cost to photocopy the map is \$2.00. Table IV-D30 shows, by mine size, the first-year and annualized costs to revise, and post the mine evacuation map.

**Table IV-D30: First-Year and Annualized Costs to Revise Mine Evacuation Map to Include SCSR Storage Locations as required by § 75.1505**

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mine Size	No. of Mines <sup>a</sup>	Time for Revision <sup>b</sup>	Wage rate per Hour <sup>c</sup>	Copy Costs for Map <sup>d</sup>	First Year Costs <sup>e</sup>	Annualized Costs <sup>f</sup>
1-19	119	0.5	\$39.39	\$4	\$2,820	\$197
20-49	134	0.5	\$39.39	\$4	\$3,175	\$222
50-99	75	0.5	\$39.39	\$4	\$1,777	\$124
100-500	79	0.5	\$39.39	\$6	\$2,030	\$142
501+	8	0.5	\$39.39	\$6	\$206	\$14
<b>Total</b>	<b>415</b>				<b>\$10,007</b>	<b>\$701</b>

<sup>a</sup> 119 mines = (237 mines - 118 mines). Of the 237 mines with 1-19 employees, 118 mines take <30 minutes to evacuate and do not need to store SCSRs in escapeways or outby areas; thus, there is no need for these mines to revise the map.

134 mines = (235 mines - 101 mines). Of the 235 mines with 20 to 49 employees, 101 mines take <30 minutes to evacuate and do not need to store SCSRs in escapeways or outby areas; thus, there is no need for these mines to revise the map.

The source of the remaining mine size categories is Table IV-D1.

<sup>b</sup> 0.5 hrs. = 0.25 hrs. to revise map + 0.25 hrs. to copy and post maps.

<sup>c</sup> \$39.39 = ((0.25 hrs./0.5 hrs.) x \$57.82 supervisor wage per hr.) + ((0.25 hrs./0.5 hrs.) x \$20.96 clerical wage per hr.).

<sup>d</sup> \$4 (\$2 copy costs x 2 maps) for mines with fewer than 100 employees, and \$6 (\$2 copy costs x 3 maps) for mines with 100 or more employees.

<sup>e</sup> First-Year Costs = (col. 2 x col. 3 x col. 4) +(col. 2 x col. 5).

<sup>f</sup> Annualized Costs = First-Year costs x 0.07, where 0.07 is the annualization factor.

**Mine Map Required by § 75.1200**

Section 75.1714-5 also states that the operator must revise the mine map, required by existing § 75.1200, to include the locations of stored SCSRs. The mine map includes pillared, worked out, and abandoned areas. This would include areas traveled by pumpers, examiners, and other persons who do not have a fixed work location. The revised mine map required by § 75.1200 does not have to be posted but a copy is sent to MSHA. The Agency estimates that it takes a supervisor, earning \$57.82 per hour, 0.25 hours (15 minutes) to revise the mine map. A clerical employee, earning \$20.96 per hour, is estimated to take 0.1 hours (6 minutes) to copy and mail the mine map. The

estimated photocopy cost is \$2.00 per map. The cost to send the mine map is estimated at \$2.00 per map. Table IV-D31 shows, by mine size, the first-year and annualized costs to revise and mail a copy of the mine map required by existing § 75.1200.

**Table IV-D31: First-Year and Annualized Costs to Revise Mine Map to Include SCSR Storage Locations as Required by § 75.1200**

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mine Size	No. of Mines <sup>a</sup>	Time for Revision <sup>b</sup>	Wage Rate per Hour <sup>c</sup>	Postage & Copy Costs <sup>d</sup>	First-Year Costs <sup>e</sup>	Annualized Costs <sup>f</sup>
1-19	119	0.35	\$47.29	\$4	\$2,446	\$171
20-49	134	0.35	\$47.29	\$4	\$2,754	\$193
50-99	75	0.35	\$47.29	\$4	\$1,541	\$108
100-500	79	0.35	\$47.29	\$4	\$1,624	\$114
501+	8	0.35	\$47.29	\$4	\$164	\$12
Total	415				\$8,529	\$597

<sup>a</sup> Source: Table IV-D30.

<sup>b</sup> 0.35 hrs. = 0.25 hrs. to revise map + 0.1 hrs. to copy, post and mail map.

<sup>c</sup> \$47.29 = ((0.25 hrs./0.35 hrs.) x \$57.82 supervisor wage per hr.) + ((0.1 hrs./0.35 hrs.) x \$20.96 clerical wage per hr.).

<sup>d</sup> \$4 = \$2 postage + (\$2 copy cost x 1 copy).

<sup>e</sup> First-year costs = (col. 2 x col. 3 x col. 4) +(col. 2 x col. 5).

<sup>f</sup> Annualized costs = first-year costs x 0.07, where 0.07 is the annualization factor.

### **Final § 75.1714-6: Emergency Tethers**

Section 75.1714-6 requires that at least one tether device be provided and stored with the additional SCSRs in accordance with final § 75.1714-4(a)(1) and (b) (fixed work locations and on mantrips). This requirement was not in the ETS. A tether is expected to be placed in each storage box containing SCSRs on mantrips. The mantrips are assumed to be at fixed work locations. Data from a tether manufacturer show that a box containing a tether with 13 clips costs \$171. Tethers are assumed to last for 10 years, and are thus annualized using a 10 year annualization factor of 0.1423. Table IV-D32 shows, by mine size, the first-year and annualized costs for tethers.

**Table IV-D32: First-Year and Annualized Costs for Tethers**

Details	1-19	20-49	50-99	100-500	501+	Total
No. of Storage Boxes on Mantrips <sup>a</sup>	237	705	414	912	190	2,458
Tether Cost per Box <sup>b</sup>	\$171	\$171	\$171	\$171	\$171	
First-Year Costs	\$40,527	\$120,555	\$70,794	\$155,952	\$32,490	\$420,318
Annualized Costs <sup>c</sup>	\$5,767	\$17,155	\$10,074	\$22,192	\$4,623	\$59,811

<sup>a</sup> Source: Table IV-D14.

<sup>b</sup> Each box holds 13 tethers.

<sup>c</sup> Annualized costs = first-year costs x 0.1423, where 0.1423 is the annualization factor.

## **Final § 75.1714-7: Multi-Gas Detectors**

### Cost of (Three-Gas) Multi-Gas Detectors

Section 75.1714-7 requires that every group of miners, including miners who work alone, have at least one trained person provided with an MSHA-approved multi-gas detector that can measure methane, oxygen, and carbon monoxide. This provision means that the mine operator will need a three-gas (multi-gas) detector at all MMUs and for some crews working in outby areas. Multi-gas detectors were not required in the ETS.

MSHA assumes that every MMU has 2 multi-gas detectors. Half of the MMUs are assumed to have 2 (two-gas) multi-gas detectors, and the remaining half are assumed to have 2 (three-gas) multi-gas detectors. Since the rule requires the measurement of three gases (methane, oxygen, and carbon monoxide), the two-gas detectors will need to be replaced with three-gas detectors. In addition, MSHA assumes that many pumpers, weekly examiners, belt examiners, and maintenance personnel already have a three-gas detector and, on average, that only one additional three-gas detector will be required for outby crews for each active MMU. One manufacturer sells a three-gas detector, without a pump, for \$515 while another manufacturer sells one, without a pump, for \$595. On average, MSHA estimates that a three-gas detector, without a pump, costs \$555  $((\$515 + \$595) / 2)$  and will last for 5 years. MSHA assumes that mine operators can use a pump that they have from previous purchases of multi-gas detectors. Table IV-D33 shows, by mine size, the first-year and annualized costs to purchase (three-gas) multi-gas detectors.

**Table IV-D33: First-Year and Annualized Costs to Purchase Three-Gas Detectors**

Mine Size	No. of MMUs <sup>a</sup>	No. of Three-Gas Detectors Needed at MMUs <sup>b</sup>	No. of Three-Gas Detectors Needed in Outby areas <sup>c</sup>	Cost per Detector	First-Year Costs <sup>d</sup>	Annualized costs <sup>e</sup>
1-19	237	237	237	\$555	\$263,070	\$64,189
20-49	235	235	235	\$555	\$260,850	\$63,647
50-99	126	126	126	\$555	\$139,860	\$34,126
100-500	212	212	212	\$555	\$235,320	\$57,418
501+	33	33	33	\$555	\$36,630	\$8,938
<b>Total</b>	<b>843</b>	<b>843</b>	<b>843</b>		<b>\$935,730</b>	<b>\$228,318</b>

<sup>a</sup> Source: Table IV-D15.

<sup>b</sup> No. of Three-Gas Detectors Needed at MMUs = (No. of MMUs x 0.5) x 2 Three-Gas Detectors.

<sup>c</sup> No. of Three-Gas Detectors Needed in Outby Areas = No. of MMUs x 1 Three-Gas Detector.

<sup>d</sup> First-year costs = (No. of Three-Gas Detectors Needed at MMUs + No. of Three-gas Detectors Needed in Outby Areas) x \$555.

<sup>e</sup> Annualized costs = first-year costs x 0.244, where 0.244 is the annualization factor to reflect a 5-year life for gas detectors.

Annual Maintenance Costs for (Three-Gas) Multi-Gas Detectors

The final rule also adds maintenance costs for (three-gas) multi-gas detectors that are purchased for outby areas but not for those detectors purchased for MMUs. The reason is that at MMUs the (three-gas) multi-gas detectors are replacing the (two-gas) multi-gas detectors currently being used. Therefore, annual maintenance costs are already being incurred for these (three-gas) multi-gas detectors. However, the purchase of (three-gas) multi-gas detectors for outby areas is new, and annual maintenance costs will need to be developed for these instruments.

Section 75.1714-7 states that the (three-gas) multi-gas detectors be maintained and calibrated as specified in § 75.320. Paragraph (a) of § 75.320 requires that calibration be done every 31 days (approximately monthly). A bottle of gas is needed to calibrate the detector. A 34 liter bottle of gas costs approximately \$134 and can be used to calibrate the detector approximately 24 times. Thus, annual gas costs for calibration are estimated to be \$67 (\$134 / 2 years). Further, on average, a sensor, costing \$150, will need to be replaced yearly. On average, each calibration is estimated to take 0.075 hours (4.5 minutes) to perform, and the time to change a sensor is estimated at 0.25 hours (15 minutes). Both calibration and changing a sensor can be done by a trained person earning \$26.55 per hour. Table IV-D34 shows, by mine size, the annual costs to maintain (three-gas) multi-gas detectors purchased for outby areas.

**Table IV-D34: Annual Costs to Maintain Three-Gas Detectors**

(1)	(2)	(3)	(4)	(5)	(6)
Mine Size	No. of Three-Gas Detectors Needed in Outby areas <sup>a</sup>	Time for Annual Maintenance in hours <sup>b</sup>	Wage Rate per Hour	Cost of Materials <sup>c</sup>	Annual Costs <sup>d</sup>
1-19	237	1.15	\$26.55	\$217	\$58,665
20-49	235	1.15	\$26.55	\$217	\$58,170
50-99	126	1.15	\$26.55	\$217	\$31,189
100-500	212	1.15	\$26.55	\$217	\$52,477
501+	33	1.15	\$26.55	\$217	\$8,169
Total	843				\$208,670

<sup>a</sup> Source: Table IV-D33.

<sup>b</sup> 1.15 hrs. = (0.075 hrs. per calibration x 12 calibration per year) + 0.25 hrs. to replace sensor once per year.

<sup>c</sup> \$217 = \$67 for gas per year for calibration + \$150 per sensor.

<sup>d</sup> Annual costs = col. 2 x ((col. 3 x col. 4) + col.5).

#### Costs to Train Existing Miners to Use (Three-Gas) Multi-Gas Detectors

No training in the use of multi-gas detectors is needed for miners using (three-gas) multi-gas detectors instead of (two-gas) multi-gas detectors on the working section. Both two-gas and three-gas detectors are multi-gas detectors and training on one type can satisfy the training needs for the other type. However, training on the use of multi-gas detectors will be needed for those miners that will use the instrument in outby areas of the mine. MSHA assumes that for each (three-gas) multi-gas detector purchased for an outby area of a mine a miner will need to be trained on how to use the instrument. A miner can be trained to use multi-gas detectors in various ways. Most commonly, state regulatory agencies will provide free classes for miners to learn how to use a multi-gas detector. In addition, MSHA personnel provide free classes, at the mine, to teach miners how to use a multi-gas detector. The only cost to the miner for this training is the miner's time to attend the training and the expense to travel to the training site (in cases where training is not provided at the mine). MSHA assumes that 75 percent of the miners will be trained by state regulatory agencies and 25 percent will be trained by MSHA personnel providing the training at the mine. The training is assumed to take approximately 1 hour. On average, combined travel time to and from the training site is estimated to be 2 hours. Travel expenses are estimated at \$100 per person trained. There are no travel expenses for the 25 percent of miners trained by MSHA personnel at the mine site. Table IV-D35 shows, by mine size, the first-year and annualized cost to the mine operator to provide (three-gas) multi-gas detector training to existing miners.

**Table IV-D35: First-Year and Annualized Costs  
to Train Existing Miners to Use Three-Gas Detectors**

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mine Size	No. of Miners to be Trained <sup>a</sup>	Time to Train in Hours	Travel Time in Hours	Miner Wage Rate per Hour	Travel Expenses Related to Training	First-Year Costs <sup>b</sup>	Annualized Costs <sup>c</sup>
1-19	237	1	2	\$26.55	\$100	\$33,506	\$2,345
20-49	235	1	2	\$26.55	\$100	\$33,223	\$2,326
50-99	126	1	2	\$26.55	\$100	\$17,813	\$1,247
100-500	212	1	2	\$26.55	\$100	\$29,972	\$2,098
501+	33	1	2	\$26.55	\$100	\$4,665	\$327
<b>Total</b>	<b>843</b>					<b>\$119,179</b>	<b>\$8,343</b>

<sup>a</sup> Source: Table IV-D33, No. of Three-Gas Detectors Needed in Outby Areas.

<sup>b</sup> First-year costs = (col. 2 x col.3 x col. 5) + (col. 2 x 0.75 x ((col. 4 x col. 5) + col. 6)), where 0.75 is the percentage of miners that receive training off mine property.

<sup>c</sup> Annualized costs = first year costs x 0.07, where 0.07 the annualization factor.

Costs to Train New Miners to Use (Three-Gas) Multi-Gas Detectors

MSHA assumes that there is a 7 percent annual coal miner turnover rate. Thus, an additional 7 percent of miners must receive training on multi-gas detectors annually. Table IV-D36 shows, by mine size, the annual cost to the mine operator to provide (three-gas) multi-gas detector training to new miners.



**Table IV-D36: Annual Costs to Train Miners  
to Use Three-Gas Detectors Due to Miner Turnover**

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mine Size	No. of Miners to be Trained <sup>a</sup>	Time to Train in Hours	Travel Time	Miner Wage Rate per Hour	Travel Expenses Related to Training	Annual Costs <sup>b</sup>
1-19	16.6	1	2	\$26.55	\$100	\$2,345
20-49	16.5	1	2	\$26.55	\$100	\$2,326
50-99	8.8	1	2	\$26.55	\$100	\$1,247
100-500	14.8	1	2	\$26.55	\$100	\$2,098
501+	2.3	1	2	\$26.55	\$100	\$327
Total	59.0					\$8,343

<sup>a</sup> Source: Table IV-D35 x 0.07, where 0.07 is the percentage of miner turnover in an average mine.

<sup>b</sup> Annual costs = (col. 2 x col.3 x col. 5) + (col. 2 x 0.75 x ((col. 4 x col. 5) + col. 6)), where 0.75 is the percentage of miners that receive training off mine property.

**Final § 75.1714-8: Reporting SCSR Inventory and Malfunctions; Retention of SCSRs**

Under paragraph (a) of this provision, mine operators must provide to MSHA, in writing, a complete inventory of all SCSRs at each mine. For each mine the report must include mine name, MSHA mine ID number, and mine location. For each SCSR unit in each mine, the report must include the manufacturer, the model type, the date of unit manufacture, and the serial number.

MSHA assumes that to conduct the SCSR inventory and prepare the report it will take 2 hours in mines with 1-19 employees; 4 hours in mines with 20-49 employees; 10 hours in mines with 50-99 employees; and 18 hours in mines with 100 or more employees. A clerical employee is assumed to take 0.2 hours (12 minutes) to copy and send the report. Costs to copy and send the report are estimated to be \$1 in mines with 1-19 employees and mines with 20-49 employees, and \$2 in mines with 50 or more employees. Because this is a management responsibility, a supervisor, earning \$57.82 per hour, is assumed to conduct the SCSR inventory and prepare the report. A clerical employee, earning \$20.96 per hour, is assumed to copy and send the report.

Table IV-D37 shows, by mine size, the first-year and annualized costs to conduct and send to MSHA an SCSR inventory report.

**Table IV-D37: First-Year and Annualized Costs  
for SCSR Inventory and Report**

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Emp. Size	No. of Mines	Time to Conduct Report (in Hrs.)	Time to Copy & Send Report (in Hrs.)	Superv. Wage Rate (per Hr.)	Clerical Wage Rate (per Hr.)	Cost to Copy & Send Report	First-Year Costs <sup>a</sup>	Annualized Costs
1-19	237	2	0.2	\$57.82	\$20.96	\$1	\$28,637	\$2,005
20-49	235	4	0.2	\$57.82	\$20.96	\$1	\$55,571	\$3,890
50-99	75	10	0.2	\$57.82	\$20.96	\$2	\$43,829	\$3,068
100-500	79	18	0.2	\$57.82	\$20.96	\$2	\$82,709	\$5,790
501+	8	18	0.2	\$57.82	\$20.96	\$2	\$8,376	\$586
<b>Total</b>	<b>634</b>						<b>\$219,122</b>	<b>\$15,339</b>

<sup>a</sup> First-year costs = col. 2 x ((col. 3 x col. 5) + (col. 4 x col. 6) + col. 7).

<sup>b</sup> Annualized costs = first year costs x 0.07, where 0.07 is the annualization factor.

In the event that a change in the inventory occurs during the reporting year, the change must be reported to MSHA within the quarter that the change occurs. MSHA assumes that all mines will revise their SCSR inventory report in 3 of the 4 quarters throughout the year. The time to revise the report is estimated to be 0.25 hours (15 minutes) in mines with 1-19 employees and 20-49 employees; and 0.5 hours (30 minutes) in mines with 50 or more employees. It is estimated that a clerical employee, earning \$20.96 per hour, will take 0.1 hours (6 minutes) to copy and send the report. Costs to copy and send the report are estimated to be \$1.

Table IV-D38 shows, by mine size, the annual costs to revise and send to MSHA SCSR inventory reports.

**Table IV-D38: Annual Costs to Revise SCSR Inventory Report**

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Emp. Size	No. of Mines	Revisions per Year	Time to Revise Report (in Hrs.)	Time to Copy & Send Report (in Hrs.)	Superv. Wage Rate per Hr.	Clerical Wage Rate per Hr.	Costs to Copy & Send Revised Report	Annual Costs <sup>a</sup>
1-19	237	3	0.25	0.1	\$57.82	\$20.96	\$1	\$12,479
20-49	235	3	0.25	0.1	\$57.82	\$20.96	\$1	\$12,373
50-99	75	3	0.50	0.1	\$57.82	\$20.96	\$1	\$7,201
100-500	79	3	0.50	0.1	\$57.82	\$20.96	\$1	\$7,585
501+	8	3	0.50	0.1	\$57.82	\$20.96	\$1	\$768
Total	634							\$40,407

<sup>a</sup> Annual costs = col. 2 x col. 3 x ((col. 4 x col.6) + (col. 5 x col. 7) + col. 8).

Final § 75.1714-8(b) requires that the mine operator report to MSHA any SCSR problems or malfunctions. This provision was not in the ETS. MSHA estimates that all mine operators, regardless of size, will send, on average, to MSHA a year. The Agency estimates that a supervisor, earning \$57.82 per hour, will take 0.25 hours (15 minutes) to prepare the report. A clerical employee, earning \$20.96 per hour, is estimated to take 0.1 hours (6 minutes) to copy and send the report. The cost to copy and send the information is estimated to be \$1.00. Table IV-D39 shows, by mine size, mine operators' annual costs to report to MSHA any SCSR problems or malfunctions.

**Table IV-D39: Annual Costs to Report SCSR Problems**

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mine Size	No. of Mines <sup>a</sup>	Annual Reports of SCSR Problems	Time to Make Report	Wage Rate per Hour <sup>b</sup>	Cost to Copy and Send Report	Annual Costs <sup>c</sup>
1-19	237	1	0.35	\$47.29	\$1	\$4,160
20-49	235	1	0.35	\$47.29	\$1	\$4,124
50-99	75	1	0.35	\$47.29	\$1	\$1,316
100-500	79	1	0.35	\$47.29	\$1	\$1,387
501+	8	1	0.35	\$47.29	\$1	\$140
Total	634					\$11,127

<sup>a</sup> Source: Table IV-D1, Row 2.

<sup>b</sup> \$47.29 = ((0.25 hrs./0.35 hrs.) x \$57.82) + ((0.1 hrs./0.35 hrs.) x \$20.96).

<sup>c</sup> Annual costs = col. 2 x col. 3 x ((col. 4 x col. 5) + col.6).

## Summary of First-Year Costs for Section IV-D

Table IV-D40 provides a summary of the first-year costs for Section IV-D.

**Table IV-D40: Summary of First-Year Costs (Excluding Annual Costs)  
for Section IV-D**

Provision	1-19	20-49	50-99	100-500	501+	Total
Purchase SCSRs (Table IV-D13)	\$3,632,895	\$13,054,615	\$16,808,540	\$63,216,895	\$15,010,380	\$111,723,325
Storage Boxes (Table IV-20)	\$451,250	\$1,655,500	\$2,078,400	\$7,302,850	\$1,707,150	\$13,195,150
Retrofit Mantrips (Table IV-22)	\$59,250	\$58,750	\$47,250	\$79,500	\$10,250	\$255,000
Distance Test (Table IV-D23)	\$19,076	\$39,451	\$21,786	\$33,318	\$3,417	\$117,049
Storage Signs (Table IV-D24)	\$17,850	\$27,525	\$28,125	\$47,925	\$5,400	\$126,825
Directional Signs (Table IV-D25)	\$17,850	\$27,525	\$28,125	\$47,925	\$5,400	\$126,825
75.1505 Revise Map (Table IV-D30)	\$2,820	\$3,175	\$1,777	\$2,030	\$206	\$10,007
75.1200 Revise Map (Table IV-D31)	\$2,446	\$2,754	\$1,541	\$1,624	\$164	\$8,529
Tethers (Table IV- D32)	\$40,527	\$120,555	\$70,794	\$155,952	\$32,490	\$420,318
Buy Gas Detectors (Table IV-D33)	\$263,070	\$260,850	\$139,860	\$235,320	\$36,630	\$935,730
Gas Detectors Training (Table IV- D35)	\$33,506	\$33,223	\$17,813	\$29,972	\$4,665	\$119,179
SCSR Inventory Report (Table IV-37)	\$28,637	\$55,571	\$43,829	\$82,709	\$8,376	\$219,122
Section IV-D First- Year Costs	\$4,569,176	\$15,339,494	\$19,287,841	\$71,236,020	\$16,824,528	\$127,257,059

### Costs for New Mines

Based on a five year data analysis conducted by MSHA's Office of Program Evaluation and Information Resources (PEIR), the proportion of all underground coal mines that are new each year is approximately: 20 percent for those mines with 1-19 employees; approximately 9 percent for mines with 20-500 employees; and 0 percent for mines having 501+ employees. Therefore, MSHA estimates that the costs for new mines each year will be: 20 percent of the first-year costs for mines that have 1-19 employees; 9 percent of the first-year costs for mines that have 20-49 employees, 50-99 employees, and 100-500 employees; and 0 percent of the first-year costs for mine that have 501+ employees. These costs are assumed to begin in the second year and continue every year thereafter. Table IV-D41, which is derived from Table IV-D40, shows, by mine

size, the annual costs for new mines.<sup>35</sup> These costs have been discounted by 1/1.07 to reflect the fact that they do not begin until year 2.

**Table IV-D41: Annual Costs for New Mines <sup>a</sup>**

Detail	1-19	20-49	50-99	100-500	501+	Total
Purchase SCSRs (Table IV-D13)	\$679,046	\$1,098,052	\$1,413,802	\$5,317,309	\$0	\$8,508,209
Purchase Storage Boxes (Table IV-D20)	\$84,346	\$139,248	\$174,819	\$614,258	\$0	\$1,012,671
Retrofit Mantrips (Table IV-D22)	\$11,075	\$4,942	\$3,974	\$6,687	\$0	\$26,678
Distance Test (Table IV-D23)	\$3,566	\$3,318	\$1,832	\$2,802	\$0	\$11,519
Storage Signs (Table IV-D24)	\$3,336	\$2,315	\$2,366	\$4,031	\$0	\$12,048
Directional Signs (Table IV-D25)	\$3,336	\$2,315	\$2,366	\$4,031	\$0	\$12,048
Tethers (Table IV-D32)	\$7,575	\$10,140	\$5,955	\$13,117	\$0	\$36,787
Three-Gas Detectors (Table IV-D33)	\$49,172	\$21,941	\$11,764	\$19,793	\$0	\$102,670
Three-Gas Training (Table IV-D35)	\$6,263	\$2,794	\$1,498	\$2,521	\$0	\$13,077
SCSR Inventory Report (Table IV-D37)	\$5,353	\$4,674	\$3,687	\$6,957	\$0	\$20,670
Annual Costs for New Mines	\$853,067	\$1,289,739	\$1,622,063	\$5,991,507	\$0	\$9,756,377

<sup>a</sup> Annual costs for mines with 1-19 employees = ((first-year only costs x 0.20) x (1/1.07)). Annual costs for mines with 20 to 49 employees, 50 to 99 employees, and 100 to 500 employees = ((first-year only costs x 0.09) x (1/1.07)). The 1/1.07 is a discount factor to reflect the fact that annual costs begin in Year 2.

### Summary of Yearly Costs for Section IV-D

Table IV-D42 provides a summary of the yearly costs (annualized first-year cost plus annual costs) for Section IV-D.

<sup>35</sup> New mines will not incur the first-year costs that existing mines must bear to revise the mine evacuation map under 75.1505 and the mine map under 75.1200. Therefore, these costs have been deleted from Table IV-D41.

**Table IV-D42: Summary of Yearly Costs for Section IV-D <sup>a</sup>**

Provision	Table	1-19	20-49	50-99	100-500	501+	Total
Buy SCSRs	13	\$516,961	\$1,857,672	\$2,391,855	\$8,995,764	\$2,135,977	\$15,898,229
Storage Boxes	20	\$64,213	\$235,578	\$295,756	\$1,039,196	\$242,927	\$1,877,670
Retrofit Mantrips	22	\$8,431	\$8,360	\$6,724	\$11,313	\$1,459	\$36,287
Distance Test	23	\$1,335	\$2,762	\$1,525	\$2,332	\$239	\$8,193
Storage Signs	24	\$2,540	\$3,917	\$4,002	\$6,820	\$768	\$18,047
Direction Signs	25	\$2,540	\$3,917	\$4,002	\$6,820	\$768	\$18,047
Inspect SCSRs	26	\$31,587	\$113,506	\$146,146	\$549,654	\$130,511	\$971,405
Replace SCSRs	27	\$18,164	\$65,273	\$84,043	\$316,084	\$75,052	\$558,617
Certify SCSR Inspection	28	\$3,159	\$11,351	\$14,615	\$54,965	\$13,051	\$97,140
SCSR Record	29	\$79	\$284	\$365	\$1,374	\$326	\$2,429
75.1505 Revise map	30	\$197	\$222	\$124	\$142	\$14	\$701
75.1200 Revise map	31	\$171	\$193	\$108	\$114	\$12	\$597
Tethers	32	\$5,767	\$17,155	\$10,074	\$22,192	\$4,623	\$59,811
Buy Gas Detectors	33	\$64,189	\$63,647	\$34,126	\$57,418	\$8,938	\$228,318
Maintain Gas Detectors	34	\$58,665	\$58,170	\$31,189	\$52,477	\$8,169	\$208,670
Gas Detector Training	35	\$2,345	\$2,326	\$1,247	\$2,098	\$327	\$8,343
Turnover Training	36	\$2,345	\$2,326	\$1,247	\$2,098	\$327	\$8,343
SCSR Inventory Report	37	\$2,005	\$3,890	\$3,068	\$5,790	\$586	\$15,339
SCSR Inventory Report Revised	38	\$12,479	\$12,373	\$7,201	\$7,585	\$768	\$40,407
Report SCSR Problems	39	\$4,160	\$4,124	\$1,316	\$1,387	\$140	\$11,127
New Mines Costs	41	\$853,067	\$1,289,739	\$1,622,063	\$5,991,507	\$0	\$9,756,377
Section IV-D Yearly Costs		\$1,654,401	\$3,756,784	\$4,660,797	\$17,127,130	\$2,624,983	\$29,824,095

<sup>a</sup> Yearly costs = annualized costs + annual costs.

### Summary of Section IV-D Yearly Costs Associated with the ETS

Compliance with certain provisions in the final rule is reflected as costs associated with the ETS. They include the costs related to: SCSRs stored on mantrips; SCSRs stored in escapeways; retrofitting mantrips; and storage and directional signs for SCSRs stored in escapeways. The costs in Table IV-D42 will all recur in 9 years. These recurring costs are associated only with the final rule, not the ETS. Therefore, only  $1-1/(1.07^9)$  of these costs are associated with the ETS.<sup>36</sup> Table IV-43 shows, by mine size, the portion of Section IV-D yearly costs associated with the ETS.

<sup>36</sup> As shown in Table IV-D42, the yearly costs in Section IV-D are estimated to be approximately \$29.8 million. Of that amount, approximately \$8.9 million, as shown as a subtotal in Table IV-D43, are yearly costs for equipment previously required by the ETS (and subsequently required by the final rule). The \$8.9 million corresponds to a first-year cost of approximately \$62.5 million for the equipment, all of which has a 10-year life. In nine years and then every ten years thereafter, mine operators must replace the equipment to remain in compliance with the final rule (not the ETS, which will have been superseded by the final rule). The equation in the text reflects these circumstances.

**Table IV-D43: Portion of Section IV-D Final Rule's Yearly Costs Associated with the ETS**

Section IV-D	1-19	20-49	50-99	100-500	501+	Total
Costs for SCSRs on Mantrips <sup>a</sup>	\$246,699	\$711,614	\$395,646	\$990,960	\$212,916	\$2,557,835
Adj. Costs for SCSRs in Escapeways <sup>b</sup>	\$0	\$222,095	\$786,513	\$3,485,299	\$850,128	\$5,344,035
Costs for Storage Boxes on Mantrips <sup>c</sup>	\$32,039	\$91,961	\$53,917	\$118,308	\$24,568	\$320,794
Costs for Storage Boxes in Escapeways <sup>d</sup>	\$0	\$4,226	\$100,855	\$403,421	\$97,333	\$605,835
Costs to Retrofit Mantrips <sup>e</sup>	\$8,431	\$8,360	\$6,724	\$11,313	\$1,459	\$36,287
Cost to Buy Signs <sup>f</sup>	\$5,080	\$7,834	\$8,004	\$13,639	\$1,537	\$36,094
Sub-Total Costs	\$292,249	\$1,046,091	\$1,351,660	\$5,022,940	\$1,187,941	\$8,900,881
Section IV-D Costs Associated with the March 9 ETS <sup>g</sup>	\$133,285	\$477,087	\$616,446	\$2,290,794	\$541,780	\$4,059,391

<sup>a</sup> Source: Tables IV-D3 and IV-D4 of this REA.

<sup>b</sup> Source: Tables IV-D3 and IV-D4 of the REA that accompanied the ETS, adjusted to account for mines that conduct hot seat change-outs.

<sup>c</sup> Source: Tables IV-D14, IV-D15, and IV-D16 of this REA.

<sup>d</sup> Source: Tables IV-D7 of the REA that accompanied the ETS, adjusted to account for mines that conduct hot seat change-outs.

<sup>e</sup> Source: Tables IV-D21 and IV-D22 of this REA.

<sup>f</sup> Source: Tables IV-D24 and IV-D25 of this REA.

<sup>g</sup> Sub-total costs in this table were multiplied by  $1-(1/1.07)^9$  to reflect the fact that these costs will recur in nine years. These recurring costs are associated only with the final rule, not the ETS. Therefore, only  $1-(1/1.07)^9$  of these costs are associated with the ETS.

### **Summary of the Net Section IV-D Yearly Costs Associated with the Final Rule**

In Table IV-D44, Section IV-D yearly costs associated with the ETS are subtracted from the Section IV-D total yearly costs to derive the Section IV-D net yearly costs associated with the final rule.

**Table IV-D44: Section IV-D Net Yearly Costs Associated with the Final Rule**

Detail	1-19	20-49	50-99	100-500	501+	Total
Section IV-D Yearly Costs <sup>a</sup>	\$1,654,401	\$3,756,784	\$4,660,797	\$17,127,130	\$2,624,983	\$29,824,095
Section IV-D Costs Associated with ETS <sup>b</sup>	\$133,285	\$477,087	\$616,446	\$2,290,794	\$541,780	\$4,059,391
Net Section IV-D Yearly Costs Associated Only with the Final Rule <sup>c</sup>	\$1,521,116	\$3,279,698	\$4,044,350	\$14,836,337	\$2,083,204	\$25,764,704

<sup>a</sup> Source: Table IV-D42.

<sup>b</sup> Source: Table IV-D43.

<sup>c</sup> Section IV-D net yearly costs associated only with the final rule = Section IV-D yearly costs minus Section IV-D costs associated with the ETS.



## **FEASIBILITY**

As discussed in the preamble of the final rule, MSHA has concluded that the requirements of the final rule are technologically and economically feasible.

### Technological Feasibility

The final rule contains accident notification provisions, which apply to all mines. These provisions clarify existing requirements. Although they expand existing notification requirements to cover more underground mine fires, they present no compliance difficulties. As such, they are technologically feasible.

The final rule also involves the purchase, installation, and maintenance of lifelines; SCSRs; and evacuation and SCSR training. These requirements, which apply only to underground coal mines, are generally not technology-forcing and would not involve activities on the frontiers of scientific knowledge. Most SCSRs and lifelines are proven technologies long available in the marketplace and already installed and used in the underground coal mining industry. Several provisions involve newly developed technology in the areas of realistic training units and flame-resistant lifelines; however MSHA has provided delayed effective dates to facilitate operator compliance with these provisions.

### Economic Feasibility

The total yearly compliance costs of the final rule (of \$44.1 million), including costs associated with the ETS, are equal to approximately 0.4 percent of annual revenues (of \$11.1 billion in 2004) for all underground coal mines. In addition, approximately \$3,000 of yearly compliance costs are attributable to underground M/NM mines, whose 2004 revenues are estimated to be approximately \$4.6 billion. Since the total compliance costs are well below one percent of the estimated revenues for all underground coal and M/NM mines, MSHA concludes that the final rule is economically feasible for these mines.

## APPENDIX IV-A: ALTERNATIVE 3 PERCENT COST ESTIMATES

MSHA has also estimated the costs of the rule by using an alternative discount rate. Tables IV-X1 and IV-X2 summarize the estimated yearly costs for the final rule by mine size and type of provision when using a 3 percent, instead of a 7 percent, discount rate.

**Table IV-X1: Summary of Yearly Compliance Costs for Final Rule  
(Including Costs Associated with the ETS) <sup>a</sup>**

Section	1-19	20-500	501+	Total
Training (Tables IV-A)	\$976,877	\$10,953,289	\$1,694,674	\$13,624,841
Part 50 (Table IV-B)	\$165	\$2,891	\$2,110	\$5,167
Lifelines (Tables IV-C)	\$105,798	\$329,070	\$10,008	\$444,875
SCSRs (Tables IV-D)	\$1,571,423	\$23,227,461	\$2,202,419	\$27,001,303
<b>Total Compliance Costs</b>	<b>\$2,654,264</b>	<b>\$34,512,711</b>	<b>\$3,909,210</b>	<b>\$41,076,185</b>

<sup>a</sup> Yearly costs = annualized first-year costs + annual costs. These costs were derived using an alternative discount rate of 3 percent (rather than 7 percent, which was used to derive costs in the rest of this REA).

**Table IV-X2: Summary of Yearly Compliance Costs  
That are Associated Only with the Final Rule  
(Excluding Costs Associated with the ETS) <sup>a</sup>**

Section	1-19	20-500	501+	Total
Training (Tables IV-A)	\$973,322	\$10,894,939	\$1,693,234	\$13,561,496
Part 50 (Table IV-B)	\$165	\$2,891	\$2,110	\$5,167
Lifelines (Tables IV-C)	\$96,058	\$283,727	\$7,698	\$387,483
SCSRs (Tables IV-D)	\$1,458,392	\$20,014,296	\$1,677,890	\$23,150,579
<b>Total Net Compliance Costs</b>	<b>\$2,527,938</b>	<b>\$31,195,854</b>	<b>\$3,380,933</b>	<b>\$37,104,724</b>

<sup>a</sup> Yearly costs = annualized first-year costs + annual costs. These costs were derived using an alternative discount rate of 3 percent (rather than 7 percent, which was used to derive costs in the rest of this REA).

## **V. REGULATORY FLEXIBILITY CERTIFICATION**

### **INTRODUCTION**

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

### **DEFINITION OF A SMALL MINE**

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

The SBA defines a small entity in the mining industry as an establishment with 500 or fewer employees (13 CFR 121.201). Almost all of the mines that are affected by the final rule fall into this category. Consequently, they can be viewed as sharing the special regulatory concerns which the RFA was designed to address.

Traditionally, MSHA has considered mines with 1-19 employees as “small mines.” These small mines differ from larger mines not only in the number of employees, but also, among other things, in economies of scale in material produced, in the type and amount of production equipment, and in supply inventory. Therefore, the costs for this category of small mines to comply with MSHA’s rules and the impact of MSHA’s rules on them will also tend to be different. It is for this reason that “small mines,” as traditionally defined by the Agency, are of special concern to MSHA.

This analysis complies with the legal requirements of the RFA for an analysis of the impacts on “small entities” while continuing MSHA’s traditional definition of “small mines.” The Agency concludes that it can certify that the final rule does not have a significant economic impact on a substantial number of small entities that are covered by the final rule. MSHA has determined that this is the case both for mines with 1-19 employees and for mines with 1-500 employees affected by the final rule.

### **FACTUAL BASIS FOR CERTIFICATION**

#### **General Approach**

MSHA’s analysis of impacts on “small entities” begins with a “screening” analysis. The screening compares the estimated compliance costs of a rule for small entities in the sector affected by the rule to the estimated revenues for those small entities.

When estimated compliance costs are less than 1 percent of the estimated revenues, MSHA considers that it is generally appropriate to conclude that there will be no significant economic impact on a substantial number of small entities. When estimated compliance costs equal or exceed 1 percent of revenues, it tends to indicate that further analysis may be warranted.

### **Derivation of Costs and Revenues**

The compliance costs noted in this chapter were presented in Chapter IV of this document along with an explanation of how they were derived. The final rule applies to all underground coal mine operators.<sup>37</sup> In addition, compliance costs for 30 CFR Part 50 of the final rule will generate compliance costs for underground metal and nonmetal (M/NM) mines.

In determining estimated revenues for underground coal mine operators, coal production (in tons) for mine size categories of 1-19 employees, and 1-500 employees, was multiplied by the 2004 price per ton of the commodity (\$30.36 per ton). Coal production data were obtained from MSHA's Program Evaluation and Information Resources (PEIR),<sup>38</sup> and the coal price per ton estimate was calculated from Department of Energy (DOE) data.<sup>39</sup>

Estimated total revenues for underground M/NM mine operators were derived by multiplying estimated total underground M/NM production (converted to tons) by the average M/NM price per ton (\$37.77 per ton). Estimated total underground M/NM revenues were then apportioned to mine size categories of 1-19 employees, and 1-500 employees, based on the M/NM employee work hours for these categories. Employee work hours were used because there is no M/NM production data that distributes total underground M/NM production between mine size categories. The estimated total underground M/NM production and the average M/NM price per ton were obtained from the Mining and Quarrying Trends.<sup>40</sup> Employee work hours were obtained from PEIR data.

### **Results of Screening Analysis**

With respect to all underground coal mine operators, Table V-1 shows that the estimated yearly cost of the rule as a percentage of yearly revenues is approximately 0.87 percent for underground coal mine operators with 1-19 employees and approximately 0.42 percent for underground coal operators with 1-500 employees. In addition, Table V-1 also shows that for all underground M/NM mine operators the

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<sup>37</sup> All surface mines are also covered by some provisions in the rule; however, they don't have any compliance costs.

<sup>38</sup> U. S. DOL, MSHA, PEIR, Calendar Year 2004 data.

<sup>39</sup> The 2004 coal price per ton was obtained from the U.S. DOE, EIA, *Annual Coal Report 2004*, Table 28, November 2005.

<sup>40</sup> U.S. DOI, USGS, *Mining and Quarrying Trends for 2004*, Tables 1 and 3, 2004.

estimated yearly cost of the rule as a percentage of yearly revenues is negligible for underground M/NM mines with 1-19 employees and 1-500 employees.

**Table V-1: Yearly Cost Relative to Revenues**

Mine Size	Yearly Costs of Final Rule	Estimated Underground Revenues	Cost as Percentage of Revenues
Underground Coal Mine Operators			
1-19	\$2,753,506	\$315,005,038	0.87%
1-500	\$39,714,080	\$9,488,466,936	0.42%
Underground M/NM Mine Operators			
1-19	\$0	\$277,849,618	0.00%
1-500	\$1,714	\$3,715,408,837	0.00%

Using both MSHA’s definition and SBA’s definition of a small mine, the estimated yearly costs for small underground coal and M/NM mines to comply with the final rule are less than 1 percent of their estimated yearly revenues, and therefore below the level suggesting that they might have a significant economic impact on a substantial number of small entities. Accordingly, MSHA has certified that the final rule will not have a significant economic impact on a substantial number of small entities that are covered by the final rule.

## **VI. OTHER REGULATORY CONSIDERATIONS**

### **THE UNFUNDED MANDATES REFORM ACT**

Title II of the Unfunded Mandates Reform Act of 1995 (2 U.S.C. 1531 *et seq.*) directs agencies to assess the effects of federal regulatory actions on state, local, and tribal governments, and the private sector, “other than to the extent that such regulations incorporate requirements specifically set forth in law.” For purposes of the Unfunded Mandates Reform Act, the final rule includes a Federal mandate that will increase private sector expenditures by more than \$100 million in any one year. It will not result in increased expenditures by State, local, or tribal governments; nor will it significantly or uniquely affect small governments. The Regulatory Economic Analysis provided pursuant to E.O. 12866 addresses the analytic requirements of the Unfunded Mandates Reform Act of 1995 (2 U.S.C. 1501 *et seq.*).

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

The final rule has no effect on family well-being or stability, marital commitment, parental rights or authority, or income or poverty of families and children. Accordingly, Section 654 of the Treasury and General Government Appropriations Act of 1999 (5 USC 601 note) requires no further agency action, analysis, or assessment.

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

The final rule does not implement a policy with takings implications. Accordingly, Executive Order 12630, Governmental Actions and Interference with Constitutionally Protected Property Rights, requires no further agency action or analysis.

### **EXECUTIVE ORDER 12988: CIVIL JUSTICE REFORM**

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

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

The final rule will have no adverse impact on children. Accordingly, Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks, as amended by Executive Orders 13229 and 13296, requires no further agency action or analysis.

### **EXECUTIVE ORDER 13132: FEDERALISM**

The final rule does not have “federalism implications,” because it does not “have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.” Accordingly, Executive Order 13132, Federalism, requires no further agency action or analysis.

### **EXECUTIVE ORDER 13175: CONSULTATION AND COORDINATION WITH INDIAN TRIBAL GOVERNMENTS**

The final rule does not have “tribal implications,” because it does not “have substantial direct effects on one or more Indian tribes, on the relationship between the Federal government and Indian tribes, or on the distribution of power and responsibilities between the Federal government and Indian tribes.” Accordingly, Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, requires no further agency action or analysis.

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

MSHA has reviewed the final rule for its impact on the supply, distribution, and use of energy because it applies to the underground coal mining sector. Insofar as the final rule will impose total yearly costs of approximately \$44.1 million on the underground coal mining industry, relative to annual revenues of approximately \$11.1 billion (in 2004), MSHA has concluded that the final rule will not significantly increase the price of coal. Consequently, MSHA has concluded that the final rule is not a “significant energy action,” because it is not “likely to have a significant adverse effect on the supply, distribution, or use of energy... (including a shortfall in supply, price increases, and increased use of foreign supplies).” Accordingly, Executive Order 13211, Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use, requires no further agency action or analysis.

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

MSHA has thoroughly reviewed the final 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 this REA, MSHA has determined and certified that the final rule will not have a significant economic impact on a substantial number of small entities. Accordingly, Executive Order 13272, Proper Consideration of Small Entities in Agency Rulemaking, requires no further Agency action or analysis.

## **VII. PAPERWORK REDUCTION ACT OF 1995**

### **INTRODUCTION**

The purpose of this chapter is to show the estimated paperwork burden hours and related costs to be borne by mine operators as a result of the final rule. The costs in this chapter are derived from Chapter IV in this REA. However, in this chapter, we estimate costs only in relation to the burden hours that the final rule imposes. Those costs derived in Chapter IV that do not have burden hours related to them do not appear in this chapter.

In this chapter, the burden hours and related costs in § 48.3, § 50.10, § 50.11, § 75.1502, § 75.1504, § 75.1714-3, § 75.1714-5, and § 75.1714-8 are discussed.

### **SUMMARY OF PAPERWORK BURDEN HOURS AND RELATED COSTS**

The final rule contains the following types of burden: first-year burden that only occurs in the first year of the rule; annual burden that occurs in the first year of the rule and continues for every year thereafter; and annual burden that occurs in the second year of the rule and continues for every year thereafter.

MSHA estimates that mine operators will incur 23,920 burden hours and \$1,465,480 of related yearly costs in the first year that the final rule is in effect. In the second year that the rule is in effect, and for every year thereafter, the Agency estimates that mine operators will incur 20,092 burden hours and \$1,149,252 of related costs.<sup>41</sup> Table VII-1 shows, by mine size, a summary of the burden hours and costs discussed above.

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<sup>41</sup> Burden in the first year equals first year burden plus annual burden starting in year one. Since first year burden occurs only in the first year, burden in the second year, and for every year thereafter, equals annual burden only (including some annual burden starting in year two).



**Table VII-1: Summary of Paperwork Burden Hours and Costs**

Year	Mine Size by Employment							
	1-19		20-500		501+		Total	
	Burden Hrs.	Burden Costs	Burden Hrs.	Burden Costs	Burden Hrs.	Burden Costs	Burden Hrs.	Burden Costs
1st Year <sup>a</sup>	1,571	\$111,948	19,640	\$1,195,784	2,710	\$157,748	23,920	\$1,465,480
2nd Year <sup>b</sup>	1,051	\$56,763	16,489	\$945,390	2,553	\$147,099	20,092	\$1,149,252
3rd Year <sup>b</sup>	1,051	\$56,763	16,489	\$945,390	2,553	\$147,099	20,092	\$1,149,252

<sup>a</sup> The first year burden consists of the burden from: Tables VII-A1 through VII-A4; Table VII-B1; and Tables VII-D1 through VII-D8.

<sup>b</sup> To obtain the second and third year burden: subtract from the first year burden those that only occur in the first year (first year only burden is contained in Tables VII-A1, VII-A2, VII-D4, VII-D5, and VII-D6); and then add the burden from Table VII-D9. Burden from Table VII-D9 begins in the second year and continues in the third year.

## Section VII-A

Section 48.3(p) of the final rule requires each underground coal mine to submit a revised training plan to address SCSR donning and transfer procedures, requiring insertion of the mouthpiece under part 48. MSHA estimates that to revise the training plan will take a safety director approximately: 0.5 hours (30 minutes) at mines with 1-19 employees; and 0.75 hours (45 minutes) at mines with 20 or more employees. A clerical employee is estimated to take 0.05 hours (3 minutes) at mines with 1-19 employees; and 0.01 hours (6 minutes) at mines with 20 or more employees to copy and send the revised material. Table VII-A1 shows, by mine size, first-year burden hours and cost to revise the training plan.

**Table VII-A1: First-Year Burden Hours and Costs to Revise Training Plan under § 48.3**

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Mine Size	No. of Mines	Superv. Time to Revise Plan in Hrs.	Clerical Time to Copy Plan in Hrs.	Annual Burden Hours	Superv. Wage Rate per Hr.	Clerical Wage Rate per Hr.	First-Year Burden Costs <sup>a</sup>	Annualized Burden Costs <sup>b</sup>
1-19	237	0.50	0.05	0.55	\$57.82	\$20.96	\$7,100	\$497
20-500	389	0.75	0.10	0.85	\$57.82	\$20.96	\$17,684	\$1,238
501+	8	0.75	0.10	0.85	\$57.82	\$20.96	\$364	\$25
<b>Total</b>	<b>634</b>			<b>2.25</b>			<b>\$25,148</b>	<b>\$1,760</b>

<sup>a</sup> First-year burden costs = col. 2 x ((col.3 x col.6) + (col.4 x col.7)).

<sup>b</sup> Annualized burden costs = col. 8 x 0.07, where 0.07 is the annualization factor.

Section 75.1502 requires each underground coal mine operator to revise the program of instruction in the mine emergency evacuation and firefighting program of instruction to reflect the new requirements and to send it to the District Manager of the Coal Mine Safety and Health district in which the mine is located. MSHA estimates that to revise this program will take a safety director approximately: 1.5 hours at mines with 1-19 employees; 2.5 hours at mines with 20-500 employees; and 3.5 hours at mines with 501+ employees. The Agency also estimates that it takes 0.1 hours (6 minutes) of a clerical employee's time to photocopy and send a program of instruction to the appropriate MSHA District Manager. Table VII-A2 shows, by mine size, first-year burden hours and cost to revise the § 75.1502 program of instruction.

**Table VII-A2: First Year Burden Hours and Costs to Revise the Program of Instruction under § 75.1502**

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Mine Size	No. of Mines	Superv. Time to Revise Plan in Hrs.	Clerical Time to Copy Plan in Hrs.	Annual Burden Hours	Superv. Wage Rate per Hr.	Clerical Wage Rate per Hr.	First Year Burden Costs <sup>a</sup>	Annualized Burden Costs <sup>b</sup>
1-19	237	1.5	0.1	1.60	\$57.82	\$20.96	\$21,052	\$1,474
20-500	389	2.5	0.1	2.60	\$57.82	\$20.96	\$57,045	\$3,993
501+	8	3.5	0.1	3.60	\$57.82	\$20.96	\$1,636	\$115
<b>Total</b>	<b>634</b>			<b>7.80</b>			<b>\$79,733</b>	<b>\$5,581</b>

<sup>a</sup> First year burden costs = col. 2 x ((col.3 x col.6) + (col.4 x col.7)).

<sup>b</sup> Annualized burden costs = col. 8 x 0.07, where 0.07 is the annualization factor.

Section 75.1502(c) and § 75.383(b) of the ETS are revised and combined into § 75.1504. Paragraph (a)(2) requires a new section or outby foreman, or a current section or outby foreman who receives a new work location, to travel both the primary and alternate escapeways prior to assuming duties on the new section or outby work location. Paragraph (d)(1) requires the operator to certify when a portion of the training was completed. MSHA estimates that a safety director takes approximately 0.0025 hours (9 seconds) to certify, by signature and date, that the foremen completed this requirement. MSHA also estimates that such certification will occur 8 times per year for current outby foremen traveling escapeways, and 1 time per year for new foremen and current section foremen traveling escapeways. Table VII-A3 shows, by mine size, the annual burden hours and costs for certifying each time foremen travel the escapeways prior to assuming new duties.

**Table VII-A3: Annual Burden Hours and Costs  
Under § 75.1504(d)(1) to Certify Foremen  
Traveling Escapeways Prior to Assuming New Duties**

Mine Size	No. of Foremen	No. of Times to Certify per Year	Time to Certify Each Miner in Hrs.	Annual Burden Hours	Superv. Wage Rate per Hr.	Annual Burden Costs
<b>New Foremen and Current Section Foremen Traveling Escapeways</b>						
1-19	332	1	0.0025	0.83	\$57.82	\$47.99
20-500	745	1	0.0025	1.8625	\$57.82	\$107.69
501+	50	1	0.0025	0.125	\$57.82	\$7.23
Sub-Total	1,127			2.82		\$162.91
<b>Current Outby Foremen Traveling Escapeways</b>						
1-19	237	8	0.0025	4.74	\$57.82	\$274
20-500	287	8	0.0025	5.74	\$57.82	\$332
501+	50	8	0.0025	1.00	\$57.82	\$58
Sub-Total	574			11.48		\$664
<b>Total</b>				<b>14.30</b>		<b>\$827</b>

Section 75.1504(d)(4) requires mine operators, upon request, to provide a copy of the training certification under § 75.1504 to miners. A clerical employee, earning \$20.96 per hour, is estimated to take 0.025 hours (1.5 minutes) to provide the information for each request.

**Table VII-A4: Annual Burden Hours and Costs to provide Training Records under § 75.1504(d)(4)**

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mine Size	No. of Miners	No. of Contractors	Time to Provide Record (in Hrs.)	Annual Burden Hours <sup>a</sup>	Clerical Wage Rate per Hour	Annual Burden Costs <sup>b</sup>
1-19	106	47	0.025	3.83	\$20.96	\$80
20-500	1,358	600	0.025	48.95	\$20.96	\$1,026
501+	211	93	0.025	7.60	\$20.96	\$159
Total	1,675	740		60.38		\$1,265

<sup>a</sup> Col. 5 = (col. 2 + col. 3) x col. 4.

<sup>b</sup> Col. 7 = (col. 2 + col. 3) x col. 4 x col. 6.

**Section VII-B**

Under § 50.10 coal and metal and nonmetal (M/NM) operators are required to report to MSHA immediately and without delay certain types of accidents (such as unplanned fires). The definition of accident concerning an unplanned mine fire has been changed under § 50.2(h)(6) such that underground coal and M/NM operators must now report any unplanned fire not extinguished within 10 minutes. Therefore, it is expected that this change will result in an increase in the number of unplanned fires reported to MSHA. Also, under § 50.11(b) the mine operator must conduct an investigation of each accident required to be reported under § 50.10, and for those mines with 20 or more employees a report must be submitted. Mines with 1-19 employees are allowed to report an accident on Form 7000-1 and do not have to write a separate report.

MSHA estimates that it takes: 0.1 hours (6 minutes) to notify MSHA (by telephone) of a fire; 1 hour to investigate the fire; and another 1 hour to prepare the report. A supervisory person, earning \$57.82 per hour in coal mines and \$52.31 per hour in M/NM mines, is expected to notify MSHA, conduct the investigation, and prepare the report. Thus, MSHA estimates that it will take an operator to notify MSHA and conduct an investigation: 1.1 hours for mines with 1-19 employees; and 2.1 hours for mines with 20 or more employees. MSHA estimates the following additional fires annually: 20.9 fires in underground coal mines; and 25.3 fires in underground M/NM mines. Table VII-B1 shows, by mine size, the annual burden hours and costs for underground coal and M/NM mines to report additional unplanned fires to MSHA.

**Table VII-B1: Annual Burden Hours and Costs to Report Fires under § 50.10 and § 50.11(b)**

Mine Size	No. of Fires	Time to Notify, Investigate, & Report in Hrs.	Annual Burden Hours	Superv. Wage Rate Per Hr.	Annual Burden Costs
Underground Coal Mines					
1-19	2.6	1.1	2.86	\$57.82	\$165
20-500	9.7	2.1	20.37	\$57.82	\$1,178
501+	8.6	2.1	18.06	\$57.82	\$1,044
Total	20.9		41.29		\$2,387
Underground M/NM Mines					
1-19	0	1.1	0.00	\$52.31	\$0
20-500	15.6	2.1	32.76	\$52.31	\$1,714
501+	9.7	2.1	20.37	\$52.31	\$1,066
Total	25.3		53.13		\$2,779

**Section VII-C**

There are no information collections burdens associated with Section C of Chapter IV.

**Section VII-D**

Under existing § 75.1714-3(d) operators need to inspect SCSRs. This inspection occurs approximately every 90 days (or 4 times annually) and is estimated to take 0.025 hours (1.5 minutes) per inspection, for a supervisor to conduct. Table VII-D1 shows, by mine size, the annual burden hours and costs for mine operators to inspect the additional SCSRs required by the final rule.

**Table VII-D1: Annual Burden Hours and Costs to Inspect SCSRs under § 75.1714-3(d)**

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mine Size	Total No. of SCSRs Required by the Rule <sup>a</sup>	Time to Inspect an SCSR <sup>a</sup>	No. of Inspections per Year	Annual Burden Hours	Superv. Wage Rate per Hour	Annual Burden Costs to Inspect SCSR
1-19	5,463	0.025	4	546.30	\$57.82	\$31,587
20-49	19,631	0.025	4	1,963.10	\$57.82	\$113,506
50-99	25,276	0.025	4	2,527.60	\$57.82	\$146,146
100-500	95,063	0.025	4	9,506.30	\$57.82	\$549,654
501+	22,572	0.025	4	2,257.20	\$57.82	\$130,511
<b>Total</b>	<b>168,005</b>			<b>16,800.50</b>		<b>\$971,405</b>

<sup>a</sup> Source: Table IV-D26.

In addition, under existing § 75.1714-3(e), the person inspecting the SCSRs must certify, by signature and date, that the inspection has been performed. MSHA estimates that it takes 0.0025 hours (9 seconds) to certify an SCSR inspection. This inspection occurs 4 times per year. Thus, annually, it will take 0.01 hours to certify that an inspection has been conducted on an SCSR (0.0025 hours x 4 times per year). A supervisor will conduct the inspection. Table VII-D2 shows, by mine size, the annual burden hours and costs for mine operators to certify that inspections of additional SCSRs required by the final rule were performed.

**Table VII-D2: Annual Burden Hours and Costs to Certify that SCSR Inspections Were Performed under §75.1714-3(e)**

(1)	(2)	(3)	(4)	(5)	(6)
Mine Size	Total No. of SCSRs Required by the Rule <sup>a</sup>	Time to Certify Inspection per Yr. (in Hrs.) <sup>a</sup>	Annual Burden Hours	Superv. Wage Rate per Hr.	Annual Burden Costs to Inspect
1-19	5,463	0.01	54.63	\$57.82	\$3,159
20-49	19,631	0.01	196.31	\$57.82	\$11,351
50-99	25,276	0.01	252.76	\$57.82	\$14,615
100-500	95,063	0.01	950.63	\$57.82	\$54,965
501+	22,572	0.01	225.72	\$57.82	\$13,051
<b>Total</b>	<b>168,005</b>		<b>1,680.05</b>		<b>\$97,140</b>

<sup>a</sup> Source: Table IV-D28.

Also, under existing § 75.1714-3(e) a record has to be made of any inspection that involved corrective action. MSHA estimates that it takes 0.05 hours (3 minutes) for a supervisor to make a corrective action record and that only 0.5 percent of the SCSRs inspected would require a record noting the corrective action taken. Table VII-D3 shows, by mine size, the annual burden hours and costs to make corrective action records.

**Table VII-D3: Annual Burden Hours and Costs to Make a Record of Correction Actions Taken Concerning SCSRs Inspected under § 75.1714-3(e)**

(1)	(2)	(3)	(4)	(5)	(6)
Mine Size	Annual No. of SCSR Records <sup>a</sup>	Time to Make Each Record (in Hrs.)	Annual Burden Hours	Superv. Wage Rate per Hour	Annual Burden Costs to Make Record
1-19	27	0.05	1.37	\$57.82	\$79
20-49	98	0.05	4.91	\$57.82	\$284
50-99	126	0.05	6.32	\$57.82	\$365
100-500	475	0.05	23.77	\$57.82	\$1,374
501+	113	0.05	5.64	\$57.82	\$326
Total	840		42.00		\$2,429

<sup>a</sup> Source: Table IV-D29.

Final § 75.1714-5 requires that the mine escapeway map under § 75.1505 be revised to indicate storage locations of SCSRs. The revised mine escapeway map has to be posted in each working section and in each area where mechanized mining equipment is being installed or removed, and at a surface location of the mine where miners congregate, such as the mine bulletin board. On average, MSHA assumes the map will be posted at two locations in the mine for mines with less than 100 employees, and three locations in the mine for mines with 100 or more employees. The Agency estimates that it takes 0.25 hours (15 minutes) to revise the map and another 0.25 hours (15 minutes) for copying and posting. Thus, it is estimated to take 0.5 hours (30 minutes) for revising, copying and posting. The revisions will be done by a supervisor. Copying and posting will be done by a clerical employee. The \$39.39 hourly wage is derived as follows:  $\$39.39 = ((0.25 \text{ hrs.} / 0.5 \text{ hrs.}) \times \$57.82 \text{ supervisor wage rate per hr.}) + ((0.25 \text{ hrs.} / 0.5 \text{ hrs.}) \times \$20.96 \text{ clerical wage per hr.})$ . Table VII-D4 shows, by mine size, the first-year burden hours and costs, and annualized costs associated with revising the § 75.1505 mine escapeway map.

**Table VII-D4: First Year Burden Hours and Costs  
to Revise § 75.1505 Mine Evacuation Map to Include  
SCSR Storage Locations as Required by § 75.1714-5**

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mine Size	No. of Mines <sup>a</sup>	Time for Revision <sup>a</sup>	First Year Burden Hours	Wage Rate per Hour <sup>a</sup>	First Year Burden Costs	Annualized Burden Costs <sup>b</sup>
1-19	119	0.5	59.50	\$39.39	\$2,344	\$164
20-49	134	0.5	67.00	\$39.39	\$2,639	\$185
50-99	75	0.5	37.50	\$39.39	\$1,477	\$103
100-500	79	0.5	39.50	\$39.39	\$1,556	\$109
501+	8	0.5	4.00	\$39.39	\$158	\$11
<b>Total</b>	<b>415</b>		<b>207.50</b>		<b>\$8,173</b>	<b>\$572</b>

<sup>a</sup> Source: Table IV-D30.

<sup>b</sup> Annualized burden costs = first year burden costs x 0.07, where 0.07 is the annualization factor.

Final § 75.1714-5 requires that the mine map under existing § 75.1200 be revised to indicate the stored locations of SCSRs. The mine map required by § 75.1200 does not have to be posted but needs to be sent to MSHA. MSHA estimates that it takes 0.25 hours (15 minutes) to revise this map. A supervisor will make the revision. A clerical employee is estimated to take 0.1 hours (6 minutes) to copy and send the map. The \$47.29 hourly wage is derived as follows:  $\$47.29 = ((0.25 \text{ hrs.} / 0.35 \text{ hrs.}) \times \$57.82 \text{ supervisor wage rate per hr.}) + ((0.1 \text{ hrs.} / 0.35 \text{ hrs.}) \times \$20.96 \text{ clerical wage per hr.})$ . Table VII-D5 shows, by mine size, the first-year burden hours and costs associated with revising mine maps required by § 75.1200.



**Table VII-D5: First Year Burden Hours and Costs  
to Revise § 75.1200 Mine Map to Include  
SCSR Storage Locations as Required by § 75.1714-5**

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mine Size	No. of Mines <sup>a</sup>	Time for Revision <sup>a</sup>	First Year Burden Hours	Wage Rate per Hour <sup>a</sup>	First Year Burden Costs	Annualized Burden Costs <sup>b</sup>
1-19	119	0.35	41.65	\$47.29	\$1,970	\$138
20-49	134	0.35	46.90	\$47.29	\$2,218	\$155
50-99	75	0.35	26.25	\$47.29	\$1,241	\$87
100-500	79	0.35	27.65	\$47.29	\$1,308	\$92
501+	8	0.35	2.80	\$47.29	\$132	\$9
<b>Total</b>	<b>415</b>		<b>145.25</b>		<b>\$6,869</b>	<b>\$481</b>

<sup>a</sup> Source: Table IV-D31.

<sup>b</sup> Annualized burden costs = first year burden costs x 0.07, where 0.07 is the annualization factor.

Under § 75.1714-8(a) mine operators must provide to MSHA an inventory of all SCSRs at each mine. For each mine, the report must include mine name, MSHA mine ID number, and mine location. For each SCSR in each mine, the report must include: manufacturer, model type, date of manufacture, and serial number. The inventory must be sent to MSHA.

MSHA assumes that to conduct the SCSR inventory and prepare the report will take a supervisor, earning \$57.82 per hour, 2 hours in mines with 1-19 employees; 4 hours in mines with 20-49 employees; 10 hours in mines with 50-99 employees; and 18 hours in mines with 100 or more employees. A clerical employee, earning \$20.96 per hour, is assumed to take 0.2 hours (12 minutes) to copy and send the report. Table VII-D6 shows, by mine size, first-year burden and costs to prepare and send to MSHA an SCSR inventory report.

**Table VII-D6: First Year Burden Hours and Costs  
for SCSR Inventory and Report under § 75.1714-8(a)**

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Mine Size	No. of Mines <sup>a</sup>	Time to Conduct Report (in Hrs.) <sup>a</sup>	Time to Copy & Send Report (in Hrs.) <sup>a</sup>	First Year Burden Hours	Superv. Wage Rate (per Hr.)	Clerical Wage Rate (per Hr.)	First Year Burden Costs <sup>b</sup>	Annualized Burden Costs <sup>c</sup>
1-19	237	2	0.2	521.40	\$57.82	\$20.96	\$28,400	\$1,988
20-49	235	4	0.2	987.00	\$57.82	\$20.96	\$55,336	\$3,874
50-99	75	10	0.2	765.00	\$57.82	\$20.96	\$43,679	\$3,058
100-500	79	18	0.2	1,437.80	\$57.82	\$20.96	\$82,551	\$5,779
501+	8	18	0.2	145.60	\$57.82	\$20.96	\$8,360	\$585
<b>Total</b>	<b>634</b>			<b>3,856.80</b>			<b>\$218,326</b>	<b>\$15,283</b>

<sup>a</sup> Source: Table IV-37.

<sup>b</sup> First year burden costs = (col. 2 x col. 3 x col. 6) + (col. 2 x col. 4 x col. 7).

<sup>c</sup> Annualized burden costs = first year burden costs x 0.07, where 0.07 is the annualization factor.

Final rule § 75.1714-8(a)(2) requires changes in the inventory during the reporting year to be reported to MSHA within the quarter that a change occurs. Annually, MSHA assumes that all mines will revise their SCSR inventory report in 3 of 4 annual quarters. The time to revise the report, by a supervisor earning \$57.82 per hour, is estimated to be 0.25 hours (15 minutes) in mines with 1-19 employees and 20-49 employees; and 0.5 hours (30 minutes) in mines with 50 or more employees. MSHA estimates that a clerical employee, earning \$20.96 per hour, will take 0.1 hours (6 minutes) to copy and send the report. Table VII-D7 shows, by mine size, annual burden hours and costs to prepare and send to MSHA a revised SCSR inventory report.

**Table VI-D7: Annual Burden Hours and Costs  
to Revise SCSR Inventory Report under § 75.1714-8(a)(2)**

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Mine Size	No. of Mines <sup>a</sup>	Revisions per Year <sup>a</sup>	Time to Revise Report (in Hrs.) <sup>a</sup>	Time to Copy & Send Report (in Hrs.) <sup>a</sup>	Annual Burden Hours	Superv. Wage Rate per Hr.	Clerical Wage Rate per Hr.	Annual Burden Costs <sup>b</sup>
1-19	237	3	0.25	0.1	248.85	\$57.82	\$20.96	\$11,768
20-49	235	3	0.25	0.1	246.75	\$57.82	\$20.96	\$11,668
50-99	75	3	0.50	0.1	135.00	\$57.82	\$20.96	\$6,976
100-500	79	3	0.50	0.1	142.20	\$57.82	\$20.96	\$7,348
501+	8	3	0.50	0.1	14.40	\$57.82	\$20.96	\$744
<b>Total</b>	<b>634</b>				<b>787.20</b>			<b>\$38,505</b>

<sup>a</sup> Source: Table IV-D38.

<sup>b</sup> Annual burden costs = col. 2 x col. 3 x ((col. 4 x col. 7) + (col. 5 x col. 8)).

Final § 75.1714-8(b) requires that the mine operator report to MSHA any problem or malfunction with an SCSR. MSHA estimates that, for all mine sizes, on average, a mine will make such reports to MSHA once per year. The Agency estimates that a supervisor, earning \$57.82 per hour, will take 0.25 hours (15 minutes) to prepare the report. A clerical employee, earning \$20.96 per hour, is estimated to take 0.1 hours (6 minutes) to copy and send the report. The \$47.29 hourly wage rate is derived as follows:  $\$47.29 = ((0.25 \text{ hrs.} / 0.35 \text{ hrs.}) \times \$57.82 \text{ supervisor wage rate per hr.}) + ((0.1 \text{ hrs.} / 0.35 \text{ hrs.}) \times \$20.96 \text{ clerical wage per hr.})$ . Table VII-D8 shows, by mine size, annual costs to report malfunctions or problems with SCSRs.

**Table VII-D8: Annual Burden Hours and Costs  
to Report SCSR Problems under § 75.1714-8(b)**

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mine Size	No. of Mines <sup>a</sup>	Annual Reports of SCSR Use <sup>a</sup>	Time to Make Report <sup>a</sup>	Annual Burden Hours	Wage Rate per Hour <sup>a</sup>	Annual Burden Costs
1-19	237	1	0.35	82.95	\$47.29	\$3,923
20-49	235	1	0.35	82.25	\$47.29	\$3,889
50-99	75	1	0.35	26.25	\$47.29	\$1,241
100-500	79	1	0.35	27.65	\$47.29	\$1,308
501+	8	1	0.35	2.80	\$47.29	\$132
<b>Total</b>	<b>634</b>			<b>221.90</b>		<b>\$10,493</b>

<sup>a</sup> Source: Table IV-39.

MSHA estimates that the burden hours and costs for new mines will be: 20 percent of the first-year costs for mines that have 1-19 employees; 9 percent of the first-year costs for mines that have 20-49 employees, 50-99 employees, and 100-500 employees. MSHA estimates no new mine costs for mines that employ 501+ employees. New mine costs (which are only the costs to provide to MSHA an inventory of all SCSRs at the mine) are assumed to begin in the second year and continue every year thereafter. Table VII-D shows, by mine size, the annual burden hours and costs that begin in the second year for new mines.

**Table VII-D9: New Mine Annual Burden Hours and Costs Beginning in Second Year and Subsequent Years**

Detail	Mine Size by Employment									
	1-19		20-49		50-99		100-500		Total	
	Burden Hrs.	Burden Costs	Burden Hrs.	Burden Costs	Burden Hrs.	Burden Costs	Burden Hrs.	Burden Costs	Burden Hrs.	Burden Costs
Table VII-D6	521.40	\$28,400	987.00	\$55,336	765.00	\$43,679	1,437.80	\$82,551	3,711.20	\$209,967
Total	521.40	\$28,400	987.00	\$55,336	765.00	\$43,679	1,437.80	\$82,551	3,711.20	\$209,967
New Mines Factor <sup>a</sup>	0.2	0.2	0.09	0.09	0.09	0.09	0.09	0.09		
New Mine Burden	104.28	\$5,680	88.83	\$4,980	68.85	\$3,931	129.402	\$7,430	391.36	\$22,021

<sup>a</sup> Annual costs for mines with 1-19 employees = (first year only burden hours and costs x 0.20). Annual costs for mines with 20-49 employees, 50-99 employees, and 100-500 employees = (first year only burden hours and costs x 0.09).

<sup>b</sup> New mine burden for Table VII-D6 applies to § 75.1714-8(a).

## VIII. REFERENCES

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