REGULATORY ECONOMIC ANALYSIS

FOR

SEALING OF ABANDONED AREAS
EMERGENCY TEMPORARY STANDARD

RIN: 1219-AB52

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

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I. EXECUTIVE SUMMARY

INTRODUCTION

This Regulatory Economic Analysis (REA) examines the costs and benefits of MSHA's emergency temporary standard (ETS) to revise MSHA's existing standards for the seals in underground coal mines that separate abandoned areas from active workings. Miners face a grave danger from the hazards of sealed areas. This ETS includes requirements to strengthen the design, construction, maintenance, and repair of seals, as well as requirements for sampling and controlling atmospheres behind seals. It also increases the level of overpressure for new seals, thus, implementing the requirements of the Mine Improvement and New Emergency Response (MINER) Act of 2006.

MINE SECTOR AFFECTED

The ETS would be applicable to all underground coal mines subject to MSHA's jurisdiction. Chapter II of this REA provides a description of the underground coal mine sector. The ETS would cover all seals in underground coal mines.

POPULATION AT RISK

The ETS applies to all underground coal mines in the United States. Based on preliminary data, there were 670 underground coal mines, employing 42,667 miners, operating in the U.S. in 2006.

BENEFITS SUMMARY

To estimate benefits, MSHA focused on the two accidents in 2006 where the seals failed and fatalities occurred: the Sago mine explosion, where 12 miners died, and the Darby No. 1 mine explosion, where 5 miners died. It is reasonable to assume that if the ETS had been in effect, all 17 of these miners' lives might have been saved. For the period 1993 through 2006, MSHA estimates that the ETS would result in an average of more than one miner's life saved per year.

With the provisions of the ETS in effect, an explosion is less likely to occur behind seals that are being actively monitored and maintained in an inert atmosphere. The provisions of the ETS also strengthen seals to better withstand explosions, which reduces miner injuries and fatalities and provides miners more time to react to a situation involving an explosion in the sealed area.

COMPLIANCE COST SUMMARY

MSHA estimates that the ETS will result in total yearly costs for underground mine operators of approximately $39.7 million. Total first year costs will be approximately $43.2 million. Disaggregated by mine size, yearly costs will be $2.6 million for the 83 mine operators with fewer than 20 employees; $34.7 million for the 279 mine operators with 20-500 employees; and $2.4 million for the 10 mine operators with more than 500 employees. Most of the compliance cost occurs in the mine size category with 20-500 employees because 75 percent of the mines that use seals are in this size category.

REGULATORY FLEXIBILITY CERTIFICATION AND ANALYSIS

In accordance with § 605 of the Regulatory Flexibility Act, MSHA certifies that the ETS would 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, MHSA must include in the ETS 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 ETS published 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 chapter provides information concerning the structure and economic characteristics of the underground coal mining industry, including the number of mines and employees by type and size of mine. The value of the coal output of the U.S. underground coal mining sector was estimated to be approximately $13.1 billion in 2006.[1]

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. Each sector is further divided by type of operation (e.g., underground mines or surface mines). The Agency maintains data on the number of mines and on mining employment by mine type and size. MSHA also collects data on the number of independent contractor firms and their employees. Each independent contractor is issued one MSHA contractor ID but may work at any mine.

MSHA generally groups mines into three different categories based on employment: 1-19 employees; 20-500 employees; and 501+ employees. For rulemaking purposes, the Agency has traditionally defined a small mine to be one employing 1-19 employees and a large mine to be one employing 20 or more employees. However, to comply with the requirements of the SBREFA amendments to the Regulatory Flexibility Act (RFA), MSHA also uses 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 underground coal mines, by employment size, excluding contractors.

Table II-1: Distribution of Underground Coal Mines (Excluding Contractors), by Employment Size, 2006

Size of Underground Coal Mine									All Underground Coal Mines		
1-19 Employees			20 to 500 Employees			501+ Employees					
Mines	Miners	Office Empl.	Mines	Miners	Office Empl.	Mines	Miners	Office Empl.	Mines	Miners	Office Empl.
236	2,313	73	421	32,874	969	13	7,490	146	670	42,677	1,188

Source: U.S. DOL, MSHA, PEIR, based on preliminary data, March 27, 2007.

[1] 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), 2006 preliminary data, March 27, 2007 Teradata run. Estimated coal revenue in 2006 is reported in 2005 dollars. The average U.S. price of underground coal for 2005 is from the Department of Energy (DOE), Energy Information Administration (EIA), *Annual Coal Report 2005*, October 2006, Table 28, page 56.

Table II-2 presents data on the number of independent contractors that worked in underground coal mines in 2006.

Table II-2: Distribution of Underground Coal Contractors, by Employment Size, 2006

Size of Underground Coal Contractor									All Underground Coal Contractors		
1-19 Employees			20 to 500 Employees			501+ Employees					
Firms	Non-Office Empl.	Office Emp.	Firms	Non-Office Empl.	Office Emp.	Firms	Non-Office Empl.	Office Emp.	Firms	Non-Office Empl.	Office Emp.
197	1,386	56	84	6,864	206	0	0	0	281	8,250	262

Source: U.S. DOL, MSHA, PEIR, based on preliminary data, March 27, 2007.

STRUCTURE OF THE COAL MINING INDUSTRY

Agency data in Table II-1 indicate that there were 670 underground coal mines that reported employment during some portion of calendar year 2006. Underground coal mine employment in 2006 was 43,865, of which 42,677 were miners and 1,188 were office employees.

ECONOMIC CHARACTERISTICS OF THE COAL MINING INDUSTRY

MSHA classifies the U.S. coal mining sector into three major commodity groups: bituminous, lignite, and anthracite.[2] Bituminous operations represent approximately 91% of coal mining operations, employ 94% of all coal miners, and account for 93% of total coal production. Lignite operations represent approximately 1% of coal mining operations, employ 4% of all coal miners, and account for 7% of total coal production. Anthracite operations represent approximately 7% of coal mining operations, employ 1% of all coal miners, and account for 0.1% of total coal production.[3]

The U.S. underground coal sector produced an estimated 0.359 billion short tons of coal in 2006. The average price of coal underground mines in 2005 was $36.42 per ton.[4]

Mines east of the Mississippi River accounted for approximately 44 percent of coal production in 2005. For the period 1949 through 2005, coal production east of the Mississippi River ranged from a low of 413 million tons in 1960 to a high of 630 million tons in 1990; 2005 production was estimated at 493 million tons. Coal production west of the Mississippi ranged from a low of 21 million tons in 1960 to an estimated record high of 640 million tons in 2005.[5]

[2] This categorization is based on MSHA-collected data grouped by SIC code description. Some publications of the U.S. Department of Energy further divide the bituminous group into bituminous coal and sub-bituminous coal. Other publications from MSHA combine lignite coal with bituminous coal.

[3] Based on 2006 preliminary data from U.S. DOL, MSHA, PEIR, March 27, 2007 Teradata run.

[4] Coal prices are the average open market sales prices for 2005. U.S. DOE, EIA, *Annual Coal Report* 2005, October 2006, Table 28, p. 56.

[5] U.S. DOE, EIA, *Annual Energy Review 2005*, July 2006, Table 7.2, p. 207.

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 1950-2005 are presented in Table II-3. The nominal price is the actual price received. The real price is the price adjusted for inflation by using constant dollars from a particular year, which in Table II-3 is the year 2000. During this period, the real price of coal has generally declined. The only exceptions were a spike during the OPEC petroleum price increases in the 1970s and increases since 2000. The estimated real price of coal per ton was approximately 31 percent lower in 2005 than in 1950.[6] The estimated real price of coal per Btu was approximately 15 percent lower in 2005 than in 1950, making coal the least expensive of the major fossil fuels in terms of dollars per Btu.[7]

[6] Ibid., Table 7.8, p. 219.

[7] Ibid., Table 3.1, p. 67. Per Btu, coal energy was more expensive than natural gas energy in 1950, but since 1979 has been less expensive. Both coal and gas energy were less expensive than crude oil energy in 1950 and have remained less expensive in every year since then.

Table II-3: Coal Prices 1950-2005
(Dollars per Short Ton and Dollars per Million Btu)

Year	Nominal Price (Dollars per Short Ton)	Real Price (Year 2000 Dollars per Short Ton)	Nominal Price (Dollars per Million Btu)	Real Price (Year 2000 Dollars per Million 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	0.87	0.92
1997	18.14	19.01	0.85	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	17.26	0.87	0.84
2003	17.85	16.79	0.87	0.82
2004	19.93	18.27	0.98	0.89
2005	24.12	21.51	1.19	1.06

Source: DOE, EIA, *Annual Energy Review 2005*, July 2006, 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, following the growth of electrical power demand of approximately 1.2 percent a year. Approximately 92 percent of U.S. coal demand was accounted for by electric power producers in 2005.[8] Domestic coal demand is projected to increase based on the increase in its use for electricity generation. Coal consumption for electricity generation has been projected to increase on average, by 1.6 percent per year from 2003 to 2025 as the utilization of existing coal-fired generation capacity increases and as new capacity is added.[9]

[8] U.S. DOE, EIA, *Annual Energy Review 2005*, July 2006, Table 7.3, p. 209.

[9] U.S. DOE, EIA, *Annual Energy Outlook 2005*. February 2005, p. 108.

III. BENEFITS

BACKGROUND

In underground coal mines there is a risk of an explosion if a methane build-up occurs in the mine. The minimum temperature required to ignite an explosive methane-air mixture is approximately 1,000 degrees Fahrenheit (538° C). An explosive mixture can easily be ignited by a weak electrical spark, frictional spark, heated surface, or open flame. The amount of energy necessary for ignition will vary with the gas concentration; however, as little as 0.3 millijoule of electrical energy is capable of igniting methane. The 0.3 millijoule of electrical energy is equivalent to 1/120,000,000 of energy used in one second by a 50-horsepower motor or about 1/50 of the static electricity accumulated by an average-sized person walking on a carpeted floor on a dry day.

This risk of a methane explosion is of special concern in worked-out areas of the mine. In order to decrease the risk of explosion in worked-out areas of the mine, existing 30 CFR §75.334 requires underground coal mine operators to either ventilate or seal worked-out areas. For some underground mines, continued ventilation of worked-out areas may be costly and could divert ventilating air away from other, more productive uses. In addition, worked-out areas that are ventilated need to be regularly inspected, because those areas can expose miners to underground hazards. As an alternative to ventilating worked-out areas in an underground coal mine, an operator can choose to seal off those areas. Seals are walls constructed from solid, incombustible materials that separate worked-out areas from the active areas of an underground coal mine.

If seals are not constructed properly or if the area around the seal has been disturbed by the earth's movement, thus compromising the seal, methane can leak through the seal and be ignited by a source in the active working area of the mine. In rare cases, roof falls can ignite an explosive methane-air mixture within the sealed area, either by generating heat or by releasing piezoelectric energy. During a roof fall rocks forming the strata comprising the main roof rub against one another as the roof moves and eventually falls. In rare cases, the resulting friction from rubbing or from impact can cause temperatures above the ignition temperature of methane. Ignition can also be obtained by piezoelectric discharges during certain roof falls. This type of event is typically associated with rock containing crystalline structures such as tourmaline, quartz, boracite, topaz, and Rochele salt. These crystals produce electric charges on parts of their surface when they are compressed in particular directions. In coal mining, the most notable crystal formation found is the quartzarenite content of sandstone. Finally, lightning can also be an ignition source. It is possible for lightning to travel down a borehole and strike an insulated cable and thus create a spark that could ignite an explosive methane-air mixture contained in a sealed-off area of the mine.

When a methane explosion occurs in a sealed area, contamination of the air can be contained provided the seals can withstand the force of the explosion. If the seal is breached from an explosion, air in active work areas outside the seal can become contaminated. In addition, when an explosion breeches a seal, the force of the explosion can turn pieces of the seal and other mine debris into projectiles. In situations where a seal withstands the force of an explosion, miners have a much better chance to avoid injury and to evacuate safely from the

mine. Thus, the importance of strong seals that are adequately maintained cannot be overemphasized.

EXPLOSIONS IN SEALED AREAS IN UNDERGROUND COAL MINES

From 1993 through 2006 there have been 13 explosions in sealed areas. In 11 of the 13 explosions seals were damaged or destroyed by the force of the explosion, and in the remaining two explosions the seals remained intact. In addition, two of the 13 explosions resulted in a total of 17 fatalities.

On January 2, 2006, an explosion in the Sago mine near Buchannon, West Virginia resulted in the death of 12 miners. Sixteen of the 29 miners that were in the mine at the time of the explosion exited the mine safely. One miner was found dead by a rescue team in direct line of the forces and gases from the explosion. Twelve other miners located themselves in a temporary barricade a considerable distance from where the explosion occurred. Only one of these twelve miners was found alive in the barricade. The surviving miner suffers from the effects of carbon monoxide poisoning. All seals between the worked-out area where the explosion occurred and the active areas of the mine were reported destroyed.

On May 20, 2006, an explosion in the Darby No. 1 mine in Middlesboro, Kentucky resulted in the death of 5 miners. Mine rescue team members responding to the disaster at the Darby No. 1 mine reported that seals used in the mine had failed to withstand the explosion. MSHA's accident investigation reported that two miners died from the initial explosion and, following the explosion, three other miners died from carbon monoxide poisoning with smoke and soot inhalation, as they attempted to escape.[10]

In the remaining explosions where seals were breached, no injuries occurred either because miners were far enough away from the initial explosion or because no one was in the mine. There is evidence that areas of the mine far from the initial explosion were damaged. On February 1, 2002, an explosion occurred at the Big Ridge Portal No. 2 mine in Harrisburg, Illinois. Fortunately, 30 miners who were in the mine were able to safely evacuate the mine. However, airlock doors approximately 3,600 feet outby the 2nd East seals where the explosion originated were opened by the forces of the explosion. In addition, the nearest active unit was 4,200 feet outby the seals. Miners on that unit felt the forces of the explosion. The resultant forces from the explosion damaged ventilation control devices in the mine, causing a brief air reversal on the mining unit. On May 15 and June 22, of 1996, explosions occurred at the Mine No. 1 in Quinland, West Virginia. As a result of the May 15 explosion, one of the blown-out seals (No. 43 seal) had pieces of the seal fiber cribs scattered outby for a distance of approximately 200 feet. On January 29, 1996, an explosion occurred at the Oak Grove Mine in Adger, Alabama. Investigation of the explosion revealed that 5 seals (Nos. 29 through 33) were destroyed, with pieces being blown 80 to 100 feet outby the explosion. Also, in this explosion some stoppings located approximately 1,500 feet east of the damaged seals were compromised. In each of these explosions, miners were fortunate in that they were either not in the mine or they were far enough away.

[10] U.S. DOL, MSHA, Coal Mine Safety and Health, *Report of Investigation Fatal Underground Coal Mine Explosion, Darby Mine No. 1*, 2007.

BENEFITS OF THE ETS

The ETS will improve miner safety by improving the design, construction, and monitoring of seals to minimize potential explosions behind seals and to assure that seals better withstand explosions. New seals must be designed, constructed, and maintained to withstand 50 psi overpressure when the atmosphere in the sealed area is monitored and maintained inert. If the atmosphere is not monitored and is not maintained inert, then new seals must be designed, constructed, and maintained to withstand an overpressure of 120 psi. If the atmosphere is not monitored and is not maintained inert and the area to be sealed is likely to contain: (1) homogeneous mixtures of explosive gas throughout the entire sealed area, (2) pressure piling, or (3) other conditions conducive to an explosion, seals must meet an overpressure of greater than 120 psi.

All new seal designs and all mine-site seal installations must be certified by a professional engineer. A certified person must directly supervise seal construction, and a senior management official must certify that the seal was correctly built. The procedures concerning seal construction and repair must be addressed in the ventilation plan.

A sampling protocol for monitored seals must be submitted to MSHA for approval in the ventilation plan. This protocol must include an action plan that specifies what the mine operator must do if the atmosphere approaches or becomes explosive in a sealed area.

Miners who construct or repair seals, certified persons supervising seal construction, and certified persons who sample the atmosphere behind seals must be trained and the training records must be maintained at the mine.

To provide a preliminary quantitative estimate of benefits, MSHA analyzed the explosions in sealed areas that have taken place since 1993, and especially the two accidents in 2006 where the seals failed and fatalities occurred: the Sago mine explosion, where 12 miners died, and the Darby No. 1 mine explosion, where 5 miners died. It is reasonable to assume that if the ETS had been in effect, all 17 of these miners' lives might have been saved. Fourteen of these lives might have been saved by the 2006 ETS and final rule on emergency mine evacuation. However, three of the miners that perished in the Sago and Darby accidents died immediately from the explosion impact. They could not have been saved by the emergency mine evacuation rule. For purposes of estimating benefits, MSHA attributes the saving of three miners' lives to this ETS and splits the remaining 14 lives between this ETS and the 2006 emergency mine evacuation rule. Hence, MSHA attributes the saving of 10 lives to this ETS (3 + (14/2) = 10).

MSHA has good data on explosions in sealed areas only since 1993. During the period 1993-2006 (14 years) there were 13 explosions in sealed areas. However, only 11 of these explosions caused any seal damage and thus had the potential to cause fatalities or injuries. Only two of these 11 explosions actually caused fatalities or injuries. A strict division, (10 lives) / (14 years), would suggest that the ETS will save approximately 0.7 lives per year if the explosions followed approximately the same distribution as they did since 1993.

However, MSHA believes that the risk from explosions in sealed areas has been increasing during this time period because the number of seals has been increasing. MSHA did not allow alternative seals until 1992. Prior to 1992, most mines did not seal, but instead ventilated. During the period from 1993 through 2006, mines went through a transition period of

shifting from ventilation to seals. The current risk from explosions in sealed areas is therefore higher than the historic risk during this transition period.

MSHA roughly estimates that, on average, during that transition period, the number of mines using seals was no more than 2/3 of the number of mines that currently use seals. Furthermore, the number of seals in mines is cumulative. During this period of increased seal use, MSHA roughly estimates that the average number of seals in mines that used seals was no more than 2/3 of the number in mines that currently use seals. MSHA specifically asks for comments on these estimates. After adjusting this estimate to account for the increased future risk, the ETS will save approximately 1.6 lives per year, since (10/14)/(2/3)/(2/3) = 1.6. This is MSHA's best estimate on the number of lives saved per year due to the ETS.

MSHA also developed a higher risk estimate, based primarily on the distribution of miners put at risk and the characteristics of the explosions themselves. MSHA also asks for comments on these calculations.

In the 11 explosions in sealed areas with property damage, approximately 688 miners total were underground at the time of the explosions. This is an average of 62.5 miners per explosion that were put at risk. In the two explosions at Sago and Darby only a total of 35 miners were underground at the time of the explosions, for an average risk exposure of 17.5 miners per explosion. Fortunately, no explosions in sealed areas at larger mines (so far) have caused any injuries or fatalities.

If an explosion with the characteristics of the explosions at Sago or Darby occurs at a larger mine, many more lives potentially could be lost. Assuming the risk of fatality from an explosion in a sealed area is about the same at both large and small mines, and the number of potential fatalities is proportional to the number of miners working underground during the other explosions studied by MSHA, then a higher estimate of the benefits of the ETS is approximately 5.7 lives saved per year, since 1.6 x (62.5/17.5) = 5.7.

MSHA also calculated the cumulative risk faced by a miner over a 45 year working life. The 372 existing underground coal mines that seal employ 33,684 miners; of these, 30,095 work underground. Under MSHA's best estimate, the ETS will save 1.6 lives per year, which means the risk of fatality per year per 1,000 miners is 0.053. Over a 45-year working lifetime, the risk of fatality from an explosion in a sealed area is 2.4 per 1,000 miners. If the ETS will save MSHA's higher estimate of benefits of 5.7 lives per year, then the risk of fatality per year per 1,000 miners is 0.191. Over a 45-year working lifetime, the risk of fatality from an explosion in a sealed area is 8.5 per 1,000 miners.

With the provisions of the ETS in effect, an explosion is less likely to occur behind seals that are being actively monitored to maintain an inert atmosphere. The provisions of the ETS also strengthen seals to better withstand explosions, which reduces immediate miner injuries and fatalities and gives miners more time to react to a situation involving an explosion.

SUMMARY

In conclusion, the provisions of the ETS will help reduce the likelihood of explosion and strengthen seals to better withstand explosions, thus reducing injury and death to miners and providing miners more time to react to a situation involving an explosion. Based on historical data, adjusted for an estimate of current risk, MSHA estimates that the ETS will result in an

average of 1.6 to 5.7 miners' lives saved per year. For those miners at risk from explosions in sealed areas, this is a reduction in lifetime risk of approximately 2.4 to 8.5 fatalities per 1,000 miners.

IV. COMPLIANCE COSTS

SUMMARY

In this chapter, MSHA develops estimates of the costs of complying with the ETS. Table IV-1 presents MSHA's estimate of the total yearly costs of the ETS for underground coal mine operators, by size, and by section of the ETS. The cost of the ETS for all underground coal mine operators will be approximately $39.7 million per year. Of this total, mines with 1-19 employees will incur costs of approximately $2.6 million per year, mines with 20-500 employees will incur costs of approximately $34.7 million per year, and mines with 501+ employees will incur costs of approximately $2.4 million per year. Table IV-2 displays the estimated average yearly cost of the ETS per underground coal mine, by mine size. All cost estimates are presented in 2005 dollars.

Table IV-1: Summary of Yearly Costs under Seals ETS

ETS	Description	Table	Yearly Costs by Mine Size			
			1-19	20-500	501+	Total
§75.335(a)	Purchase and Install New Seals	IV-A1	$1,833,293	$23,935,113	$1,599,737	$27,368,143
§75.335(b)	Sampling	IV-B17	$455,117	$6,760,685	$572,867	$7,788,670
§75.336(a)	Manufacturer's Approval	IV-C2	$2,401	$24,209	$1,350	$27,960
§75.336(b)	MSHA Approval of Seals	IV-C3	$99,600	$1,674,000	$56,000	$1,829,600
§75.337	Construction and Repair	IV-D9	$195,731	$1,943,102	$118,121	$2,256,954
§§75.335(b) & 75.336(b)	Ventilation Plan Revisions	IV-E5	$50,522	$319,010	$16,816	$386,347
Total Costs			$2,636,665	$34,656,119	$2,364,891	$39,657,675

Table IV-2: Yearly Cost per Underground Coal Mine

Mine Size	Yearly Cost of ETS	No. of Mines	Yearly Cost per Mine
1-19	$2,636,665	236	$11,172
20-500	$34,656,119	421	$82,319
501+	$2,364,891	13	$181,915
All Mines	$39,657,675	670	$59,191

The total costs reported in Table IV-1, and in all other tables in this chapter, are MSHA's estimates of the projected costs based on the Agency's knowledge, experience, and available information. In some cases, however, the estimates may appear to deviate slightly from the sum or product of their components due to rounding.

METHODOLOGY

For the ETS, 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 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 hourly wage rates of $25.98 for an underground coal miner, $62.50 for an underground coal mine supervisor and a certified person, $21.74 for an underground coal clerical employee, $60.58 for an underground coal mining engineer, $80.17 for an underground coal senior mine official, and $100 for a registered professional engineer.[11] The wage rates include benefits such as social security, unemployment insurance, and workers' compensation, but they do not reflect shift differentials or overtime pay. MSHA refers to miner "compensation" in this REA as "wages," where that term is understood to include benefits.

SCOPE

The ETS applies to all underground coal mines in the United States. Based on preliminary MSHA data, in 2006 there were 670 underground coal mines, employing 42,667 miners.[12]

SECTION-BY-SECTION ANALYSIS

Below MSHA provides a section-by-section analysis of the estimated costs of the ETS. Where possible, the specific data sources that MSHA used for its estimates have been identified. Where no data source is specified, MSHA relied on the experience and expertise of its technical

[11] Hourly wage rates are derived from Western Mine Engineering Inc., *U.S. Coal Mine Salaries, Wages, & Benefits – 2005 Survey Results*.

[12] Based on 2006 preliminary data from U.S. DOL, MSHA, PEIR, March 27, 2007 Teradata run.

staff in the Agency's Offices of Coal Mine Safety and Health, Educational Policy and Development, and Technical Support.

MSHA solicits comments on all the cost estimates presented in the section-by-section analysis, as well as on the assumptions and data sources that MSHA used.

Tables in the section-by-section analysis in this chapter have been numbered according to the requirement: IV-A for seal purchase and installation; IV-B for sampling; IV-C for seal design applications and installation approvals; IV-D for construction and repair of seals; and IV-E for ventilation plan revisions.

ETS § 75.335(a) Seal Construction

Currently 372 underground coal mines use seals: 83 with 1-19 employees; 279 with 20-500 employees; and 10 with 501+ employees. For purposes of this ETS, MSHA assumes that all underground coal mines that currently use seals will continue to seal, rather than ventilate, worked-out areas. MSHA solicits comments on this assumption.

The ETS will increase the cost of constructing seals. MSHA estimates are based on constructing new seals according to the requirements of the ETS minus the cost of constructing existing seals. The items in the Agency's cost estimates include soil and rock drilling, materials and transportation of materials, formwork, pouring of concrete, grouting, and quality control testing. The cost estimates include two sampling pipes per seal, in accordance with ETS § 75.335(d), and one drain pipe per set of seals in accordance with ETS § 75.335(e). MSHA's estimate of the additional cost to mine operators for constructing seals under the ETS is presented below.

The ETS presents a three-tiered approach to seal construction. Under ETS § 75.335(a), seals shall be constructed to withstand either 50 pounds per square inch (psi) overpressure, 120 psi, or an overpressure greater than 120 psi if certain conditions are present. MSHA has estimated the cost of constructing seals at each of the specified psi overpressure levels. MSHA believes that it is doubtful that a mine operator would get representative sample results throughout a sealed area which would indicate the need for a seal greater than 120 psi. Therefore, MSHA has not projected that any mine would construct seals with an overpressure greater than 120 psi.

MSHA estimates that a 3.5-foot thick plug made of concrete with a compressive strength of 3,000 psi will meet the 50 psi overpressure requirement. A 2.0 foot-thick plug made of reinforced concrete with a compressive strength of 4,000 psi will meet the 120 psi overpressure requirement.

MSHA expects seals will be constructed either by a contractor or by in-house employees. MSHA estimates that to construct seals: 80 percent of mines with 1-19 employees will use contractors and 20 percent will use in-house employees; 30 percent of mines with 20-500 employees will use contractors and 70 percent will use in-house employees; and 10 percent of mines with 501+ employees will use contractors and 90 percent will use in-house employees.

Based on the weighted average of the costs of constructing a seal either by a contractor or by in-house employees, MSHA estimates costs of: $14,039 for a 50 psi seal for mines with

1-19 employees;[13] $13,631 for a 50 psi seal and $18,612 for a 120 psi seal for mines with 20-500 employees; and $13,468 for a 50 psi seal and $18,493 for a 120 psi seal for mines with 501+ employees.

Based on the same weighting of costs according to whether the mine uses a contractor or in-house employees, the cost of existing seals is estimated to average $6,676 for mines with 1-19 employees; $5,759 for mines with 20-500 employees; and $5,391 for mines with 501+ employees.

MSHA has subtracted the cost to construct an existing seal from the cost to construct a new seal to compute the additional cost of constructing a seal (that portion of seal costs attributable to the ETS). Using the above cost figures, the estimated additional cost to construct a seal under the ETS will be: $7,363 for a 50 psi seal for mines with 1-19 employees; $7,872 for a 50 psi seal and $12,853 for a 120 psi seal for mines with 20-500 employees; and $ 8,077 for a 50 psi seal and $13,102 for a 120 psi seal for mines with 501+ employees.

MSHA estimates the number of seals built per mine per year to be: 3 seals for a mine with 1-19 employees; 9 seals for a mine with 20-500 employees; and 14 seals for a mine with 501+ employees.

MSHA also estimates that: in a mine with 1-19 employees, all seals built will be 50 psi seals; in a mine with 20-500 employees, two-thirds of the seals built will be 50 psi seals and one-third will be 120 psi seals; and in a mine with 501+ employees, one-third of the seals built will be 50 psi seals and the remaining two-thirds will be 120 psi seals.

Table IV-A1 shows, by mine size, the additional annual cost to construct seals under the ETS. MSHA solicits comments on all assumptions and estimates related to seal installation.

[13] MSHA has estimated that mines with 1-19 employees will not construct any 120 psi seals.

Table IV-A1: Annual Cost to Purchase and Install New Seals Required by §75.335(a)

Mine Size	No. of Mines that Will Continue to Seal	Annual No. of New Seals per Mine	Percentage of Mines Using 50 psi Seals	Additional Cost for a 50 psi Seal[a]	Percentage of Mines Using 120 psi Seals	Additional Cost for a 120 psi Seal[a]	Cost for Seals of More than 120 psi	Annual Cost[b]
1-19	83	3	100%	$7,363	0%	$12,234	$0	$1,833,293
20-500	279	9	67%	$7,872	33%	$12,853	$0	$23,935,113
501+	10	14	33%	$8,077	67%	$13,102	$0	$1,599,737
Total	372							$27,368,143

[a] Additional Cost for a seal = Cost of seal at the strength indicated minus weighted average cost of existing seals. This amount varies by mine size because a larger percentage of the small and medium-sized mines use contractors instead of in-house labor.

[b] Annual Cost = (no. of mines that will continue to seal x annual no. of new seals per mine) x ((percentage using 50 psi seals x additional cost for a 50 psi seal) + (percentage using 120 psi seals x additional cost for a 120 psi seal)).

ETS § 75.335(b) Seal Sampling requirements

Effective upon publication of the ETS in the Federal Register, a certified person as defined in § 75.100 shall monitor atmospheres of sealed areas. Under ETS § 75.335(b), for seals constructed prior to the effective date of the ETS and for seals designed for 50 psi overexposure, the mine operator must develop a protocol to monitor methane and oxygen concentration, and to maintain an inert atmosphere in the sealed area. The protocol must be in the approved ventilation plan. Costs for the sampling protocol will be addressed later in costs to revise the ventilation plan.

ETS § 75.335(b)(1) requires a certified person to sample atmospheres of sealed areas weekly when the barometric pressure is decreasing or the seal is outgassing. Oxygen and methane need to be measured. Mine operators already have the equipment to take oxygen measurements. However, MSHA's existing regulations do not require underground coal operators to measure for methane at the high concentration levels that are listed in the ETS. Therefore, operators will need to purchase a gas detector able to measure methane concentrations from 0 to 100 percent by volume.

MSHA estimates that, on average, the number of methane gas detectors needed per mine is: 1 detector in mines with 1-19 employees; 1 to 2 detectors (an average of 1.5 detectors) in mines with 20-500 employees; and 2 detectors in mines with 501+ employees. The detectors (including tubing and calibration kit) are estimated to cost approximately $2,114 and are estimated to last for 5 years. All mines that have seals must sample and will likely need to purchase a methane gas detector. MSHA estimates the number of these mines to be: 83 mines with 1-19 employees; 279 mines with 20-500 employees; and 10 mines with 501+ employees.

Table IV-B1 shows, by mine size, the first year and annualized costs for mine operators to purchase methane detectors to perform the sampling.

Table IV-B1: First Year and Annualized Cost for Methane Gas Detectors under ETS §75.335(b)

Mine Size	No. of Mines that Will Sample Seals	No. of Methane Detectors per Mine	Purchase Cost for Methane Detection Equipment[a]	First Year Cost[b]	Annualized Cost[c]
1-19	83	1	$2,114	$175,462	$42,813
20-500	279	1.5	$2,114	$884,709	$215,869
501+	10	2	$2,114	$42,280	$10,316
Total	372			$1,102,451	$268,998

[a] Purchase cost for methane detection equipment = $1,775 for detector with carrying case; $8 for 10 ft. of tubing; and $331 for calibration kit (excluding gas cylinders).

[b] First Year Costs = no. of mines that will sample seals x no. of methane detectors per mine x cost of methane detection equipment.

[c] Annualized Costs = first year costs x 0.244, where 0.244 is the annualization factor to reflect a 5-year life of the equipment.

Maintenance for the methane detector consists of: calibrating the detector approximately once a month, purchasing a probe filter once per year, and performing a bump test before each use. Table IV-B2 shows, by mine size, the annual costs to maintain the methane gas detectors required to meet ETS § 75.335(b).

Table IV-B2: Annual Cost to Maintain Methane Gas Detectors under ETS §75.335(b)

Mine Size	No. of Mines that Will Sample Seals	No. of Methane Detectors per Mine	Workdays per year	Maintenance Cost per Methane Detector[a]	Annual Cost[b]
1-19	83	1	260	$202	$16,783
20-500	279	1.5	260	$202	$84,625
501+	10	2	365	$275	$5,493
Total	372				$106,902

[a] Annual maintenance cost per detector = {$1.38 per liter of methane x [(1 liter x 12 calibrations per year) + (0.5 liter x 1 bump test x no. of workdays per year)]} + 1 probe filter @ $6.25.

[b] Annual Cost = no. of mines that will sample seals x no. of methane detectors per mine x maintenance cost per methane detector.

The costs to train persons that will sample will be estimated first, then the costs of sampling. Under ETS § 75.335(b)(2), certified persons conducting sampling shall be trained in the sampling procedures included in the sampling protocol contained in the mine ventilation plan. Mines that will sample and thus need to train personnel are: 83 mines with 1-19 employees; 279 mines with 20-500 employees; and 10 mines with 501+ employees. MSHA estimates that the number of miners to train will be: 2 certified persons in mines with 1-19 employees; 4 certified persons in mines with 20-500 employees; and 6 certified persons in mines with 501+ employees. The certified persons to be trained and the person providing the training are both supervisors estimated to earn $62.50 per hour. MSHA estimates that it will take 2 hours to initially train the miners and another 0.1 hours (6 minutes) to certify the date and content of training provided to those trained. Table IV-B3 shows, by mine size, the first year and annualized cost to train and certify miners in the sampling procedures in the mine ventilation plan.

Table IV-B3: First Year and Annualized Cost to Train Certified Persons in Sampling Procedures under ETS §75.335(b)(2)

Mine Size	No. of Mines that Will Sample Seals	No. of Certified Persons to Train per Mine	Time to Train Certified Persons (in hrs.)	Time to Certify (in hrs.)	Supervisor Hourly Wage Rate	First Year Cost [a]	Annualized Cost [b]
1-19	83	2	2	0.1	$62.50	$31,644	$7,721
20-500	279	4	2	0.1	$62.50	$176,119	$42,973
501+	10	6	2	0.1	$62.50	$8,813	$2,150
Total	372					$216,575	$52,844

[a] First Year Costs = (no. of mines that will sample seals) x ((no. of certified persons to train x time to train x supervisor hourly wage rate) + (time to train x supervisor hourly wage rate) + (time to certify x supervisor hourly wage rate)).

[b] Annualized Costs = first year costs x 0.244, where 0.244 is the annualization factor.

The initial training to certify persons conducting sampling will need to be conducted yearly due to mine personnel turnover, and this training is assumed to be given one-on-one. On average, MSHA estimates an annual turnover rate of 0.07. The annual training given due to mine personnel turnover will also need to be certified with the date and content of the training provided to the certified person. Table IV-B4 shows, by mine size, the annual initial training and certification costs due to turnover of mine personnel.

Table IV-B4: Annual Cost For Sampling Training and Certification under ETS §75.335(b)(2) due to Mine Personnel Turnover

Mine Size	No. of Mines that Will Sample Seals	No. of Certified Persons to Train per Mine	Turn-over Rate	Time to Train Certified Persons (in hrs.)	Time to Certify (in hrs.)	Supervisor Hourly Wage Rate	Annual Cost [a]
1-19	83	2	0.07	2	0.1	$62.50	$2,978
20-500	279	4	0.07	2	0.1	$62.50	$20,018
501+	10	6	0.07	2	0.1	$62.50	$1,076
Total	372						$24,072

[a] Annual costs = no. of mines that will sample seals x ((no. of certified persons to train x turnover rate x time to train x supervisor hourly wage rate) + (time to train x turnover rate x no.of certified persons to train per mine x supervisor hourly wage rate) + (time to certify x turnover rate x no. of certified persons to train per mine x supervisor hourly wage rate)).

ETS § 75.335(b)(2) also requires that annual retraining be provided. MSHA assumes that retraining every year will not be as extensive as the initial training and therefore estimates that it will take 1 hour to provide the annual retraining. Table IV-B5 shows, by mine size, the annual cost to provide annual retraining and certification under ETS § 75.335(b)(2).

Table IV-B5: Annual Cost For Retraining For Sampling under ETS §75.335(b)(2)

Mine Size	No. of Mines that Will Sample Seals	No. of Certified Persons to Train per Mine	Time to Train Certified Persons (in hrs.)	Time to Certify (in hrs.)	Supervisor Hourly Wage Rate	Annual Cost [a]
1-19	83	2	1	0.1	$62.50	$16,081
20-500	279	4	1	0.1	$62.50	$88,931
501+	10	6	1	0.1	$62.50	$4,438
Total	372					$109,450

[a] Annual costs = (no. of mines that will sample seals) x ((no. of certified persons to train x time to train x supervisor hourly wage rate) + (time to train x supervisor hourly wage rate) + (time to certify x supervisor hourly wage rate)).

Under § 75.335(b)(5)(iii) mine operators must sample to establish a baseline analysis of oxygen and methane concentrations at each sampling point over a 14-day period. Operators are required to have one sampling pipe with one sampling point for each set of existing seals. Therefore, 2 samples (1 oxygen and 1 methane sample) must be taken for each of the 14 days, for a total of 28 samples at existing seals that have sampling pipes. In addition, MSHA assumes that 5 percent of the samples taken will involve recording a hazardous condition (to be abated with additional baseline sampling). MSHA estimates that, on average, the number of existing seal sets are approximately: 2 seal sets per mine for mines with 1-19 employees, 7 seal sets per mine for mines with 20-500 employees, and 14 seal sets per mine for mines with 501+ employees. MSHA estimates that a certified person, earning $62.50 per hour, will take 0.075 hours (4.5 minutes) to take a sample, 0.05 hours (3 minutes) to make a record of sample concentrations, and an additional 0.05 hours (3 minutes) to record a hazardous condition in those samples where a hazardous condition was found. Table IV-B6 shows, by mine size, the first year and annualized cost of sampling to establish a baseline for existing seals.

Table IV-B6: First Year and Annualized Cost for Sampling to Establish a Baseline under § 75.335(b)(5)(iii) for Existing Sets of Seals

Mine Size	No. of Mines that Will Seal	No. of Samples Taken Over 14 Day Period [a]	No. of Sets of Seals per Mine	No. of Samples to Establish the Baseline [b]	No. of Samples that Involve a Hazardous Condition [c]	Time to Take Sample and Make a Record that Does Not Involve a Hazardous Condition (in hrs.) [d]	Additional Time to Make a Record that Involves a Hazardous Condition (in hrs.)	Certified Person Hourly Wage Rate	First Year Cost [e]	Annualized Cost [f]
1-19	83	28	2	4,648	232	0.125	0.05	$62.50	$37,038	$9,037
20-500	279	28	7	54,684	2,734	0.125	0.05	$62.50	$435,763	$106,326
501+	10	28	14	3,920	196	0.125	0.05	$62.50	$31,238	$7,622
Total	372			63,252	3,162				$504,038	$122,985

[a] The sampling pipe in an existing seal has one sampling point in it; thus 2 samples (1 oxygen and 1 methane sample) will be taken for each of the 14 days, for a total of 28 samples.

[b] No. of Samples to Establish the Baseline = no. of mines that will seal x no. of samples taken over 14 day period x no. of sets of seals per mine.

[c] No. of Samples that Involve a Hazardous Condition = no. of samples to establish the baseline x 5 percent.

[d] 0.125 hrs. = 0.075 hrs. (4.5 minutes) to take a sample + 0.05 hrs. (3 minutes) to make record of sample concentrations.

[e] First Year Cost = ((no. of samples to establish the baseline x time to take sample and make a record that does not involve a hazardous condition) + (no. of samples that involve a hazardous condition x additional time to make a record that involves a hazardous condition)) x certified person hourly wage rate.

[f] Annualized Cost = first year cost x 0.244, where 0.244 is the annualization factor reflecting a 5-year amortization period.

Also, sampling to establish a baseline would need to be conducted for newly constructed seals built each year. The ETS requires under § 75.335(d) that for new seals at least two sampling pipes be installed in each seal. Therefore, 4 samples (2 oxygen and 2 methane samples) are taken for each of the 14 days, for a total of 56 samples at new seals that have sampling pipes. In addition, MSHA assumes that 5 percent of the samples taken will involve recording a hazardous condition that will be abated with additional baseline sampling. MSHA estimates that, on average, the number of new seals built annually is: 3 seals per mine for mines with 1-19 employees, 9 seals per mine for mines with 20-500 employees, and 14 seals per mine for mines with 501+ employees. MSHA estimates that a certified person, earning $62.50 per hour, will take 0.075 hours (4.5 minutes) to take a sample, 0.05 hours (3 minutes) to make a record of sample concentrations, and an additional 0.05 hours (3 minutes) to record a hazardous condition in those samples where a hazardous condition was found. Table IV-B7 shows, by mine size, the annual cost of sampling to establish a baseline for new seals.

Table IV-B7: Annual Cost For Sampling to Establish a Baseline under § 75.335(b)(5)(iii) for Newly Constructed Seals

Mine Size	No. of Mines that Will Seal	No. of Samples Taken Over 14 Day Period [a]	No. of Seals Built per Yr. per Mine	No. of Samples to Establish the Baseline [b]	No. of Samples that Involve a Hazardous Condition [c]	Time to Take Sample and Make a Record that Does Not Involve a Hazardous Condition (in hrs.) [d]	Additional Time to Make a Record that Involves a Hazardous Condition (in hrs.)	Certified Person Hourly Wage Rate	Annual Cost [e]
1-19	83	56	3	13,944	697	0.125	0.05	$62.50	$111,116
20-500	279	56	9	140,616	7,031	0.125	0.05	$62.50	$1,120,534
501+	10	56	14	7,840	392	0.125	0.05	$62.50	$62,475
Total	372			162,400	8,120				$1,294,125

[a] The sampling pipe in a new seal has two sampling points in it; thus 4 samples (2 oxygen and 2 methane sample) will be taken for each of the 14 days, for a total of 56 samples.

[b] No. of Samples to Establish the Baseline = no. of mines that will seal x no. of samples taken over 14 day period x no. of seals built per yr. per mine.

[c] No. of Samples that Involve a Hazardous Condition = no. of samples to establish the baseline x 5 percent.

[d] 0.125 hrs. = 0.075 hrs. (4.5 minutes) to take a sample + 0.05 hrs. (3 minutes) to make record of sample concentrations.

[e] Annual Cost = ((no. of samples to establish the baseline x time to take sample and make a record that does not involve a hazardous condition) + (no. of samples that involve a hazardous condition x additional time to make a record that involves a hazardous condition)) x certified person hourly wage rate.

ETS § 75.335(b)(1) sets forth the amount of sampling of sealed areas that is required. MSHA estimates that most mines will take methane and oxygen samples once per week. However, the MSHA District Manager may approve a different sampling frequency in the ventilation plan. MSHA estimates that where the District Manager approves a different sampling frequency for a mine, sampling will occur 5 times per week. Further, ETS § 75.335(b)(4) states that when oxygen and methane concentrations are within certain levels, the mine operator must take two additional gas samples at one-hour intervals. Table IV-B8 shows, by mine size, mines that will sample sealed areas, frequency of sampling, and the estimated annual number of samples to be taken.

Table IV-B8: Annual Sampling under ETS §75.335(b)

Mine Size	No. of Mines that Sample Once per Week under §75.335 (b)(1)	No. of Mines that Sample 5 Times per Week under §75.335 (b)(1) [a]	No. of Mines that Sample under §75.335 (b)(4) [b]	No. of Sets of Seals per Mine	Annual No. of Times that Samples are Taken in Mines that Sample Once per Week	Annual No. of Times that Samples are Taken in Mines that Sample 5 Times per Week	Annual No. of Times that Samples are Taken in Mines that Sample under §75.335 (b)(4)[c]	Total No. of Times Samples are Taken Annually [d]	No. of Samples Taken Each Time Sampling is Done [e]	Annual No. of Samples Taken
1-19	75	8	2	2	52	260	2	11,968	2	23,936
20-500	251	28	6	7	52	260	2	142,408	2	284,816
501+	9	1	1	14	52	260	2	10,220	2	20,440
Total	335	37	9					164,596		329,192

[a] Under §75.335(b)(1), the District Manager can require more frequent sampling. MSHA assumes that these mines would sample five times per week.

[b] §75.335(b)(4) requires that when oxygen concentrations are 10% or higher and methane concentrations are from 3.0% to 20.0% in a sealed area, the mine operator shall take two additional gas samples at one-hour itervals.

[c] Once per year the mine operator would need to conduct additional sampling twice at one-hour intervals as required by §75.335(b)(4).

[d] Total No. of Annual Samples = (mines that sample once per week x sets of seals per mine x annual no. of times samples are taken in mines that sample once per week) + (mines that sample 5 times per week x sets of seals per mine x annual no. of times samples are taken in mines that sample 5 times per week) + (mines that sample under §75.335(b)(4) x sets of seals per mine x annual no.of times that samples are taken in mines that sample under §75.335(b)(4)).

[e] Each time sampling is done, both an oxygen and a methane sample need to be taken.

Table IV-B6 shows, by mine size, the estimated annual number of oxygen and methane samples from sealed areas. MSHA estimates that either an oxygen or a methane sample takes 0.075 hours (4.5 minutes) to conduct. The Agency assumes that a certified person, earning a supervisory wage of $62.50 per hour, will take the samples. Table IV-B9 shows, by mine size, the estimated annual cost to take oxygen and methane samples.

Table IV-B9: Annual Cost of Sampling under ETS §75.335(b)

Mine Size	Total No. of Annual Samples [a]	Time to Take Sample (in hrs.)	Certified Person Hourly Wage Rate	Annual Cost [b]
1-19	23,936	0.075	$62.50	$112,200
20-500	284,816	0.075	$62.50	$1,335,075
501+	20,440	0.075	$62.50	$95,813
Total	329,192			$1,543,088

[a] Source: Table IV-B8.

[b] Annual Cost = total no. of annual samples x time to take sample x supervisor hourly wage.

Under ETS § 75.335(b)(6) a certified person must record each sampling result, including the location of the sampling points, and the oxygen and methane concentrations. Also, any hazardous conditions found must be corrected and recorded in accordance with existing § 75.363. Hazardous conditions that are not corrected immediately must be posted. MSHA estimates that mines that sample once per week will not require the recording of a hazardous condition. Approximately 15 percent of the samples in mines that sample 5 times per week and those that sample under § 75.335(b)(4) will involve samples that need to record a hazardous condition. The number of samples to be recorded is estimated to be: 1,250 samples in mines with 1-19 employees; 15,313 samples in mines with 20-500 employees; and 1,100 samples in mines with 501+ employees. Most of the hazardous conditions will be resolved by additional sampling. However, a few hazardous conditions will require that mines either inert or make adjustments to their ventilation systems. The cost of these actions is discussed later.

MSHA estimates that the time to make a record is: 0.05 hours (3 minutes) when there is no hazardous condition and an additional 0.3 hours (3 minutes) when a hazardous condition needs to be recorded. Table IV-B10 shows, by mine size, the annual cost of making a sampling record as required by ETS § 75.335(b)(6).

Table IV-B10: Annual Costs to Make a Sampling Record under ETS §75.335(b)(6)

Mine Size	Total No. of Annual Samples [a]	No. of Annual Samples that Involve a Hazardous Condition [b]	Time to Make a Record that Does Not Involve a Hazardous Condition (in hrs.)	Additional Time to Make a Record that Involves a Hazardous Condition (in hrs.)	Certified Person Hourly Wage Rate	Annual Cost [c]
1-19	23,936	1,250	0.05	0.05	$62.50	$78,706
20-500	284,816	15,313	0.05	0.05	$62.50	$937,903
501+	20,440	1,100	0.05	0.05	$62.50	$67,313
Total	329,192	17,663				$1,083,922

[a] Source: Table IV-B8.

[b] No. of Annual Samples that Involve a Hazardous Condition = 15% x (the no. of samples taken in mines where 5 samples are required per week + the no. of samples taken as a result of §75.335(b)(4)).

[c] Annual Cost = [(total no. of annual samples x time to make a record that does not involve a hazardous condition) + (no. of annual samples that involve a hazardous condition x time to make record that involves a hazardous condition)] x certified person hourly wage rate.

In the rare situation where a hazardous condition identified during sampling cannot be corrected immediately (typically by further sampling), the mine operator will need to post a danger sign. MSHA estimates that approximately 0.5 percent of the time when a hazardous condition is found from sampling, a danger sign will need to be posted. The estimated number of samples that will result in posting danger signs is approximately: 6 samples in mines with 1-19 employees; 77 samples in mines with 20-500 employees; and 6 samples in mines with 501+ employees. MSHA estimates that 2 signs will be posted in each area where a hazardous condition was found though sampling. The cost of a danger sign is estimated to be $8 (which includes the labor to put up the signs). Table IV-B11 shows, by mine size, the annual cost to post danger signs.

Table IV-B11: Annual Costs to Post Danger Signs under Existing §75.335(b)(6)

Mine Size	No. of Annual Samples that Involve a Hazardous Condition Not Corrected Immediately[a]	No. of Signs to Post at Each Sampled Site	Cost per Sign (includes Labor cost)	Annual Cost[b]
1-19	6	2	$8	$96
20-500	77	2	$8	$1,232
501+	6	2	$8	$96
Total	89			$1,424

[a] MSHA estimates that in approximately 0.5 percent of the times that a hazardous condition is found immediate correction action is not possible and a danger sign will need to be posted [0.005 x no. of annual samples that involve recording a hazardous conditions (see Table IV-B8)].

[b] Annual Cost = no. of annual samples that involve a hazardous condition not corrected immediately x no. of signs to post at each sampled site x cost per sign.

MSHA estimates that some mines will choose to inert the atmosphere behind seals because maintaining the correct oxygen and methane concentration levels behind these seals without inerting would be difficult. MSHA estimates that 5 percent of mines with 20 or more employees will choose to inert the atmosphere behind the seals. Mines choosing to inert will be: 0 mines with 1-19 employees; 14 mines with 20-500 employees; and 1 mine with 501+ employees. In order to inert, MSHA assumes that the mine will inert from the surface, which will require the purchase of a boiler with piping that runs from the boiler to the sealed area. MSHA estimates that the cost of the boiler, piping, and any other equipment, along with the cost of labor, is approximately $100,000 per boiler. One boiler is needed per mine. Table IV-B12 shows, by mine size, the first year and annualized cost to purchase and install equipment needing to inert the mine.

Table IV-B12: First Year and Annualized Cost to Purchase and Install Equipment for Mines that Inert under §75.335(b)

Mine Size	No. of Mines that Will Inert	Cost to Purchase Equipment to Inert	First Year Cost	Annualized Cost[a]
1-19	0	$100,000	$0	$0
20-500	14	$100,000	$1,400,000	$198,800
501+	1	$100,000	$100,000	$14,200
Total	15		$1,500,000	$213,000

[a] Annualized Cost = first year costs x 0.142, where 0.142 is the annualization factor to reflect a 10-year life of the equipment.

There are also costs to maintain surface equipment for inerting. Annual repair cost, per boiler, is estimated to be approximately 10 percent of the original cost of the equipment (10% of $100,000). Annual fuel costs for the boiler are estimated to be approximately $146,000 ($400 per day for diesel fuel x 365 days). The mine operator will need an employee to check the boiler each day. MSHA estimates that the annual cost for daily checks of the boiler is approximately $9,483 (1 miner x 1 hour x $25.98 per hour x 365 days). Table IV-B13 shows, by mine size, the annual cost to maintain a boiler on the surface that inerts the mine atmosphere.

Table IV-B13: Annual Maintenance Cost for Equipment to Inert Mines under §75.335(b)

Mine Size	No. of Mines that Will Inert	Annual Repair Cost [a]	Annual Fuel Cost [b]	Labor Cost to Check Equipment Daily [c]	Annual Maintenance Cost
1-19	0	$10,000	$146,000	$9,483	$0
20-500	14	$10,000	$146,000	$9,483	$2,316,758
501+	1	$10,000	$146,000	$9,483	$165,483
Total	15				$2,482,241

[a] Annual Repair Cost is assumed to be 10% of the $100,000 price of the equipment.

[b] Annual Fuel Cost = $400 per day cost for diesel fuel x 365 days.

[c] Labor Cost to Check Equipment Daily = 1 miner x 1 hr. x $25.98 hourly wage x 365 days.

Under ETS § 75.335(b)(4), when oxygen concentrations are 10.0 percent or greater and methane concentrations are from 3 percent to 20.0 percent in a sealed area, the mine operator

shall take two additional gas samples at one-hour intervals. If the two additional gas samples are from 3.00 percent to 20 percent and oxygen is 10.0 percent or greater—

(i) The mine operator shall implement the actions in the protocol; or

(ii) Persons shall be withdrawn from the affected area, except those persons referred to in § 104(c) of the Act.

MSHA estimates that 9 mines a year will have to withdraw miners from the affected area under § 75.335(b)(4)(ii). MSHA assumes that all the miners on the shift will be withdrawn from the mine for 8 hours and that, as a result, no production will occur during that time period.

MSHA projects that the withdrawal of miners will impose two types of costs on the mine operator. One cost is due to the 8-hour production delay (not permanent production loss). MSHA assumes that the operator will extract the coal not produced during the period when miners are withdrawn at the end of the life of the mine (which MSHA estimates to be in 5 years). The value, in today's dollars, of a dollar of production 5 years from now is equal to one dollar multiplied by $(1/1.07)^5$, or 0.713. The cost of the delayed production is equal to the value of 8 hours of production today minus its present value if produced in 5 years.[14] The second cost for the period when miners are withdrawn is the cost of the labor needed for the delayed 8 hours of coal production (delayed by 5 years). That cost is equal to the labor cost for a shift multiplied by 0.713.

Table IV-B14 shows, by mine size, MSHA's estimate of the value of 8 hours of underground coal production. Table IV-B15 shows, by mine size, MSHA's estimate of the cost to the mine operator due to delayed production, including the extra labor cost.

Table IV-B14: Value of 8 Hours of Underground Coal Production

Mine Size	U/G Coal Mine Production	Miner-Hours in U/G Coal Mines	Tons per Miner-Hour [a]	2005 Price of U/G Coal per Ton[b]	No. of Hours Production is Stopped	Avg. No. of Miners Working per Shift	Value of Production for 8 Hours [c]
1-19	7,813,073	3,203,772	2.439	$36.42	8	10	$7,105
20-500	269,686,946	75,847,075	3.556	$36.42	8	39	$40,403
501+	81,059,978	18,095,624	4.480	$36.42	8	192	$250,590

[a] Tons per Miner-Hour = U/G Coal Mine Production / Miner-Hours in U/G Coal Mines. Source: Preliminary 2006 MSHA data from Teradata run on March 27, 2007.

[b] Source: Dept. of the Interior, Energy Information Administration, Annual Coal Report 2005, Table 28.

[c] Value of Production for 8 Hours = tons per miner-hour x no. of hours production is stopped x price of coal x avg. no. of miners working per shift.

[14] That is, the cost of delayed production is equal to (1 – 0.713) multiplied by P, where P is equal to the value of eight hours of current production.

Table IV-B15: Annual Cost For Withdrawing Miners under ETS §75.335(b)(4)(ii)

Mine Size	No. of Mines to Withdraw Miners	Occurrences per Year	Value of Production for 8 Hours [a]	Avg. No. of Miners Working per Shift	Lost Work Time (in hrs.)	Hourly Wage Rate [b]	Annual Cost for Withdrawing Miners[c]
1-19	2	1	$6,964	10	8	$31.46	$7,586
20-500	6	1	$40,447	39	8	$31.46	$111,640
501+	1	1	$250,657	192	8	$31.46	$106,393
Total	9						$225,620

[a] Source: Table IV-B14.

[b] Hourly Wage Rate = ($25.98 miner hourly wage x 0.85) + ($62.50 supervisor hourly wage x 0.15).

[c] Annual Cost for Withdrawing Miners = no. of mines to withdraw miners x ((value of production for 8 hours - (value of production for 8 hours / 1.07^5)) + ((hourly wage rate x lost work time x avg. no. of miners working per shift) / 1.07^5))).

Mines that must withdraw miners will need to take certain action before the miners can reenter the mine. Of the 9 mines annually that will withdraw miners from the mine, MSHA assumes that 4 of the mines will make ventilation adjustments (including, but not limited to, constructing, tearing down, or adjusting stoppings, overcasts, and regulators). MSHA estimates that, for each occurrence, the per mine cost will be approximately: $20,000 for a mine with 1-19 employees; $30,000 for a mine with 20 to 500 employees, and $50,000 for a mine with 501+ employees. The remaining 5 mines will choose to inert. These remaining 5 mines are assumed to be mines that are not set up with equipment on the surface that will enable them to inert. If no facilities are set up to inert, then another option is to purchase a tanker of nitrogen gas and pipe it into the affected area. MSHA estimates that the cost to purchase a tanker of nitrogen gas and the labor involved in pumping the gas into the affected area is approximately $10,000. MSHA assumes that 3 tankers of nitrogen gas are needed for each occurrence. Thus, to inert will cost $30,000 per occurrence. Table IV-B16 shows, by mine size, the annual costs to correct problems that cause operators to have to withdraw miners.

Table IV-B16: Annual Cost to Correct Problems that Cause Miners to Be Withdrawn under §75.335(b)(4)(ii)

Mine Size	Mines that Must Withdraw		Cost to Make Ventilation Changes [a]	Cost to Inert with Nitrogen From Tankers [b]	Annual Cost to Correct Problems that Cause Miner Withdrawal [c]
	No. of Mines that Will Make Ventilation Adjustments	No. of Mines that Will Inert with Nitrogen From Tankers			
1-19	1	1	$20,000	$30,000	$50,000
20-500	3	3	$30,000	$30,000	$180,000
501+	0	1	$50,000	$30,000	$30,000
Total	4	5			$260,000

[a] Ventilation changes could include, but are not limited to, constructing, tearing down, or adjusting stoppings, overcasts, and regulators.

[b] On average MSHA assumes that 3 truck tankers of nitrogen would be needed to inert the affected area. MSHA estimates that each tanker truck of nitrogen costs $10,000 (including labor and equipment to get the nitrogen to the affected area).

[c] Annual Cost to Correct Problems that Cause Miner Withdrawal = (no. of mines that will make ventilation adjustments x cost to make ventilation changes) + (no. of mines that will inert with nitrogen from tankers x cost to inert with nitrogen from tankers).

Table IV-B17 shows, by mine size, the summary of yearly costs for § 75.335(b).

Table IV-B17: Summary of Yearly Sampling Costs under ETS §75.335(b)

ETS	Description	Table	Mine Size by Employment			
			1-19	20-500	501+	Total
§75.335(b)	Purchase Methane Gas Detectors	IV-B1	$42,813	$215,869	$10,316	$268,998
§75.335(b)	Detector Annual Maintenance	IV-B2	$16,783	$84,625	$5,493	$106,902
§75.335(b)(2)	Sampling Training	IV-B3	$7,721	$42,973	$2,150	$52,844
§75.335(b)(2)	Sampling Training (Turnover)	IV-B4	$2,978	$20,018	$1,076	$24,072
§75.335(b)(2)	Sampling Training (Refresher)	IV-B5	$16,081	$88,931	$4,438	$109,450
§75.335(b)(5)(iii)	Baseline Sampling & Record	IV-B6 & B7	$120,153	$1,226,860	$70,097	$1,417,110
§75.335(b)	Annual Sampling	IV-B9	$112,200	$1,335,075	$95,813	$1,543,088
§75.335(b)(6)	Annual Sampling Record	IV-B10	$78,706	$937,903	$67,313	$1,083,922
§75.335(b)(6)	Post Danger Signs	IV-B11	$96	$1,232	$96	$1,424
§75.335(b)	Cost For Mines to Inert	IV-B12	$0	$198,800	$14,200	$213,000
§75.335(b)	Maintenance of Inerting Equipment	IV-B13	$0	$2,316,758	$165,483	$2,482,241
§75.335(b)(4)(ii)	Cost to Withdraw Miners	IV-B15	$7,586	$111,640	$106,393	$225,620
§75.335(b)(4)(ii)	Cost to Correct Problem Causing Withdrawal	IV-B16	$50,000	$180,000	$30,000	$260,000
Total			$455,117	$6,760,685	$572,867	$7,788,670

ETS § 75.336 – Seal Design Applications and Installation Approval

ETS § 75.336(a) – Seal Design Applications

This section provides procedures for the approval of seal designs submitted by manufacturers or mine operators. Typically, manufacturers will submit applications for approval of seal designs. These applications may be submitted in accordance with either paragraph (a)(1) or paragraph (a)(2). Since paragraph (a)(2) addresses full-scale explosion testing, MSHA anticipates that applications will normally be submitted in accordance with paragraph (a)(1).

Table IV-C1 sets forth the estimated cost to manufacturers and mine operators for the seal design applications. The top half of this table estimates that a single application costs $10,883. Most of this cost is 80 hours of a professional engineer's time, priced at $100 per hour, for certifying the seal design. The bottom half of Table IV-C1 estimates the total yearly cost to manufacturers and mine operators for all seal design applications. MSHA estimates that manufacturers and mine operators will submit ten applications in the first year and two applications per year in subsequent years. When annualized, MSHA estimates that the yearly cost of seal design applications is $27,959.

Table IV-C1: Cost of Applications for MSHA Approval of Seal Designs

Cost Element	Rate/Hour or Cost/Unit	Hours or Units	Total Cost
Professional Engineer	$100.00	80	$8,000
Materials Testing	$90.00	30	$2,700
Supervisor	$62.50	2	$125
Clerical Worker	$21.74	1	$22
Copies	$10.00	2	$20
Postage	$16.00	1	$16
Cost of Seal Design Application			$10,883
Applications in First Year	$10,883	10	$108,827
Applications per Year in Subsequent Years	$10,883	2	$21,765
Total Yearly Cost of Applications[a]			$27,959

[a](total yearly cost of applications) = (total cost of applications in first year) x (0.07) + (annual cost of applications in subsequent years) / (1.07).

MSHA assumes that seal approval costs are passed on to mine operators who purchase and install the seals. Table IV-C2 allocates the manufacturers' costs to mine operators in proportion to the number of new seals installed in mines of each mine size.

Table IV-C2: Distribution of Manufacturers' Application Costs Across Mine Operations

Mine Size	Number of Mines that Will Seal	New Seals per Year per Mine	Number of New Seals per Year	Manufacturers' Application Cost[a]
1-19	83	3	249	$2,401
20-500	279	9	2,511	$24,209
501+	10	14	140	$1,350
Total	372		2,900	$27,959

[a] Total manufacturers' application cost from Table IV-C1 is allocated across each mine size category in proportion to the number of new seals per year.

ETS § 75.336(b) – Seal Installation Approval

ETS § 75.336(b) requires that mine operators install only seal designs that have been approved in ETS § 75.336(a). In accordance with § 75.336(b), mine site installation of seals must be approved in each mine operator's ventilation plan.

ETS § 75.336(b)(1) requires that the mine operator retain the seal design approval information. This is a normal business practice with de minimus cost, and MSHA has not separately included any cost for this requirement.

ETS § 75.336(b)(2) requires that a professional engineer conduct or have oversight of the seal installation. ETS § 75.336(b)(2) also requires that the professional engineer certify that the seal design was installed in accordance with the provisions of ETS § 75.336(a). ETS § 75.336(b)(3)(ii) requires that a professional engineer also certify the mine map of the sealed area and seal locations. The hours, unit cost, and annual cost for these activities of the professional engineers are shown in Table IV-C3.

Table IV-C3: Cost of Professional Engineers to Conduct or Oversee and to Certify Mine-Specific Seal Installations

Mine Size	Hours to Conduct or Oversee and Certify Seal Installation	Wage Rate of Professional Engineer	Cost of Professional Engineer for Mine-Specific Seal-Set Installation[a]	Number of New Seal Sets per Year[b]	Annual Cost of Professional Engineers for Mine-Specific Seal-Set Installations
1-19	24	$100	$2,400	42	$99,600
20-500	40	$100	$4,000	419	$1,674,000
501+	56	$100	$5,600	10	$56,000
Total				470	$1,829,600

[a](cost of professional engineer for mine-specific seal installation) = (hours to conduct or oversee and certify seal installation) x (wage rate of professional engineer).

[b](number of new seal sets per year) = (number of new seals per year, from Table IV-C2) / S, where S = seals per set. S=6 for mines with 1-500 employees and S=14 for mines with 501+ employees.

ETS § 75.336(b)(3) requires the mine operator to provide seal information for approval in the ventilation plan. The costs for ETS § 75.336(b)(3)(ii) are covered by the costs shown in Table IV-C3. The costs for revising the ventilation plan to include the requirements of ETS § 75.336(b)(3) are shown in Tables IV-E1 through IV-E3 in connection with revising the ventilation plan to include the sampling protocol required by ETS § 75.335(b)(5).

ETS § 75.337 Construction of seals

The worked-out area must be cleared prior to sealing. Specifically, ETS § 75.337(a)(1) requires that insulated cables be removed from the area to be sealed when constructing seals, and ETS § 75.337(a)(2) requires the removal of metallic objects through or across seals, except water pipes, gas sampling pipes, and form ties approved in the design.

MSHA estimates that 83 mines with 1-19 employees; 279 mines with 20 to 500 employees; and 10 mines with 501+ employees will continue to construct seals after the ETS becomes effective. Based on information from MSHA's Coal Safety and Technical Support

staff, the annual numbers of worked-out areas are estimated to be: 0.5 worked-out areas in the average mine with 1-19 employees, 1.5 worked-out areas in the average mine with 20 to 500 employees, and 1 worked-out area in the average mine with 501+ employees.

MSHA estimates that it will take two miners, earning $25.98 per hour, 10 hours to clear a worked-out area (8 hours to remove insulating cables and 2 hours to remove other metallic objects). Table IV-D1 shows, by mine size, the annual cost to clear worked-out areas before sealing.

Table IV-D1: Annual Cost to Clear Worked-Out Areas Prior to Sealing Pursuant to ETS §§75.337(a)(1) and 75.337(a)(2)

Mine Size	No. of Mines that Will Seal	Average No. of Worked-Out Areas Annually per Mine	Time to Remove Insulated Cables (in hrs.)	Time to Remove Metallic Objects (in hrs.)	No. of Miners Needed	Miner Hourly Wage Rate	Annual Cost [a]
1-19	83	0.5	8	2	2	$25.98	$21,563
20-500	279	1.5	8	2	2	$25.98	$217,453
501+	10	1	8	2	2	$25.98	$5,196
Total	372						$244,212

[a] Annual Cost = no. of mines that will seal x average no. of worked-out areas annually per mine x (time to remove insulated cables + time to remove metallic objects) x no. of miners needed x miner hourly wage rate.

Under ETS § 75.337(b)(1)-(b)((5), a certified person must perform several tasks during seal construction and repair, and a mine foreman or equivalent must countersign the record. MSHA estimates that it will take 0.85 hours (51 minutes) to perform these functions. The 0.85 hours will consist of: 0.75 hours (45 minutes) for the certified person to perform the requirements under § 75.337(b)(1) through (b)(5), which include making the record but not countersigning it; and 0.1 hours (6 minutes) for a mine foreman or equivalent mine official to countersign the record made by the certified person. The certified person and mine foreman are estimated to earn $62.50 per hour.

Under ETS § 75.337(c), a senior mine management official shall certify that construction, installation, and materials used were in accordance with the approved ventilation plan. MSHA estimates that a senior mine management official, earning $80.17 per hour, will take 0.25 hours to perform this certification.

The requirements of ETS § 75.337(b) and (c) apply to both the construction of seals and the repair of existing seals. MSHA estimates that the mines that will seal are: 83 mines with 1-19 employees; 279 mines with 20 to 500 employees; and 10 mines with 501+ employees. With respect to new seals, MSHA estimates that, on average, the annual number of new seals that will be built is: 3 seals per mine with 1-19 employees; 9 seals per mine with 20-500 employees; and 14 seals per mine with 501+ employees. For existing seals, MSHA's 2006 data on the number of seals in existing mines show that, on average, there are: 12.82 existing seals per mine in mines with 1-19 employees; 43.54 existing seals per mine in mines with 20-500

employees; and 73.70 existing seals per mine in mines with 501+ employees. MSHA assumes that 3 percent of these seals will need to be repaired annually. Consequently, the number of existing seals to be repaired in the average mine will be: 0.4 seals per mine with 1-19 employees; 1.3 seals per mine with 20-500 employees; and 2.2 seals per mine with 501+ employees.

Table IV-D2 shows, by mine size, the annual costs for mine operators to perform the requirements under ETS § 75.337(b) and (c).

Table IV-D2: Annual Cost to Examine, Certify, Record, and Countersign Seal Construction and Repair under ETS §§75.337(b) and 75.337(c)

Mine Size	No. of Mines that Will Seal	Annual No. of Seals Built per Mine	Annual No. of Seals Repaired per Mine	Time to Examine, Certify, Record, and Countersign (in hrs.) [a]	Time to Certify by Senior Mine Official (in hrs.) [b]	Supervisor Hourly Wage Rate	Senior Mine Official Hourly Wage Rate	Annual Cost [c]
1-19	83	3	0.4	0.85	0.25	$62.50	$80.17	$20,648
20-500	279	9	1.3	0.85	0.25	$62.50	$80.17	$210,261
501+	10	14	2.2	0.85	0.25	$62.50	$80.17	$11,853
Total	372							$242,762

[a] 0.85 hrs. = 0.75 hrs. for a certified person to examine seal site prior to construction or repair, examine seal during construction or repair, examine seal upon completion of construction or repair, certify at the seal site that examinations were made, and to make a record + 0.1 hrs. for mine foreman to countersign record.

[b] 0.25 hrs. for senior mine management official to certify that construction, installation, and materials used were in accordance with approved ventilation plan

[c] Annual Cost = (no. of mines that will seal x (annual no. of seals built per mine + annual no. of seals repaired per mine)) x ((time to examine, certify, record, and countersign x supervisor hourly wage rate) + (time to certify by senior mine official x senior mine official hourly wage rate)).

Also, under ETS § 75.337(b), a certified person (a supervisor earning $62.50 per hour) must directly supervise the construction and repair of seals. MSHA assumes that in an 8 hour period a certified person can supervise the construction of a group of three seals. As stated above, a certified person will spend a total of 0.75 hours (45 minutes), performing the specific activities required by ETS § 75.337(b)(1)-(b)(5). The remaining 5.75 hours per group of three seals will be spent on general supervision. The remaining time to supervise the construction for every three seals will be:

5.75 hours in mines with 1-19 employees [5.75 hrs. x 1 group of 3 seals],

17.25 hours in mines with 20-500 employees [5.75 hrs. x 3 groups of 3 seals], and

26.83 hours in mines with 501+ employees [5.75 hrs. x 4.67 groups of 3 seals].

In addition, on average, MSHA estimates that it will take three hours to repair an existing seal. Thus, the remaining time to supervise the repair of a seal minus the time to perform the specific activities required by ETS § 75.337(b) will be 2.25 hours (3 hrs. - 0.75 hrs.).

Table IV-D3 shows, by mine size, the annual additional costs to supervise seal construction and repair as required by ETS § 75.337(b).

Table IV-D3: Annual Additional Cost for Certified Person to Supervise Seal Construction and Repair under ETS §75.337(b)

Mine Size	No. of Mines that Will Seal	Annual No. of Seals Built per Mine	Annual No. of Seals Repaired per Mine	Time to Examine, Certify & Record each Seal (in hrs.) [a]	Remaining Time to Supervise Seal Construction (in hrs.) [b]	Remaining Time to Supervise Seal Repair (in hrs.) [c]	Supervisor Hourly Wage Rate	Annual Cost [d]
1-19	83	3	0.4	0.75	5.75	2.25	$62.50	$34,497
20-500	279	9	1.3	0.75	17.25	2.25	$62.50	$953,395
501+	10	14	2.2	0.75	26.83	2.25	$62.50	$81,358
Total	372							$1,069,250

[a] Source: from footnote a in Table IV-D2.

[b] Remaining Time to Supervise Seal Construction = [8 hrs. x (annual no. of seals built per mine / 3 seals) - (time to examine, certify & record each seal x annual no. of seals built per mine)], where 8 is the number of hours it takes to supervise the construction of 3 seals.

[c] Remaining Time to Supervise Seal Repair = 3 hrs., on average, to make a repair - 0.75 hrs.

[d] Annual Cost = (no. of mines that will seal x remaining time to supervise seal construction x (annual no. of seals built per mine / 3 seals) x supervisor hourly wage rate] + (no. of mines that will seal x remaining time to supervise seal repair x annual no. of seals repaired per mine x supervisor hourly wage rate).

Under ETS § 75.337(d), the mine operator will need to notify MSHA of certain activities concerning the construction of a set of seals. ETS § 75.337(d)(1) requires the mine operator to notify the local MSHA field office between 2 and 14 days prior to commencement of seal construction. ETS § 75.337(d)(2) requires the mine operator to notify the District Manager, in writing, within five days of completion of a set of seals. ETS § 75.337(d)(3) requires the mine operator to submit a copy of quality control test results required by § 75.336.

MSHA estimated that, on average, the number of sets of seals per year will be 0.5 sets of seal in a mine with 1-19 employees; 1.5 sets in a mine with 20-500 employees; and 1 set of seals in a mine with 501+ employees.

MSHA estimates that a supervisor, earning $62.50 per hour, will take 0.05 hours (3 minutes) to notify the local MSHA field office between 2 and 14 days prior to commencement of seal construction. Also, MSHA estimates that it will take a clerical employee, earning $21.74 per hour, a total of 0.2 hours (12 minutes) to type and send a letter notifying of the completion of a set of seals and to copy and send the quality control test results.

In addition, a copy of the letter of completion of a set of seals is estimated to be 1 page and a copy of the quality control test results is estimated to be 15 pages. MSHA estimates that

copy costs are $0.15 per page and postage costs are $1. Postage will be charged twice because the letter of completion of a set of seals is not sent at the same time as the other material. Thus, total copy and postage costs will be $4.40 [(16 pages x $0.15) + $2 postage). Table IV-D4 shows, by mine size, the annual costs to notify and submit material to MSHA pursuant to the requirements in the ETS § 75.337(d).

Table IV-D4: Annual Cost to Notify MSHA Concerning Constructing Sets of Seals under ETS §75.337(d)

Mine Size	No. of Mines that Will Seal	Annual Number of Sets of Seals to Be Built per Mine	Time to Notify MSHA per Mine (in hrs.) [a]	Time to Submit Data to MSHA per Mine (in hrs.) [b]	Copying and Postage Costs[c]	Supervisor Hourly Wage Rate	Clerical Hourly Wage Rate	Annual Cost [d]
1-19	83	0.5	0.05	0.2	$4.40	$62.50	$21.74	$493
20-500	279	1.5	0.05	0.2	$4.40	$62.50	$21.74	$4,969
501+	10	1	0.05	0.2	$4.40	$62.50	$21.74	$119
Total	372							$5,580

[a] 0.05 hrs = the time for a supervisor to notify the local MSHA field office between 2 and 14 days prior to commencement of seal construction.

[b] 0.2 hrs. = 0.1 hrs. for clerical employee to type and send a letter which notifies of the completion of a set of seals + 0.1 hrs. for clerical employee to copy and send the quality control test results.

[c] $4.40 = $1.15 + $3.25, where $1.15 = [(1 pg. notification of completion of a set of seals x $.15 copy costs) + $1 for postage] and $2.25 = ([15 pgs. of test results x $.15 copy costs) + $1 for postage].

[d] Annual Cost = no. of mines that will seal x annual no. of sets of seals to be built per mine x ((time to notify MSHA x supervisory hourly wage rate) + (time to submit data to MSHA x clerical hourly wage rate) + copying and postage costs).

Under ETS § 75.337(e), miners constructing and repairing seals and certified persons in ETS § 75.337(b) will need to be trained prior to constructing a seal. The training will address material and procedures in the approved seal design and ventilation plan. In addition, the mine operator will have to certify the date and content of training provided each miner and certified person.

All mines that now have seals will need the training required by ETS § 75.337(e) because they will be constructing new seals in the future and maintaining existing seals. The numbers of mines that will need to provide training under ETS § 75.337(e) is estimated to be 83 mines with 1-19 employees, 279 mines with 20-500 employees, and 10 mines with 501+ employees.

MSHA estimates that of the mines with 1-19 employees, 80 percent will contract out training and 20 percent will train in-house; of those with 20-500 employees, 30 percent will contract out training and 70 percent will train in-house; and of those with 501+ employees, 10 percent will contract out training and 90 percent will train in-house.

For those mines that provide training in-house, MSHA estimates that a chief engineer, earning $60.58 per hour, will take 4 hours to prepare for the training. Table IV-D5 shows, by mine size, the first year and annualized to prepare for training.

Table IV-D5: First Year and Annualized Cost to Prepare for Training under ETS §75.337(e)

Mine Size	No. of Mines that Will Build or Repair Seals	Percentage of Mines that will Receive Training In-House	Time to Prepare for Training (in hrs.)	Chief Engineer Hourly Wage Rate	First Year Cost [a]	Annualized Cost [b]
1-19	83	20%	4	$60.58	$4,023	$981
20-500	279	70%	4	$60.58	$47,325	$11,547
501+	10	90%	4	$60.58	$2,181	$532
Total	372				$53,528	$13,061

[a] First Year Cost = no. of mines that will seal x time to prepare for training x chief engineer hourly wage rate.

[b] Annualized Cost = first year cost x 0.244, where 0.244 is the annualization factor reflecting a 5-year amortization period.

MSHA estimates that the number of persons trained per mine will be: 2 miners, 1 certified person, and 1 senior mine official in mines with 1-19 employees; and 4 miners, 2 certified persons, and 1 senior mine official in mines with 20+ employees. MSHA estimates that the hourly wage rates for those trained are: $25.98 for the miner, $62.50 for the certified person, and $80.17 for the senior mine official. The hourly wage rate of the person providing the training is estimated to be $90.87 when the training is contracted out (including expenses and per diem of the trainer), and $60.58 when the training is provided in-house. The initial training is estimated to take 8 hours and an additional 0.1 hours (6 minutes) to certify the training. Table IV-D6 shows, by mine size, the first year and annualized cost for training and certification under ETS § 75.337(e).

Table IV-D6: First Year and Annualized Cost for Training and Certification under ETS §75.337(e)

Mine Size	No. of Mines that Will Build or Repair Seals	Person to Train: No. of Miners to Train	Person to Train: No. of Certified Persons to Train	Person to Train: No. of Senior Mine Officials to Train	Hourly Wage Rates: Miner	Hourly Wage Rates: Certified Person	Hourly Wage Rates: Senior Mine Official	Hourly Wage Rates: Instructor Hourly Wage Rate[a]	Time to Train (in hrs.)	Time to Certify (in hrs.)	First Year Cost [b]	Annualized Cost [c]
1-19	83	2	1	1	$25.98	$62.50	$80.17	$84.81	8	0.1	$186,253	$45,446
20-500	279	4	2	1	$25.98	$62.50	$80.17	$69.67	8	0.1	$847,329	$206,748
501+	10	4	2	1	$25.98	$62.50	$80.17	$63.61	8	0.1	$29,880	$7,291
Total	372										$1,063,462	$259,485

[a] For mines with 1-19 employees the $84.81 hourly wage rate = (0.8 x $90.87 per hr.) + (0.2 x $60.58 per hr.). For mines with 20-500 employees the $69.67 hourly wage rate = (0.3 x $90.87 per hr.) + (0.7 x $60.58 per hr.). For mines with 501+ employees the $63.61 hourly wage rate = (0.1 x $90.87 per hr.) + (0.9 x $60.58 per hr.). The hourly wage rate for contractor trainng is $90.87 and the hourly wage rate for in-house training is $60.58.

[b] First Year Cost = no. of mines that will build or repair seals x ((time to train x ((no. of miners to train x miner hourly wage rate) + (no. of certified persons to train x certified person hourly wage rate) + (no. of senior mine officials to train x senior mine official hourly wage rate) + (1 x instructor hourly wage rate))) + (time to certify x chief engineer hourly wage rate)).

[c] Annualized Cost = first year costs x 0.244, where 0.244 is the annualization factor, reflecting a 5 year amortization period.

Initial training will need to be conducted yearly due to mine personnel turnover. On average, MSHA estimates an annual turnover rate of 7 percent, and that miners will be trained individually. Table IV-D7 shows, by mine size, the annual initial training and certification costs due to turnover of mine personnel.

Table IV-D7: Annual Cost for Training and Certification under ETS §75.337(e), Due to Mine Personnel Turnover

Mine Size	No. of Mines that Will Build or Repair Seals	Person to Train			Turn-over Rate	Hourly Wage Rates				Time to Train (in hrs.)	Time to Certify (in hrs.)	Annual Cost [b]
		No. of Miners to Train	No. of Certified Persons to Train	No. of Senior Mine Officials to Train		Miner	Certified Person	Senior Mine Official	Instructor Hourly Wage Rate [a]			
1-19	83	2	1	1	0.07	$25.98	$62.50	$80.17	$84.81	8	0.1	$25,012
20-500	279	4	2	1	0.07	$25.98	$62.50	$80.17	$69.67	8	0.1	$125,438
501+	10	4	2	1	0.07	$25.98	$62.50	$80.17	$63.61	8	0.1	$4,256
Total	372											$154,705

[a] Source: Table IV-D6.

[b] Annual Cost = no. of mines that will build or repair seals x ((time to train x ((no. of miners to train x turnover rate x miner hourly wage rate) + (no. of certified persons to train x turnover rate x certified person hourly wage rate) + (no. of senior mine officials to train x turnover rate x senior mine official hourly wage rate))) + (time to train x turnover rate x (no. of miners to train + no. of certified persons to train + no. of senior mine officials to train) x instructor hourly wage rate) + (time to certify x turnover rate x (no. of miners to train + no. of certified persons to train + no. of senior mine officials to train) x instructor hourly wage rate)).

Under ETS § 75.337(e), additional training will need to be provided when seal installation procedures change. MSHA assumes that applicable procedures will change, on average, once annually and that it will take 2 hours to provide this training. Table IV-D8 shows, by mine size, the annual cost for additional training and certification under ETS § 75.337(e) when seal installation procedures change.

Table IV-D8: Annual Cost for Retraining and Certification for New Construction Procedures under ETS §75.337(e)

Mine Size	No. of Mines that Will Build or Repair Seals	Person to Train			Hourly Wage Rates				Time to Train (in hrs.)	Time to Certify (in hrs.)	Annual Cost [b]
		No. of Miners to Train	No. of Certified Persons to Train	No. of Senior Mine Officials to Train	Miner	Certified Person	Senior Mine Official	Instructor Hourly Wage Rate [a]			
1-19	83	2	1	1	$25.98	$62.50	$80.17	$84.81	2	0.1	$47,091
20-500	279	4	2	1	$25.98	$62.50	$80.17	$69.67	2	0.1	$213,290
501+	10	4	2	1	$25.98	$62.50	$80.17	$63.61	2	0.1	$7,518
Total	372										$267,899

[a] Source: Table IV-D6.

[b] Annual Cost = no. of mines that will build or repair seals x ((time to train x ((no. of miners to train x miner hourly wage rate) + (no. of certified persons to train x certified person hourly wage rate) + (no. of senior mine officials to train x senior mine official hourly wage rate) + (1 x insturctor hourly wage rate))) + (time to certify x instructor hourly wage rate)).

Table IV-D9 shows, by mine size, a summary of the yearly costs for § 75.337.

Table IV-D9: Summary of Yearly Costs under ETS §75.337

ETS	Description	Table	Mine Size by Employment			
			1-19	20-500	501+	Total
§§75.337(a)(1) & 75.337(a)(2)	Clear Worked-Out Areas	IV-D1	$21,563	$217,453	$5,196	$244,212
§§75.337(b) & 75.337(c)	Examine, Certify, Record, & Countersign	IV-D2	$20,648	$210,261	$11,853	$242,762
§75.337(b)	Additional Supervision of Seal Construction & Repair	IV-D3	$34,497	$953,395	$81,358	$1,069,250
§75.337(d)	Notify MSHA Concerning Construction of Set of Seals	IV-D4	$493	$4,969	$119	$5,580
§75.337(e)	Prepare for Construction & Repair Training	IV-D5	$981	$11,547	$532	$13,061
§75.337(e)	Construction & Repair Training	IV-D6	$45,446	$206,748	$7,291	$259,485
§75.337(e)	Construction & Repair Training (Turnover)	IV-D7	$25,012	$125,438	$4,256	$154,705
§75.337(e)	Construction & Repair Retraining	IV-D8	$47,091	$213,290	$7,518	$267,899
Total			$195,731	$1,943,102	$118,121	$2,256,955

Revisions to Mine Ventilation Plan under §§75.335(b)(5) and 75.336(b)(3)

Under ETS § 75.335(b)(5), all mine operators that currently have seals must develop a sampling protocol (which includes an action plan) to monitor methane and oxygen concentrations in sealed areas. The sampling protocol, along with the action plan, must be part of the mine ventilation plan In addition, mine operators that continue to construct seals must provide the sealing procedure information listed in ETS § 75.336(b)(3).

MSHA estimates that after the ETS becomes effective 83 mines with 1-19 employees, 279 mines with 20-500 employees, and 10 mines with 501+ employees will continue to seal. For these mines, MSHA estimates that a supervisor, earning $62.50 per hour, will take 8 hours in a mine with 1-19 employees, 16 hours in a mine with 20-500 employees, and 24 hours in a mine with 501+ employees to revise the ventilation plan. The number of pages to be revised in the ventilation plan for these mines is estimated to be: 15 pages (5 pages for the sampling protocol and action plan + 10 pages for sealing procedures) in mines with 1-19 employees; 20 pages (5 pages for the sampling protocol and action plan + 15 pages for sealing procedures) for mines with 20-500 employees; and 30 pages (5 pages for the sampling protocol and action plan + 25 pages for sealing procedures) in mines with 501+ employees. In addition, a clerical employee, earning $21.74 per hour, is estimated to take 0.25 hours (15 minutes) to copy and submit the revised materials. Postage costs are estimated at $2.

The Agency assumes that the District Manager, in reviewing proposed ventilation plan revisions will require some changes to the proposed revisions. The mine operator will need to make those changes and resubmit the revised ventilation plan for approval. A supervisor is estimated to spend 1 hour in mines with 1-19 employees, between 1 and 2 hours (for an average

of 1.5 hours) in mines with 20-500 employees, and 2 hours in mines with 501+ employees making changes and resubmitting the revised ventilation plan. Table IV-E1 shows, by mine size, the annual cost to revise and resubmit the mine ventilation plan for those mines that will continue to seal after the ETS takes effect.

Table IV-E1: Annual Cost to Revise, Copy, and Submit the Proposed and Approved Ventilation Plan Revisions For Mines that Will Continue to Seal [a]

Mine Size	No. of Mines that Will Seal	Time to Revise Ventilation Plan (in hrs.) [b]	Time to Copy Revised Pages (in hrs.)	No. of Revised Pages	Copy Cost per page	Postage Cost	Supervisor Hourly Wage Rate	Clerical Hourly Wage Rate	Annual Cost [c]
1-19	83	9	0.25	15	$0.15	$2	$62.50	$21.74	$48,295
20-500	279	17.5	0.25	20	$0.15	$2	$62.50	$21.74	$310,979
501+	10	26	0.25	30	$0.15	$2	$62.50	$21.74	$16,489
Total	372								$375,763

[a] As a result of the ETS, mine operators will be required to revise the mine ventilation plan at 30 CFR §75.370(a)(2).

[b] The time for a supervisor to revise the ventilation plan would be: 9 hrs. (8 hours for proposed revisions + 1 hour for approved revisions) in mines with 1-19 employees; 17.5 hrs. (16 hours for proposed revisions + 1.5 hours for approved revisions) in mines with 20-500 employees; and 26 hrs. (24 hours for proposed revisions + 2 hours for approved revisions) in mines with 501+ employees;

[c] Annual Cost = no.of mines that will seal x ((((time to copy revised pages x clerical hourly wage rate) + (no. of revised pages x copy cost per page) + postage cost) x 2) +(time to revise ventilation plan x supervisor hourly wage rate)), where a factor of 2 is used to account for the proposed and approved revisions.

Mines that continue to seal after the ETS becomes effective will need to post a copy of their proposed and approved ventilation plan revisions submitted to MSHA. In addition, those mines that have a representative of miners must provide a copy of the revisions upon request. MSHA assumes that 30 percent of mines that continue to seal have a representative of miners and that all will request a copy of the revisions. MSHA estimates that it will take a clerical employee, earning $21.74 per hour, 0.35 hours (21 minutes) either: to copy and post the revisions, or to copy and provide a copy of the revisions to the representative of miners. Postage cost is estimated to be $2. Table IV-E2 shows, by mine size, the annual cost to copy and post and, when applicable, to provide a copy of the revisions to the representative of miners, for those mines that continue to seal after the ETS takes effect.

Table IV-E2: Annual Cost to Copy and Post Proposed & Approved Ventilation Plan and Provide a Copy of Ventilation Plan to Representative of Miners For Mines that Will Continue to Seal [a]

Mine Size	No. of Mines that Will Seal	Time to Copy & Post or to Copy & Provide Plan to Rep. of Miners (in hrs.) [b]	No. of Revised Pages	Percentage of Mines Providing a Copy of Plan to Rep of Miners	Copy Cost per page	Postage Cost	Clerical Hourly Wage Rate	Annual Cost [c]
1-19	83	0.35	15	30%	$0.15	$2	$21.74	$2,227
20-500	279	0.35	20	30%	$0.15	$2	$21.74	$8,031
501+	10	0.35	30	30%	$0.15	$2	$21.74	$327
Total	372							$10,585

[a] As a result of the ETS, mine operators will be required to revise the mine ventilation plan at 30 CFR §§75.370(a)(3) & 75.370(f).

[b] 0.35 hours = the time either: to copy and post the revised ventilation plan revisisons, or to copy and provide the revised ventilation revisions to representative of miners.

[c] Annual Cost = ((no. of mines that will seal x ((time to copy and post x clerical hourly wage rate) + (no. of revised pages x copy cost per page))) + (((time to copy and provide a copy to the representative of miners x clerical hourly wage rate) + (no. or revised pages x copy cost per page) + postage cost) x no. of mines that will seal x percentage of mines providing a copy of plan to representative of miners)) x 2, where a factor of 2 is used to account for the proposed and approved revisions.

Table IV-E3 shows, by mine size, the summary of yearly costs for revisions to the ventilation plan resulting from the ETS.

Table IV-E3: Summary of Yearly Costs for Ventilation Plan Changes [a]

ETS	Description	Table	Mine Size by Employment			
			1-19	20-500	501+	Total
§§75.335(b) & 75.336(b)	Submit Ventilation Changes for Mines that Will Seal	IV-E1	$48,295	$310,979	$16,489	$375,763
	Copy & Post or Provide Copy to Representative of Miners for Mines that Will Seal	IV-E2	$2,227	$8,031	$327	$10,585
Total			$50,522	$319,010	$16,816	$386,347

[a] As a result of the ETS, mine operators will be required to revise the mine ventilation plan at 30 CFR §75.370.

FEASIBILITY

MSHA has concluded that the requirements of the ETS are technologically and economically feasible.

Technological Feasibility

MSHA concludes that the ETS is technologically feasible. MSHA based its conclusion on an analysis of the compliance requirements of the ETS provisions for training, sampling, and construction and repair. MSHA believes compliance with these requirements is technologically feasible because the materials, equipment, and methods for implementing these requirements currently exist. However, MSHA will be gathering information on seal designs at 120 psi overpressure and will make this information available to the mining community. MSHA solicits comments on this issue, and on seal designs that are greater than 120 psi overpressure.

Economic Feasibility

MSHA also believes that the ETS is economically feasible. The yearly compliance cost of the ETS is $39.7 million which is 0.30 percent of all revenues ($39.7 million/$13.1 billion) for all underground coal mines. MSHA concludes that the ETS is economically feasible for these mine operators because the total compliance costs are well below one percent of the estimated revenues for all underground coal mines.

V. REGULATORY FLEXIBILITY CERTIFICATION

INTRODUCTION

Pursuant to the Regulatory Flexibility Act (RFA) of 1980, as amended by the SBREFA, MSHA has analyzed the impact of the ETS on small entities. Based on that analysis, MSHA certifies that the ETS will not have a significant economic impact on a substantial number of small entities that are covered by this rulemaking. The factual basis for this certification is presented below.

DEFINITION OF A SMALL MINE

Under the RFA, in analyzing the impact of a rule on small entities, MSHA must use the Small Business Administration's (SBA's) definition for a small entity, or after consultation with the SBA Office of Advocacy, establish an alternative definition for the mining industry by publishing that definition in the Federal Register for notice and comment. MSHA has not established an alternative definition, and hence is required to use the SBA's definition. The SBA defines a small entity in the mining industry as an establishment with 500 or fewer employees (13 CFR 121.201).

MSHA has also examined the impacts of agency rules on mines with fewer than 20 employees, which MSHA and the mining community have traditionally referred to as "small mines." These small mines differ from larger mines not only in the number of employees, but also in economies of scale in material produced, in the type and amount of production equipment, and in supply inventory. Therefore, their costs of complying with MSHA's rules and the impact of the agency's rules on them will also tend to be different. It is for this reason that "small mines," as traditionally defined by MSHA as those employing fewer than 20 workers, 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." MSHA concludes that it can certify that the ETS will not have a significant economic impact on a substantial number of small entities that are covered by this rulemaking. MSHA has determined that this is the case both for mines with fewer than 20 employees and for mines with 500 or fewer employees.

FACTUAL BASIS FOR CERTIFICATION

General Approach

MSHA's analysis of the economic impact on "small entities" begins with a "screening" analysis. The screening compares the estimated costs of a rule for small entities to the estimated revenues. When estimated costs are less than one percent of estimated revenues (for the size categories considered), MSHA believes it is generally appropriate to conclude that there is no significant economic impact on a substantial number of small entities. If estimated costs are equal to or exceed one percent of revenues, MSHA will investigate whether further analysis is required.

Derivation of Costs and Revenues

The compliance costs noted in this chapter were previously presented in Chapter IV of this document along with an explanation of how they were derived.

Revenues for coal are derived from data on coal prices and coal tonnage. Total underground coal production in 2006 was 359 million tons. The 2005 price of underground coal was $36.42 per ton.[15] Total estimated revenue in 2006 for underground coal production was $13.1 billion. Multiplying tons by the price per ton, estimated 2006 underground coal revenue, by mine size, is $0.3 billion for mines with 1-19 employees and $10.1 billion for mines with 1-500 employees.

Results of Screening Analysis

Table V-1 below shows that when dividing the yearly compliance costs by the annual revenues in each mine size category, the cost of the ETS for underground coal mines is 0.93% of revenues for mines with 1-19 employees and 0.37% of revenues for mines with 1-500 employees. Table V-1 also shows the cost as a percentage of revenues for all underground coal mines to be 0.30%.

For underground coal mines, Table V-1 further shows that the ETS will result in an average yearly cost per mine of: $11,172 for mines with 1-19 employees and $56,762 for mines with 1-500 employees. The average yearly cost per mine for all underground coal mines is $59,191.

Table V-1: Cost of Proposed Rule Compared to Mine Revenues, by Mine Size

Underground Coal Mines					
Employment Size	# of Mines	Cost of Proposed Rule	Estimated Revenue (Millions)	Cost Per Mine	Cost of Rule as % of Revenue
1-19 Employees	236	$2,636,665	$285	$11,172	0.93%
1-500 Employees	657	$37,292,784	$10,107	$56,762	0.37%
All mines	670	$39,657,675	$13,059	$59,191	0.30%

As shown in Table V-1, when applying MSHA's and SBA's definitions of small mines, the yearly costs of the ETS are less than one percent of estimated yearly revenues, below the level suggesting that the ETS might have a significant economic impact on a substantial number of small entities. Accordingly, MSHA has certified that the ETS will not have a significant economic impact on a substantial number of small entities that are covered by the ETS.

[15] U.S. DOE, EIA, "Annual Coal Report 2005," Table 28, October 2006.

VI. OTHER REGULATORY CONSIDERATIONS

THE UNFUNDED MANDATES REFORM ACT

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

EXECUTIVE ORDER 13132: FEDERALISM

This ETS 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.

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

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

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

This ETS does not implement a policy with takings implications. Accordingly, E. O. 12630 requires no further Agency action or analysis.

EXECUTIVE ORDER 12988: CIVIL JUSTICE REFORM

This ETS 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, this ETS meets the applicable standards provided in section 3 of E. O. 12988, Civil Justice Reform.

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

This ETS has no adverse impact on children. Accordingly, under E. O. 13045, no further Agency action or analysis is required.

EXECUTIVE ORDER 13175: CONSULTATION AND COORDINATION WITH INDIAN TRIBAL GOVERNMENTS

This ETS 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, under E. O. 13175, no further Agency action or analysis is required.

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

Executive Order 13211 requires agencies to publish a statement of energy effects when a rule has a significant energy action that adversely affects energy supply, distribution or use. MSHA has reviewed this ETS for its energy effects because the ETS applies to the underground coal mining sector. MSHA has concluded that this ETS is not a significant energy action because it will not have significant adverse effect on the supply, distribution, or use of energy. Further, because this ETS will result in yearly costs of approximately $39.7 million to the underground coal mining industry, relative to annual revenues of $13.1 billion in 2006, it is not a significant energy action because it is not likely to have a significant adverse effect on the supply, distribution, or use of energy. Accordingly, under this analysis, no further Agency action or analysis is required.

VII. PAPERWORK REDUCTION ACT OF 1995

INTRODUCTION

The purpose of this chapter is to show the estimated paperwork burden hours and related costs borne by mine operators and manufacturers as a result of the ETS. The costs in this chapter are derived from Chapter IV in this REA. However, in this chapter, costs are estimated only in relation to the burden hours that the ETS imposes. Costs in Chapter IV that do not have associated burden hours are not included in this chapter.

This chapter provides estimates of the burden hours and related costs in §§ 75.335, 75.336, and 75.337.

SUMMARY OF PAPERWORK BURDEN HOURS AND RELATED COSTS

The ETS contains the following types of burden: first-year burden that occurs only during the first year the ETS is in effect; annual burden that occurs during the first year the ETS is in effect and continues for every year thereafter; and annual burden that occurs in the second year after the ETS is in effect and continues for every year thereafter.

MSHA estimates that mine operators will incur 82,037 burden hours and $4,690,265 of related yearly costs the first year that the ETS is in effect. In the second year that the ETS is in effect, and for every year thereafter, the Agency estimates that mine operators will incur 73,006 burden hours and $4,552,151 of related costs.[16] Table VII-1 shows, by mine size, the first year burden hours and cost. Table VII-2 shows, by mine size, the burden hours and cost that occur in the second year and every year thereafter.

[16] 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 First Year Burden Hours and Costs

Detail	Section	Table	Employment by Mine Size							
			1-19 Empl.		20-500 Empl.		501+ Empl.		Total	
			Hours	Costs	Hours	Costs	Hours	Costs	Hours	Costs
Certify Sampling Training	§75.335 (b)(2)	VII-B1	8	$127	28	$425	1	$15	37	$567
Certify Sampling Training (Turnover)	§75.335 (b)(2)	VII-B2	1	$73	8	$488	0	$26	9	$587
Certify Sampling Retraining	§75.335 (b)(2)	VII-B3	8	$519	28	$1,744	1	$63	37	$2,325
Baseline Sampling & Record	§75.335 (b)(5)(iii)	VII-B4 & B5	2,370	$120,153	24,901	$1,226,860	1,499	$70,097	28,771	$1,417,110
Annual Sampling	§75.335 (b)	VII-B6	1,795	$112,200	21,361	$1,335,075	1,533	$95,813	24,689	$1,543,088
Annual Sampling Record	§75.335 (b)(6)	VII-B7	1,259	$78,706	15,006	$937,903	1,077	$67,313	17,343	$1,083,922
Seal Approval	§75.336 (a)	VII-C1							30	$1,467
Exam, Certify, Record & Countersign Seal Construction & Repair	§75.335 (b)&(c)	VII-D1	310	$20,648	3,161	$210,261	178	$11,853	3,650	$242,762
Notification Concerning Seal Construction	§75.337 (d)	VII-D2	10	$310	105	$3,127	3	$75	118	$3,512
Prepare for Seal Construction & Repair Training	§75.337 (e)	VII-D3	66	$981	781	$11,547	36	$532	884	$13,061
Certify Seal Construction & Repair Training	§75.337 (e)	VII-D4	2	$25	20	$289	1	$13	22	$327
Certify Seal Construction & Repair Training (Turnover)	75.337 (e)	VII-D5	1	$61	10	$580	1	$61	12	$701
Certify Annual Retraining of Construction & Repair	75.337 (e)	VII-D6	2	$101	20	$1,183	1	$55	22	$1,338
Submit Ventilation Plan for Mines that Seal	§§75.335 (b)(5) & 75.336 (b)(3)	VII-E1	789	$47,590	5,022	$308,189	265	$16,359	6,076	$372,137
Copy & Post Ventilation Plan or Provide Copy to Rep. of Miners for Mines that Seal	§§75.335 (b)(5) & 75.336 (b)(3)	VII-E2	76	$1,642	254	$5,520	9	$198	339	$7,359
Total			6,698	$383,134	70,703	$4,043,192	4,605	$262,471	82,037	$4,690,265

Table VII-2 Burden Hours and Costs
in the Second Year and Ever Year Thereafter

Detail	Section	Table	Employment by Mine Size							
			1-19 Empl.		20-500 Empl.		501+ Empl.		Total	
			Hours	Costs	Hours	Costs	Hours	Costs	Hours	Costs
Certify Sampling Training (Turnover)	§75.335 (b)(2)	VII-B2	1	$73	8	$488	0	$26	9	$587
Certify Sampling Retraining	§75.335 (b)(2)	VII-B3	8	$519	28	$1,744	1	$63	37	$2,325
Baseline Sampling & Record	§75.335 (b)(5)(iii)	VII-B5	1,778	$111,116	17,929	$1,120,534	1,000	$62,475	20,706	$1,294,125
Annual Sampling	§75.335 (b)	VII-B6	1,795	$112,200	21,361	$1,335,075	1,533	$95,813	24,689	$1,543,088
Annual Sampling Record	§75.335 (b)(6)	VII-B7	1,259	$78,706	15,006	$937,903	1,077	$67,313	17,343	$1,083,922
Seal Approval	§75.336 (a)	VII-C1							6	$293
Exam, Certify, Record & Countersign Seal Construction & Repair	§75.335 (b)&(c)	VII-D1	310	$20,648	3,161	$210,261	178	$11,853	3,650	$242,762
Notification Concerning Seal Construction	§75.337 (d)	VII-D2	10	$310	105	$3,127	3	$75	118	$3,512
Certify Seal Construction & Repair Training (Turnover)	§75.337 (e)	VII-D5	1	$61	10	$580	1	$61	12	$701
Certify Annual Retraining of Construction & Repair	§75.337 (e)	VII-D6	2	$101	20	$1,183	1	$55	22	$1,338
Submit Ventilation Plan for Mines that Seal	§§75.335 (b)(5) & 75.336 (b)(3)	VII-E1	789	$47,590	5,022	$308,189	265	$16,359	6,076	$372,137
Copy & Post Ventilation Plan or Provide Copy to Rep. of Miners for Mines that Seal	§§75.335 (b)(5) & 75.336 (b)(3)	VII-E2	76	$1,642	254	$5,520	9	$198	339	$7,359
Total			6,029	$372,964	62,903	$3,924,605	4,068	$254,288	73,006	$4,552,151

The remaining tables in this chapter have been numbered according to the type of paperwork requirement: VII-B for sampling; VII-C for seal design applications and installation approvals; VII-D for construction and repair of seals; and VII-E for ventilation plan revisions.

Under ETS § 75.335(b)(2), the mine operator must include a certification that certified persons conducting sampling have been trained in sampling procedures. Mines that will sample and thus need to train personnel are: 83 mines with 1-19 employees; 279 mines with 20-500 employees; and 10 mines with 501+ employees. MSHA estimates that it will take 0.1 hours (6 minutes) for a supervisor, earning $62.50 per hour, to certify the date and content of training provided to those trained. Table VII-B1 shows, by mine size, the burden hours and cost to certify miners trained in the sampling procedures listed in the mine ventilation plan as required by ETS § 75.335(b)(2).

Table VII-B1: Burden Hours and Cost to Certify Miners Trained in Sampling Procedures under ETS §75.335(b)(2)

Mine Size	No. of Mines that Will Sample Seals	Time to Certify (in hrs.)	First Year Burden Hours	Supervisor Hourly Wage Rate	First Year Burden Cost	Annualized Burden Cost [a]
1-19	83	0.1	8	$62.50	$519	$127
20-500	279	0.1	28	$62.50	$1,744	$425
501+	10	0.1	1	$62.50	$63	$15
Total	372		37		$2,325	$567

[a] Annualized Cost = first year costs x 0.244, where 0.244 is the annualization factor.

The initial training to certify persons conducting sampling will need to be conducted yearly due to mine personnel turnover. Therefore, MSHA assumes that training will be conducted individually due to turnover and will need to be certified. On average, MSHA estimates an annual turnover rate of 7 percent. Table VII-B2 shows, by mine size, the burden hours and cost to certify training due to turnover of mine personnel.

Table VII-B2: Burden Hours and Cost to Certify Miners Trained in Sampling Procedures under ETS §75.335(b)(2) Due to Mine Personnel Turnover

Mine Size	No. of Mines that Will Sample Seals	No. of Certified Persons to Train per Mine	Turn-over Rate	Time to Certify (in hrs.)	Annual Burden Hours	Supervisor Hourly Wage Rate	Annual Burden Cost
1-19	83	2	0.07	0.1	1	$62.50	$73
20-500	279	4	0.07	0.1	8	$62.50	$488
501+	10	6	0.07	0.1	0	$62.50	$26
Total	372				9		$587

ETS § 75.335(b)(2) also requires that annual retraining be provided. This training must also be certified. Table VII-B3 shows, by mine size, the burden hours and cost to certify annual retraining.

Table VII-B3: Burden Hours and Cost for Certifying Annual Retraining for Sampling under ETS §75.335(b)(2)

Mine Size	No. of Mines that Will Sample Seals	Time to Certify (in hrs.)	Annual Burden Hours	Supervisor Hourly Wage Rate	Annual Burden Cost
1-19	83	0.1	8	$62.50	$519
20-500	279	0.1	28	$62.50	$1,744
501+	10	0.1	1	$62.50	$63
Total	372		37		$2,325

Under § 75.335(b)(5)(iii) mine operators must sample to establish a baseline analysis of oxygen and methane concentrations at each sampling point over a 14-day period. Operators are required to have one sampling pipe with one sampling point for each set of existing seals. Therefore, 2 samples (1 oxygen and 1 methane sample) must be taken for each of the 14 days, for a total of 28 samples at existing seals that have sampling pipes. In addition, MSHA assumes that 5 percent of the samples taken will involve recording a hazardous condition (to be abated with additional baseline sampling). MSHA estimates that, on average, the number of existing seal sets are approximately: 2 seal sets per mine for mines with 1-19 employees, 7 seal sets per mine for mines with 20-500 employees, and 14 seal sets per mine for mines with 501+ employees. MSHA estimates that a certified person, earning $62.50 per hour, will take 0.075 hours (4.5 minutes) to take a sample, 0.05 hours (3 minutes) to make a record of sample concentrations, and an additional 0.05 hours (3 minutes) to record a hazardous condition in those samples where a hazardous condition was found. Table VII-B4 shows, by mine size, the burden hours and cost for sampling to establish a baseline for existing seals.

Table VII-B4: Burden Hours and Cost for Sampling to Establish a Baseline under § 75.335(b)(5)(iii) for Existing Sets of Seals

Mine Size	No. of Mines that Will Seal	No. of Samples Taken Over 14 Day Period [a]	No. of Sets of Seals per Mine	No. of Samples to Establish the Baseline [b]	No. of Samples that Involve a Hazardous Condition [c]	Time to Take Sample and Make a Record that Does Not Involve a Hazardous Condition (in hrs.) [d]	Additional Time to Make a Record that Involves a Hazardous Condition (in hrs.)	First Year Burden Hours [e]	Certified Person Hourly Wage Rate	First Year Cost	Annualized Cost [f]
1-19	83	28	2	4,648	232	0.125	0.05	593	$62.50	$37,038	$9,037
20-500	279	28	7	54,684	2,734	0.125	0.05	6,972	$62.50	$435,763	$106,326
501+	10	28	14	3,920	196	0.125	0.05	500	$62.50	$31,238	$7,622
Total	372			63,252	3,162			8,065		$504,038	$122,985

[a] The sampling pipe in an existing seal has one sampling point in it; thus 2 samples (1 oxygen and 1 methane sample) will be taken for each of the 14 days, for a total of 28 samples.

[b] No. of Samples to Establish the Baseline = no. of mines that will seal x no. of samples taken over 14 day period x no. of sets of seals per mine.

[c] No. of Samples that Involve a Hazardous Condition = no. of samples to establish the baseline x 5 percent.

[d] 0.125 hrs. = 0.075 hrs. (4.5 minutes) to take a sample + 0.05 hrs. (3 minutes) to make record of sample concentrations.

[e] First Year Burden Hours = (no. of samples to establish the baseline x time to take sample and make a record that does not involve a hazardous condition) + (no. of samples that involve a hazardous condition x additional time to make a record that involves a hazardous condition).

[f] Annualized Cost = first year cost x 0.244, where 0.244 is the annualization factor reflecting a 5-year amortization period.

Also, sampling to establish a baseline would need to be conducted for newly constructed seals built each year. The ETS requires under § 75.335(d) that for new seals at least two sampling pipes be installed in each seal. Therefore, 4 samples (2 oxygen and 2 methane samples) are taken for each of the 14 days, for a total of 56 samples at new seals that have sampling pipes. In addition, MSHA assumes that 5 percent of the samples taken will involve recording a hazardous condition that will be abated with additional baseline sampling. MSHA estimates that, on average, the number of new seals built annually is: 3 seals per mine for mines with 1-19 employees, 9 seals per mine for mines with 20-500 employees, and 14 seals per mine for mines with 501+ employees. MSHA estimates that a certified person, earning $62.50 per hour, will take 0.075 hours (4.5 minutes) to take a sample, 0.05 hours (3 minutes) to make a record of sample concentrations, and an additional 0.05 hours (3 minutes) to record a hazardous condition in those samples where a hazardous condition was found. Table VII-B5 shows, by mine size, the burden hours and cost for sampling to establish a baseline for new seals.

Table VII-B5: Burden Hours and Cost For Sampling to Establish a Baseline under § 75.335(b)(5)(iii) for Newly Constructed Seals

Mine Size	No. of Mines that Will Seal	No. of Samples Taken Over 14 Day Period [a]	No. of Seals Built per Yr. per Mine	No. of Samples to Establish the Baseline [b]	No. of Samples that Involve a Hazardous Condition [c]	Time to Take Sample and Make a Record that Does Not Involve a Hazardous Condition (in hrs.) [d]	Additional Time to Make a Record that Involves a Hazardous Condition (in hrs.)	Annual Burden Hours[e]	Certified Person Hourly Wage Rate	Annual Cost
1-19	83	56	3	13,944	697	0.125	0.05	1,778	$62.50	$111,116
20-500	279	56	9	140,616	7,031	0.125	0.05	17,929	$62.50	$1,120,534
501+	10	56	14	7,840	392	0.125	0.05	1,000	$62.50	$62,475
Total	372			162,400	8,120			20,706		$1,294,125

[a] The sampling pipe in a new seal has two sampling points in it; thus 4 samples (2 oxygen and 2 methane sample) will be taken for each of the 14 days, for a total of 56 samples.

[b] No. of Samples to Establish the Baseline = no. of mines that will seal x no. of samples taken over 14 day period x no. of seals built per yr. per mine.

[c] No. of Samples that Involve a Hazardous Condition = no. of samples to establish the baseline x 5 percent.

[d] 0.125 hrs. = 0.075 hrs. (4.5 minutes) to take a sample + 0.05 hrs. (3 minutes) to make record of sample concentrations.

[e] Annual Burden Hours = (no. of samples to establish the baseline x time to take sample and make a record that does not involve a hazardous condition) + (no. of samples that involve a hazardous condition x additional time to make a record that involves a hazardous condition).

Oxygen and methane samples will be taken under the ETS. MSHA estimates that the annual number of oxygen and methane samples taken, in each mine size category, will be: 23,936 samples in the mines with 1-19 employees, 284,816 samples in the mines with 20-500 employees, and 20,440 samples in the mines with 501+ employees. MSHA estimates that a sample takes 0.075 hours (4.5 minutes) to conduct. A certified person, earning a supervisory wage of $62.50 per hour, will take the samples. Table VII-B6 shows, by mine size, the burden hours and cost to take oxygen and methane samples as required by ETS § 75.335(b).

Table VII-B6: Burden Hours and Cost of Sampling under ETS §75.335(b)

Mine Size	Total No. of Annual Samples [a]	Time to Take Sample (in hrs.)	Annual Burden Hours	Certified Person Hourly Wage Rate	Annual Burden Cost
1-19	23,936	0.075	1,795	$62.50	$112,200
20-500	284,816	0.075	21,361	$62.50	$1,335,075
501+	20,440	0.075	1,533	$62.50	$95,813
Total	329,192		24,689		$1,543,088

[a] Source: REA Table IV-B9.

Under ETS § 75.335(b)(6) a certified person must record each sampling result, including location of the sampling points, and oxygen and methane concentrations. Also, any hazardous conditions found must be corrected and recorded in accordance with existing § 75.363. Hazardous conditions that are not corrected immediately must be posted. MSHA estimates that mines that sample once per week will not require the recording of a hazardous condition. Approximately 15 percent of the samples in mines that sample 5 times per week and those that sample under § 75.335(b)(4) will involve samples that need to record a hazardous condition: 1,250 samples in mines with 1-19 employees; 15,313 samples in mines with 20-500 employees; and 1,100 samples in mines with 501+ employees.

MSHA estimates that the time to make a record is: 0.05 hours (3 minutes) when there is no hazardous condition and an additional 0.05 hours (3 minutes) when a hazardous condition needs to be recorded. Table VII-B7 shows, by mine size, the burden hours and cost of making a sampling record.

Table VII-B7: Burden Hours and Cost to Make a Sampling Record under ETS §75.335(b)(6)

Mine Size	Total No. of Annual Samples [a]	No. of Annual Samples that Involve a Hazardous Condition [a]	Time to Make a Record that Does Not Involve a Hazardous Condition (in hrs.)	Additional Time to Make a Record that Involves a Hazardous Condition (in hrs.)	Annual Burden Hours	Certified Persons Hourly Wage Rate	Annual Burden Cost
1-19	23,936	1,250	0.05	0.05	1,259	$62.50	$78,706
20-500	284,816	15,313	0.05	0.05	15,006	$62.50	$937,903
501+	20,440	1,100	0.05	0.05	1,077	$62.50	$67,313
Total	329,192	17,663			17,343		$1,083,922

[a] Source: REA Table IV-B10.

ETS § 75.336(a) provides procedures for the approval of seal designs. MSHA estimates that in the first year 10 applications would be filed, and in the second year and every year thereafter 2 applications would be filed. On average, a supervisor, earning $62.50 per hour, would spend 2 hours on each application, and a clerical employee earning $21.74 per hour, would spend 1 hour preparing and submitting the application. Table VII-C1 shows seal approval burden hours and costs for the first year and every year thereafter.

Table VII-C1: Burden Hours and Cost for Seal Approval Applications under §75.336(a)

Year	No. of Seal Applications	Supervisor Time (in hrs.)	Clerical Time (in hrs.)	Supervisor Burden Hours	Clerical Burden Hours	Supervisor Hourly Wage Rate	Clerical Hourly Wage Rate	Annual Burden Cost
First	10	2	1	20	10	$62.50	$21.74	$1,467
Second	2	2	1	4	2	$62.50	$21.74	$293
Third	2	2	1	4	2	$62.50	$21.74	$293

Under ETS § 75.337(b)(1)-(b)((5), a certified person must perform several tasks during seal construction and repair, and a mine foreman or equivalent must countersign the record. MSHA estimates that it will take 0.85 hours (51 minutes) to perform these functions. The 0.85 hours will consist of: 0.75 hours (45 minutes) for the certified person to perform the requirements, which include making the record but not countersigning it; and 0.1 hours (6 minutes) for a mine foreman or equivalent mine official to review and countersign the record. MSHA estimates that the certified person and mine foreman earn $62.50 per hour.

ETS § 75.337(c) requires that a senior mine management official certify that construction, installation, and materials used were in accordance with the approved ventilation plan. MSHA estimates that a senior mine management official, earning $80.17 per hour, will take 0.25 hours to perform this certification.

The requirements of ETS § 75.337(b) and (c) apply to both the construction of seals and the repair of existing seals. MSHA estimates that the mines that will seal are: 83 mines with 1-19 employees; 279 mines with 20 to 500 employees; and 10 mines with 501+ employees.

With respect to new seals, MSHA estimates that, on average, the annual number of new seals that will be built is: 3 seals per mine with 1-19 employees; 9 seals per mine with 20-500 employees; and 14 seals per mine with 501+ employees. For existing seals, MSHA's 2006 data on the number of existing seals shows that, on average, there are approximately: 13 existing seals per mine in mines with 1-19 employees; 44 existing seals per mine in mines with 20-500 employees; and 74 existing seals per mine in mines with 501+ employees. MSHA assumes that 3 percent of these seals will need to be repaired annually. Consequently, the number of existing seals to be repaired in the average mine will be: 0.4 seals per mine with 1-19 employees; 1.3 seals per mine with 20-500 employees; and 2.2 seals per mine with 501+ employees.

Table VII-D1 shows, by mine size, the burden hours and cost for mine operators to perform the requirements under ETS § 75.337(b) and (c).

Table VII-D1: Burden Hours and Cost to Examine, Certify, Record and Countersign Seal Construction and Repair under ETS §§75.337(b) and 75.337(c)

Mine Size	No. of Mines that Will Seal	Annual No. of Seals Built per Mine	Annual No. of Seals Repaired per Mine	Time to Examine, Certify, Record, and Countersign (in hrs.) [a]	Time to Certify by Senior Mine Official (in hrs.) [b]	Certified Person Annual Burden Hours	Senior Mine Official Annual Burden Hours	Certified Person Hourly Wage Rate	Senior Mine Official Hourly Wage Rate	Annual Burden Cost
1-19	83	3	0.4	0.85	0.25	240	71	$62.50	$80.17	$20,648
20-500	279	9	1.3	0.85	0.25	2,443	718	$62.50	$80.17	$210,261
501+	10	14	2.2	0.85	0.25	138	41	$62.50	$80.17	$11,853
Total	372					2,820	829			$242,762

[a] 0.85 hrs. = 0.75 hrs. for a certified person to examine seal site prior to construction or repair, examine seal during construction or repair, examine seal upon completion of construction or repair, certify at the seal site that examinations were made, and to make a record + 0.1 hrs. for mine foreman to countersign record.

[b] 0.25 hrs. for senior mine management official to certify that construction, installation, and materials used were in accordance with approved ventilation plan.

Under ETS § 75.337(d), the mine operator will need to notify MSHA of certain activities concerning the construction of a set of seals. ETS § 75.337(d)(1) requires the mine operator to notify the local MSHA field office between 2 and 14 days prior to commencement of seal construction. ETS § 75.337(d)(2) requires the mine operator to notify the District Manager, in writing, within five days of completion of a set of seals. ETS § 75.337(d)(3) requires the mine operator to submit a copy of quality control test results.

MSHA estimates that, on average, the number of sets of seals per year will be 0.5 sets of seal in a mine with 1-19 employees; 1.5 sets in a mine with 20-500 employees; and 1 set of seals in a mine with 501+ employees.

MSHA estimates that a supervisor, earning $62.50 per hour, will take 0.05 hours (3 minutes) to notify the local MSHA field office between 2 and 14 days prior to commencement of seal construction. Also, MSHA estimates that it will take a clerical employee, earning $21.74 per hour, a total of 0.2 hours (12 minutes) to type and send a letter notifying of the completion of a set of seals and to copy and send the quality control test results.

Table VII-D2 shows, by mine size, the annual costs to notify and submit material to MSHA pursuant to the requirements in the ETS § 75.337(d).

Table VII-D2: Burden Hours and Cost to Notify MSHA Concerning Constructing Sets of Seals under ETS §75.337(d)

Mine Size	No. of Mines that Will Seal	Annual Number of Sets of Seals to Be Built per Mine	Time to Notify MSHA per Mine (in hrs.) [a]	Time to Submit Data to MSHA per Mine (in hrs.) [b]	Supervisor Annual Burden Hours	Clerical Annual Burden Hours	Supervisor Hourly Wage Rate	Clerical Hourly Wage Rate	Annual Burden Cost
1-19	83	0.5	0.05	0.2	2	8	$62.50	$21.74	$310
20-500	279	1.5	0.05	0.2	21	84	$62.50	$21.74	$3,127
501+	10	1	0.05	0.2	1	2	$62.50	$21.74	$75
Total	372				24	94			$3,512

[a] 0.05 hrs = the time for a supervisor to notify the local MSHA field office between 2 and 14 days prior to commencement of seal construction.

[b] 0.2 hrs. = 0.1 hrs. for clerical employee to type and send a letter which notifies of the completion of a set of seals + 0.1 hrs. for clerical employee to copy and send the quality control test results.

Under ETS § 75.337(e), miners constructing and repairing seals and certified persons in ETS § 75.337(b) will need to be trained prior to constructing or repairing a seal. The training will address material and procedures in the approved seal design and ventilation plan.

All mines that now have seals will need the training required by ETS § 75.337(e) because they will be constructing new seals in the future and maintaining existing seals. The numbers of mines that will need to provide training under ETS § 75.337(e) is estimated to be 83 mines with 1-19 employees, 279 mines with 20-500 employees, and 10 mines with 501+ employees.

MSHA estimates that of the mines with 1-19 employees, 80 percent will contract out training and 20 percent will train in-house; of those with 20-500 employees, 30 percent will contract out training and 70 percent will train in-house; and of those with 501+ employees, 10 percent will contract out training and 90 percent will train in-house.

For those mines that provide training in-house, MSHA estimates that a chief engineer, earning $60.58 per hour, will take 4 hours to prepare for the training. Table VII-D3 shows, by mine size, the burden hours and cost to prepare for training.

Table VII-D3: Burden Hours and Cost to Prepare for Training under ETS §75.337(e)

Mine Size	No. of Mines that Will Build or Repair Seals	Percentage of Mines that will Receive Training In-House	Time to Prepare for Training (in hrs.)	Annual Burden Hours	Chief Engineer Hourly Wage Rate	First Burden Year Cost	Annualized Burden Cost [a]
1-19	83	20%	4	66	$60.58	$4,023	$981
20-500	279	70%	4	781	$60.58	$47,325	$11,547
501+	10	90%	4	36	$60.58	$2,181	$532
Total	372			884		$53,528	$13,061

[a] Annualized Burden Cost =first Year costs x 0.244, where 0.244 is the annualization factor reflecting a 5-year amortization period.

The training under § 75.337(e) must be certified. Mine operators will incur burden hours related to certifying the training for in-house training. The hourly wage rate of the person providing the training is estimated to be $60.58 when the training is provided in-house. The certification is estimated to take 0.1 hours (6 minutes). Table VII-D4 shows, by mine size, the burden hours and cost for certifying the training under ETS § 75.337(e).

Table VII-D4: Burden Hours and Cost for Certifying Training under ETS §75.337(e)

Mine Size	No. of Mines that Will Build or Repair Seals	Percent Training Done In-House [a]	Time to Certify (in hrs.)	Annual Burden Hours	Instructor Hourly Wage Rate	First Year Burden Cost	Annualized Burden Cost [b]
1-19	83	20%	0.1	2	$60.58	$101	$25
20-500	279	70%	0.1	20	$60.58	$1,183	$289
501+	10	90%	0.1	1	$60.58	$55	$13
Total	372			22		$1,338	$327

[a] The number of mines conducting in-house training is estimated to be: 20 percent of mines with 1-19 employees, 70 percent of mines with 20-500 employees, and 90 percent of mines with 501+ employees

[b] Annualized Burden Costs = first year costs x 0.244, where 0.244 is the annualization factor, reflecting a 5 year amortization period.

Initial training will need to be conducted annually due to mine personnel turnover. MSHA estimates an annual turnover rate of 0.07 and that these miners will be trained individually. This training will also need to be certified. The certification is estimated to take 0.1 hours (6 minutes). Table VII-D5 shows, by mine size, the burden hours and cost for certifying training due to turnover of mine personnel.

Table VII-D5: Burden Hours and Cost for Certifying Training under ETS §75.337(e) Due to Mine Personnel Turnover

Mine Size	No. of Mines that Will Build or Repair Seals	No. of Miners to Train	No. of Certified Persons to Train	No. of Senior Mine Officials to Train	Turn-over Rate	Percent Training Done In-House [a]	Time to Certify (in hrs.)	Annual Burden Hours [b]	Instructor Hourly Wage Rate	Annual Burden Cost
1-19	83	2	1	1	0.07	20%	0.1	1	$60.58	$61
20-500	279	4	2	1	0.07	70%	0.1	10	$60.58	$580
501+	10	4	2	1	0.07	90%	0.1	1	$60.58	$61
Total	372							12		$701

[a] The number of mines conducting in-house training are estimated to be: 20 percent of mines with 1-19 employees, 70 percent of mines with 20-500 employees, and 90 percent of mines with 501+ employees

[b] Annual Burden Hours = (no. of mines that will build or repair seals x percent training done in-house) x ((no. of miners to train + no. of certified persons to train +no. of senior mine officials to train) x turnover rate) x time to certify.

Under ETS § 75.337(e), additional training would need to be provided when seal installation procedures change. MSHA assumes that applicable procedures would change, on average, once annually. This training will need to be certified. The certification is estimated to take 0.1 hours (6 minutes). Table VII-D6 shows, by mine size, the burden hour and cost for certifying ETS § 75.337(e) training performed as a result of changes to training procedures.

Table VII-D6: Burden Hours and Cost for Certifying Annual Retraining under ETS §75.337(e)

Mine Size	No. of Mines that Will Build or Repair Seals	Percent Training Done In-House [a]	Time to Certify (in hrs.)	Annual Burden Hours	Instructor Hourly Wage Rate	Annual Burden Cost
1-19	83	20%	0.1	2	$60.58	$101
20-500	279	70%	0.1	20	$60.58	$1,183
501+	10	90%	0.1	1	$60.58	$55
Total	372			22		$1,338

[a] The number of mines conducting in-house training are estimated to be: 20 percent of mines with 1-19 employees, 70 percent of mines with 20-500 employees, and 90 percent of mines with 501+ employees.

Under ETS § 75.335(b)(5), all mine operators that currently have seals must develop a sampling protocol which includes an action plan to monitor methane and oxygen concentrations in sealed areas. The sampling protocol and action plan must be included in the mine ventilation plan. In addition, mine operators that continue to construct seals must provide the sealing procedure information listed in ETS § 75.336(b)(3).

MSHA estimates that, after the ETS becomes effective, 83 mines with 1-19 employees, 279 mines with 20-500 employees, and 10 mines with 501+ employees will continue to seal. For these mines, MSHA estimates that a supervisor, earning $62.50 per hour, will take 8 hours in a mine with 1-19 employees, 16 hours in a mine with 20-500 employees, and 24 hours in a mine with 501+ employees to revise the ventilation plan. In addition, a clerical employee, earning $21.74 per hour, is estimated to take 0.25 hours (15 minutes) to copy and submit the revised materials.

The Agency assumes that the District Manager, in reviewing proposed ventilation plan revisions, will require some changes to the proposed revisions. The mine operator will need to make those changes and resubmit the revised ventilation plan for approval. A supervisor is estimated to spend 1 hour in mines with 1-19 employees, between 1 and 2 hours (for an average of 1.5 hours) in mines with 20-500 employees, and 2 hours in mines with 501+ employees making changes and resubmitting the revised ventilation plan.

Table VII-E1 shows, by mine size, the burden hours and cost to revise the mine ventilation plan for those mines that will continue to seal after the ETS takes effect.

Table VII-E1: Burden Hours and Cost to Revise, Copy, and Submit the Proposed and Approved Ventilation Plan Revisions For Mines that Will Continue to Seal [a]

Mine Size	No. of Mines that Will Seal	Time to Revise Ventilation Plan (in hrs.) [b]	Time to Copy Revised Pages (in hrs.)	Supervisor Annual Burden Hours [c]	Clerical Annual Burden Hours [d]	Supervisor Hourly Wage Rate	Clerical Hourly Wage Rate	Annual Burden Cost [e]
1-19	83	9	0.25	747	42	$62.50	$21.74	$47,590
20-500	279	17.5	0.25	4,883	140	$62.50	$21.74	$308,189
501+	10	26	0.25	260	5	$62.50	$21.74	$16,359
Total	372			5,890	186			$372,137

[a] As a result of the ETS, mine operators will be required to revise the mine ventilation plan at 30 CFR §75.370(a)(2).

[b] The time for a supervisor to revise the ventilation plan would be: 9 hrs. (8 hours for proposed revisions + 1 hour for approved revisions) in mines with 1-19 employees; 17.5 hrs. (16 hours for proposed revisions + 1.5 hours for approved revisions) in mines with 20-500 employees; and 26 hrs. (24 hours for proposed revisions + 2 hours for approved revisions) in mines with 501+ employees;

[c] Supervisor Annual Burden Hours = no. of mines that will seal x time to revise ventilation plan.

[d] Clerical Annual Burden Hours = no. of mines that will seal x time to copy revised pages x 2, where a factor of 2 is used to account for the proposed and approved revisions.

[e] Annual Burden Cost = (no. of mines that will seal x time to revise ventilation plan x supervisor hourly wage rate) + (no. of mines that will seal x time to copy and submit revised pages x clerical hourly wage rate x 2), where a factor of 2 is used to account for the proposed and approved revisions.

Mines that continue to seal after the ETS becomes effective will need to post a copy of their proposed and approved ventilation plan revisions submitted to MSHA. In addition, those mines that have a representative of miners must provide a copy of the revisions upon request. MSHA assumes that 30 percent of mines that continue to seal have a representative of miners and that all will request a copy of the revisions. MSHA estimates that it will take a clerical employee, earning $21.74 per hour, 0.35 hours (21 minutes) either: to copy and post the revisions, or to copy and provide a copy of the revisions to the representative of miners. Table IV-E2 shows, by mine size, the burden hours and cost to copy and post and, when applicable, to provide a copy of the revisions to the representative of miners, for those mines that continue to seal after the ETS takes effect.

Table VII-E2: Burden Hours and Cost to Copy and Post Proposed & Approved Ventilation Plan and Provide a Copy of Ventilation Plan to Representative of Miners For Mines that Will Continue to Seal [a]

Mine Size	No. of Mines that Will Seal	Time to Copy & Post or to Copy & Provide Plan to Rep. of Miners (in hrs.)	Percentage of Mines Providing a Copy of Plan to Rep. of Miners	Annual Burden Hours [b]	Clerical Hourly Wage Rate	Annual Burden Cost
1-19	83	0.35	30%	76	$21.74	$1,642
20-500	279	0.35	30%	254	$21.74	$5,520
501+	10	0.35	30%	9	$21.74	$198
Total	372			339		$7,359

[a] As a result of the ETS, mine operators will be required to revise the mine ventilation plan at 30 CFR §§75.370(a)(3) & 75.370(f).

[b] Annual Burden Hours = (no. of mines that will seal x time to copy & post or to copy & provide plan to representative of miners x 2) + (no. of mines that will seal x percentage of mines providing a copy of plan to representative of miners x time to copy & post or to copy & provide plan to representative of miners x 2), where a factor of 2 is used to account for the proposed and approved revisions.

VIII. REFERENCES

Jennifer B. Leinart, compiler, *U.S. Coal Mine Salaries, Wages, and Benefits: 2005 Survey Results* (Spokane, Washington: Western Mine Engineering, Inc.), 2005.

U.S. Department of Energy, Energy Information Administration, *Annual Energy Outlook 2005*, February 2005.

U.S. Department of Energy, Energy Information Administration, *Annual Energy Review 2005*, July 2006.

U.S. Department of Energy, Energy Information Administration, *Annual Coal Report 2005*, October 2006.

U.S. Department of Labor (DOL), Mine Safety and Health Administration (MSHA), Office of Program Evaluation and Information Resources (PEIR), 2006 preliminary data, March 27, 2007 Teradata run.

U.S. Department of Labor, Mine Safety and Health Administration, Coal Mine Safety and Health, *Report of Investigation Fatal Underground Coal Mine Explosion, Darby Mine No. 1*, 2007.