FINAL REGULATORY ECONOMIC ANALYSIS
AND
REGULATORY FLEXIBILITY ANALYSIS

FINAL RULE ON 30 CFR 48

TRAINING AND RETRAINING OF MINERS;
EXPERIENCED MINER AND SUPERVISOR TRAINING

RIN: 1219-AB13

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

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TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF TABLES

I. EXECUTIVE SUMMARY

INTRODUCTION

Executive Order (E.O.) 12866 requires that regulatory agencies complete a Regulatory Economic Analysis (REA) for any rule having major economic consequences for the national economy, an individual industry, a geographical region, or a level of government. The Regulatory Flexibility Act similarly requires regulatory agencies to consider the impact of the rule on small entities. This REA and Regulatory Flexibility Certification has been prepared to fulfill the requirements of E.O. 12866 and the Regulatory Flexibility Act. MSHA certifies that this final rule will not impose a significant economic impact on a substantial number of small entities.

The Mine Safety and Health Administration (MSHA) is making several changes to 30 CFR part 48, which deals with miner training. During the rulemaking process, MSHA received written and oral statements from various sectors of the mining community. The Agency has reviewed these comments and, where appropriate, used that information in this analysis. This final rule will change the definition of miner to include State-certified supervisors, change the definition of experienced miner to reflect a miner’s past experience, and strengthen training requirements for experienced miners.

POPULATION AT RISK

In 1997, there were about 20,650 mine operators, including independent contractors, employing about 326,650 miners. MSHA considers about 17,310 (84%) of these operators to be small entities in that they employ fewer than (<) 20 miners. Only about 92,440 (28%) of the total mining population, however, work for small operators.

BENEFITS

This final rule removes the exemption of State-certified supervisors from the definition of "miner" for purposes of part 48 training. This change affects supervisors in coal mines. From 1990 through 1997, 50 coal supervisors were killed in mining accidents. Of these, 35 occurred underground. Had the percentage of fatalities been the same for coal supervisors as their percentage in the population of coal miners, MSHA projects that 45 coal supervisors, rather than 50, would have died during this time period. The average of these higher than expected fatalities is about 0.6 fatalities per year. MSHA expects that the additional supervisor training required by this rule will help reduce supervisory fatalities.

Similarly, the percentage of fatalities between 1990 and 1997 for miners who had more than 1 year of total mining experience, but less than 1 year at the mine where the fatality occurred, is greater than the percentage of fatalities for all other miners

when compared to their percentage in the mining population. During that time period, these newly-employed experienced miners (NEEMs) accounted for 174, or 22 %, of the 793 fatalities. These NEEMs, however, constituted only about 5.3% of the miner population. Had the percentage of fatalities been the same for NEEMs as their percentage in the mining population, MSHA projects that 34 NEEMs, rather than 174, would have died during this time period. These higher-than-expected fatalities averaged about 17.5 per year. MSHA expects that the additional NEEM training required by this rule will help reduce NEEM fatalities.

MSHA estimates that compliance with this final rule will help reduce by half the greater than expected numbers of fatalities for supervisors and by 20 percent the greater than expected number of fatalities for NEEMs — in total an average of about four fatalities per year.

COMPLIANCE COSTS

The incremental compliance costs of this rule include (1) the annually recurring costs for training previously exempted State-certified supervisors and the added training for experienced miners, and (2) the one-time cost for modifying existing courses and developing a new training course for NEEM training. The total initial cost will be about $3.5 million. This includes an annually recurring cost of about $2.6 million and the one-time cost of about $0.9 million for these requirements. These costs

are less than 0.01% of the gross annual revenues of the mining industry of about $58 billion.

EXECUTIVE ORDER 12866 AND REGULATORY FLEXIBILITY ACT

Executive Order (E.O.) 12866 requires that regulatory agencies assess both the costs and benefits of intended regulations. MSHA has determined that this rulemaking is not a significant regulatory action.

The Regulatory Flexibility Act (RFA) requires regulatory agencies to consider a rule's impact on small entities. Under the RFA, MSHA must use the Small Business Administration's (SBA) definition for a small mine of 500 or fewer employees 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 traditionally has considered small mines to be those with fewer than 20 employees. For the purposes of the RFA, MSHA has analyzed the impact of the final rule both on mines with 500 or fewer employees and on those with fewer than 20 employees. MSHA has determined that this final rule will not impose a substantial cost increase on small mines, whether a small mine is defined as fewer than 20 miners or fewer than 500 miners.

MSHA has prepared a Regulatory Economic Analysis (REA) and Regulatory Flexibility Certification Statement to fulfill the requirements of E.O. 12866 and the Regulatory Flexibility Act.

Using the Agency's traditional definition of a small mine, one employing fewer than (<)20 miners, the initial cost of this final rule on small mines will be about $1.88 million, which includes an annually recurring cost of $1.22 million and a one-time cost of $0.66 million. These initial costs for small mines (using the Agency's traditional definition of a small mine) translate into about $109 per mine, which includes annually recurring costs of $71 per small mine and a one-time cost of $38 per small mine. This industry segment has estimated annual revenues of about $16.4 billion.

The initial cost of the final rule for small mines, using SBA's definition of 500 or fewer (≤ 500) employees, will be about $3.42 million, which includes an annually recurring cost of $2.52 million and a one-time cost of $0.90 million. These initial costs for small mines (using SBA's definition) translate into about $166 per small mine, which includes annually recurring costs of $122 per small mine and a one-time cost of $44 per small mine. Using SBA's definition of a small entity, small operators have an estimated revenue of about $54.7 billion. For all industry segments, the cost impact is less than 0.1% of revenue.

The Agency has determined that this final rule will not have a significant economic impact on prices, profits, productivity, employment, or mining output.

II. INDUSTRY PROFILE

SUMMARY

Introduction

The industry profile provides background information describing the structure and economic characteristics of the mining industry. This profile provides data on the number of mines, their size, the number of employees in each segment, as well as selected market characteristics.

Overall Structure of the Mining Industry

MSHA divides the mining industry into two major segments based on commodity, the coal mining industry and the metal and nonmetal (M/NM) mining industry. These major industry segments are further divided based on type of operation (underground mines, surface mines, and independent mills, plants, shops, and yards). The Agency maintains its own data on mine type, size, and employment. MSHA also collects data on the number of contractors and contractor employees by major industry segment.

MSHA categorizes mines on the basis of their employment size. For the purpose of this final Regulatory Economic Analysis and Regulatory Flexibility Analysis (REA), MSHA has employed two different definitions of a small mine. Based on its traditional definition, MSHA defines small mines to be those having fewer than (<) 20 employees and large mines to be those having at least ($\geq$) 20 employees. Based on SBA's definition, MSHA has also evaluated

small mines as having 500 or fewer employees, and large mines as having more than 500 employees. Over the past 20 years, for rulemaking purposes, MSHA has traditionally used the less-than-20 definition of a small mine. As will be discussed in the various sections of the preamble, MSHA's REA meets the requirements of the SBREFA amendments to the Regulatory Flexibility Act particularly as it covers small businesses.

Table II-1 presents the number of small and large mines and the corresponding number of miners, excluding contractors and office workers, by major industry segment and mine type. MSHA does not maintain a data base which would allow determination of the types of services provided by independent contractors or the job titles of contractor employees.

TABLE II-1: Distribution of Operations and Employment by Mine Type, Commodity, and Size

MINE TYPE	SMALL (<20 employees)		LARGE (≥20 employees)		TOTAL	
	# Mines	# Workers	# Mines	# Workers	# Mines	# Workers
COAL						
Underground	417	4,178	543	44,784	960	48,962
Surface	722	4,141	388	28,774	1,110	32,915
Shop/Yard/Mill/Plant	372	2,490	119	4,646	491	7,136
Coal Subtotal	1,511	10,809	1,050	78,204	2,561	89,013
M/NM						
Underground	131	1,123	130	16,590	261	17,713
Surface	8,965	50,015	1,219	80,979	10,184	130,994
Shop/Yard/Mill/Plant	288	2,181	222	18,852	510	21,033
M/NM Subtotal	9,384	53,319	1,571	116,421	10,955	169,740
TOTAL ALL MINES	10,895	64,128	2,621	194,625	13,516	258,753

Source: U.S. Department of Labor, Mine Safety and Health Administration, Office of Standards, Regulations, and Variances, based on preliminary 1997 MIS data (quarter 1 - quarter 4, 1997). Excludes contractors and office workers.

Table II-2, however, presents MSHA data on the numbers of independent contractors and the corresponding numbers of employees, excluding office workers, by major industry segment and the size of the operation based on employment.

TABLE II-2: Distribution of Contractors and Contractor Employees by Major Industry Segment and Size of Operation

CONTRACTORS	SMALL (<20)		LARGE (≥20)		TOTAL	
	# Contr	# Workers	# Contr	# Workers	# Contr	# Workers
COAL	3,561	14,151	333	15,753	3,894	29,904
M/NM	2,855	14,161	381	23,829	3,236	37,990
TOTAL CONTRACTORS	6,416	28,312	714	39,582	7,130	67,894

Source: U.S. Department of Labor, Mine Safety and Health Administration, Office of Standards, Regulations, and Variances, based on preliminary 1997 MIS data (quarter 1 - quarter 4, 1997). Excludes office workers.

For the purposes of the Small Business Regulatory Enforcement Fairness Act (SBREFA) amendments to the Regulatory Flexibility Act (RFA), MSHA also has evaluated the impact of the final rule on mines with fewer than (<) 500 employees.

Economic Characteristics

The U.S. mining industry's 1997 production is worth in excess of $58 billion in raw mineral resources. Coal mining contributed about $20 billion to the Gross Domestic Product in 1997 and M/NM mining contributed about $38 billion.[1] Another estimated $14-17 billion is reclaimed annually from recycled metal and mineral materials such as scrap iron, aluminum, and glass.[2]

The Agency obtained financial information on the various mineral commodities primarily from the U.S. Department of the Interior, former Bureau of Mines, and the U.S. Department of Energy, Energy Information Administration.

STRUCTURE OF THE COAL MINING INDUSTRY

MSHA separates the U.S. coal mining industry into two major commodity groups, bituminous and anthracite. The bituminous group includes the mining of subbituminous coal and lignite. Bituminous operations represent over 93% of the coal mining operations, employ over 98% of the coal miners, and account for over 99% of the coal production. Using MSHA's traditional definition, about 60% of the bituminous operations are large (having 20 or more employees) whereas nearly all anthracite operations are small (having fewer than 20 employees).

Underground bituminous mines are more mechanized than anthracite mines in that most, if not all, underground anthracite mines still hand-load. Over 70% of the underground bituminous mines use continuous mining and longwall mining methods. The remaining use drills, cutters, and scoops. Although underground coal mines generally use electrical equipment, a growing number of underground coal mines use diesel powered haulage equipment.

Surface mining methods include drilling, blasting, and hauling and are similar for all coal commodity types. Most surface mines use front-end loaders, bulldozers, shovels, or trucks for coal haulage. A few still use rail haulage. Although some coal may be crushed to facilitate cleaning or mixing, coal processing usually involves cleaning, sizing, and grading.

Preliminary data for 1997 indicate that there are about 2,561 active coal mines of which 1,511 are small mines (about 59% of the total) and 1,050 are large mines (about 41% of the total).[3]

These data indicate employment at coal mines to be about 89,013, of which about 10,809 (12% of the total) work at small mines and 78,204 (88% of the total) work at large mines.[4] MSHA estimates that the average employment is 7 miners at small coal mines and 75 miners at large coal mines.

STRUCTURE OF THE M/NM MINING INDUSTRY

The M/NM mining industry consists of about 70 different commodities including metals, industrial minerals, stone, and sand and gravel. Preliminary data for 1997 indicate that there are about 10,955 active M/NM mines, of which 9,384 are small mines (about 86% of the total) and 1,571 are large mines (about 14% of the total).[5]

These data indicate employment at M/NM mines to be about 169,740, of which about 53,319 (31% of the total) work at small mines and 116,421 (69% of the total) work at large mines.[6] MSHA estimates that the average employment is 6 miners at small M/NM mines and 74 miners at large M/NM mines. Table II-3 presents the number of M/NM mines and miners by major commodity category, mine size, and employment. In addition, MSHA estimates that about 210 sand and gravel or stone operations are owned by state, county, or city governments.

TABLE II-3: Estimated Distribution of M/NM Mines and Miners*

Commodity	SMALL (<20 employees)		LARGE (>20 Employees)		TOTAL	
	# Mines	# Miners	# Mines	# Miners	# Mines	# Miners
Metal	178	1,046	196	40,375	374	41,421
Nonmetal	554	3,051	234	22,178	788	25,229
Stone	2,672	20,081	907	46,359	3,579	66,440
Sand & Gravel	5,980	29,141	234	7,509	6,214	36,650
TOTAL	9,384	53,319	1,571	116,421	10,955	169,740

* Includes office workers. Excludes contractors.

Metal Mining

Metal mining in the U.S. consists of about 25 different commodities. A significant number of metal commodities are mined at only one or two mining operations in the nation. Metal mining operations represent about 3% of the M/NM mines, employ about 24% of the M/NM miners, and account for about 33% of the value of M/NM minerals produced in the U.S.[7] About 48% of the metal mining operations are small.

Underground metal mining uses a few basic mining methods, such as stope, room and pillar, and block caving with primary noise sources being diesel powered haulage equipment, pneumatic drills, and mills. Larger underground metal mines use more hydraulic drills and track-mounted haulage whereas smaller underground metal mines use more hand-held pneumatic drills. Stope mining uses more hand-held equipment. Surface metal mines include some of the largest mines in the world. Surface mining

methods (drill, blast, haul) use the largest equipment and are similar for all commodity types.

Nonmetal Mining

For enforcement and statistical purposes, MSHA separates stone and sand and gravel mining from other nonmetal mining. There are about 35 different nonmetal commodities, not including stone or sand and gravel. About half of the nonmetal commodities include fewer than 10 mining operations; some include only one or two mining operations. Nonmetal mining operations represent about 7% of the M/NM mines, employ about 15% of the M/NM miners, and account for about 35% of the value of M/NM minerals produced in the U.S.[8] About 70% of the nonmetal mining operations are small.

Nonmetal mining uses a wide variety of underground mining methods. For example, potash mines use continuous miners similar to coal mining; oil shale uses in-situ retorting; and gilsonite uses hand-held pneumatic chippers. Some nonmetal commodities use kilns and dryers in ore processing. Others use crushers and mills similar to metal mining. Underground nonmetal mining operations generally use more block caving, room and pillar, and retreat mining methods; less hand-held equipment; and more electrical equipment than metal mining operations. As with underground mining, surface mining methods vary more than for other commodity groups. In addition to drilling, blasting, and hauling, surface nonmetal mining methods include other types of mining methods, such as evaporation beds and dredging.

Stone Mining

There are basically only eight different stone commodities of which seven are further classified as either dimension stone or crushed and broken stone. Stone mining operations represent about 33% of the M/NM mines, employ about 39% of the M/NM miners, and account for about 19% of the value of M/NM minerals produced in the U.S.[9] About 75% of the stone mining operations are small (having fewer than 20 employees).

Stone generally is mined from quarries using only a few different methods and diesel powered haulage to transfer the ore from the quarry to the mill. Crushed stone mines typically drill and blast whereas dimension stone mines typically use channel burners, drills, or wire saws. Milling typically includes jaw crushers, vibratory crushers, and vibratory sizing screens.

Sand and Gravel Mining

Based on the number of mines, sand and gravel mining represents the single largest commodity group in the U.S. mining industry. About 57% of the M/NM mines are sand and gravel operations. They employ about 22% of the M/NM miners and account for about 13% of the value of M/NM minerals produced in the U.S.[10] Over 96% of the sand and gravel operations are small.

Construction sand and gravel is generally gathered from surface deposits using dredges or draglines and only washing and screening milling methods. As in other surface mining operations, sand and gravel operations use diesel powered haulage equipment,

such as front-end loaders, trucks, and bulldozers. In addition, industrial sand and silica flour operations mill the ore using crushers, ball mills, screens, and classifiers.

ECONOMIC CHARACTERISTICS OF THE COAL MINING INDUSTRY

The U.S. Department of Energy, Energy Information Administration, reported that the U.S. coal industry produced a record 1.06 billion tons of coal in 1996 with a value of over $20 billion. For 1997, production through September 1997 was estimated to be 814.9 million tons.[11] 1997 year-end production levels are expected to meet and exceed the previous year's level; preliminary MSHA data estimates production to have reached 1.088 billion tons.[12]

U.S. consumption was estimated in a report sponsored by the Western Fuels Association to be slightly over a billion tons per year with a recoverable reserve base of about 297 billion tons.[13] Further, this report estimated that the use of coal will rise by 200-250 million tons per year from a 1997 consumption level of 850 million tons. The Energy Information Administration put total 1996 consumption at 983,334 thousand short tons; for January through September 1997 consumption was estimated by the agency to be 747 million short tons with electric utilities being the largest consumer, followed by other industrial uses, coke plants, then residential/commercial users. Industrial uses include the use of coal products in the manufacturing of other products, such

as plastics, dyes, drugs, explosives, solvents, refrigerants, and fertilizers.[14]

Of the several different types of coal commodities, bituminous and subbituminous coal account for 91% of all coal production. The remainder of U.S. coal production is lignite (86 million tons) and anthracite (4 million tons). Although anthracite offers superior burning qualities, it contributes only a small and diminishing share of total coal production. A small fraction of U.S. coal production in 1997 (less than .5%) was anthracite.[15]

Mines east of the Mississippi account for about 53% of the current U.S. coal production. For the period 1949 through 1995, coal production east of the Mississippi River fluctuated relatively little from a low of 395 million tons in 1954 to 630 million tons in 1990. (It was 505 million tons in 1996.) During this same period, however, coal production west of the Mississippi increased each year from a low of 20 million tons in 1959 to a record 490 million tons in 1995.[16] The growth in western coal is due in part to environmental concerns that led to increased demand for low-sulfur coal, which is concentrated in the West. In addition, surface mining, with its higher average productivity, is much more prevalent in the West.

Preliminary MSHA data for 1997 indicate that small mines produced about 3.9% of the total coal mine production (about 42.2 million tons) and large mines produced about 96.1% of the total

(1,044.8 million tons).[17] MSHA calculations indicate that the average total production per miner for 1997 was about 3,910 tons at small mines and 13,370 tons at large mines. The average total coal production for 1997 was about 28,000 tons per small mine and 1,262,600 tons per large mine.

The Energy Information Administration estimates that 1997 coal exports were $40.76 per short ton for about 90 million short tons and imports were $33.45 per short ton for 7 million short tons.[18] The 1996 estimate of the average value of coal at the point of production was about $19 per ton for bituminous coal and lignite, and $36 per ton for anthracite.[19] MSHA continues to use $19 per ton as the value for all coal production because anthracite contributes such a small amount to total production that the higher value per ton of anthracite does not greatly impact the total value. The total value of coal production in 1997 was about $20.67 billion of which about $803.7 million was produced by small mines and $19.86 billion was produced by large mines. On a per mine basis, the average coal production was valued at over $0.5 million per small mine and $18.9 million per large mine.

The relationship between of U.S. coal production and U.S. consumption has fluctuated significantly during this decade. Year-to-year fluctuations in exports of U.S. coal vary more than domestic consumption. During the 1990’s, changes in exports from the previous year varied from a 24% increase to a 27% decrease

whereas changes in domestic consumption only varied from a 4% increase to a 1% decrease.[20]

In 1991, there was a fairly large overproduction level; by 1993, consumption had outpaced production. The market fluctuated again with an oversupply in 1994 and near equilibrium in 1995.[21] In 1996 there was a 90 million tons oversupply; most of the excess production was exported and the remainder was stockpiled. Japan (11.8 million tons), Canada (9.4 million tons), and Italy (9.1 million tons) were the top three importers of U.S. coal. For 1997, the year began with a large gap between consumption and production; however by year's end, the Energy Information Administration estimated near equilibrium. Throughout the 1990's imports have been notably low, and consumer stocks have declined.

The U.S. coal industry enjoys a fairly constant domestic demand. The demand for coal by electric utilities continues to increase annually. A 1997 report found that coal should account for 44% to 77% of electric growth to 2010; experts predict coal will be the lowest cost source of electric power.[22] Currently, the U.S. spends $200 billion annually on electric energy. MSHA does not expect a substantial change in coal demand by utilities in the near future because of the high conversion costs of changing a fuel source in the electric utility industry. Other experts in energy predict that coal will continue to be the dominant fuel source of choice for power plants built in the future. Nuclear and hydropower currently comprise, and are

anticipated in the future to comprise, a small fraction of fuel sources for utilities.

The international market for coal was marked by several notable events in the 1990's. The breakup of the Soviet Union (USSR), a new political regime in South Africa, and economic policy changes in the United Kingdom and Germany contributed to price and demand changes in coal's global marketplace; newly independent, former USSR republics provided competition to U.S. companies for a share of the European coal market; and the deep European recession of 1993-1994 caused exports of coal to decrease.[23] Similarly, the cessation of the economic boycott of South Africa, and its new political leadership, has led to new interest in South African exports. South Africa ranks third after Australia and the U.S. in coal exports. Its coal exploration and mining have the nation poised to maintain its global position. The privatization of British power companies and the elimination of coal subsidies in Germany have led to an increased interest in U.S. coal. These international economic policy changes are predicted to create a substantial export opportunity for U.S. coal over the long term.[24]

The net effect of these aforementioned international activities appears to be a continued demand for U.S. coal at or near current levels. The U.S. can expect additional competition, however, from other current coal producing countries (e.g., Australia, South Africa, former USSR republics, Poland), as well

as from new suppliers in Colombia, Venezuela, China, and Indonesia.[25] The U.S. coal industry has vast reserves of unmined coal which is predicted to satisfy coal's demand for another half millennium if mined at the current rate.

Since 1992, coal has been targeted as the top producer of CO_2 emissions but many scientists argue with that contention.[26] There had been some concerns prior to the Kyoto summit that there would be severe cuts in CO_2. Compromises were made at the summit, however, and the cuts were not as drastic as had been anticipated. Passage of the Kyoto treaty must be ratified by national governments.

The economic health of the coal industry may be summarized as a fairly stable market which may be subject to periodic price and demand fluctuations. These fluctuations are largely functions of domestic supply disruptions and increased international competition.

ECONOMIC CHARACTERISTICS OF THE M/NM MINING INDUSTRY

Summary

The 1997 value of all M/NM mining output was in excess of $38 billion.[27] Metal mining contributes $13 billion to this total and includes metals such as aluminum, copper, gold, and iron. Nonmetal mining is valued at $13.3 billion and includes commodities such as cement, clay, and salt. Stone mining

contributes about $7.4 billion, and sand and gravel contributes about $4.8 billion to this total.

The entire M/NM mining industry is markedly diverse not only in terms of the breadth of minerals, but also in terms of each commodity's usage. For example, metals such as iron and aluminum are used to produce vehicles and other heavy duty equipment, as well as consumer goods such as household equipment and soda pop cans. Other metals, such as uranium and titanium, have limited uses. Nonmetals like cement are used in construction while salt is used as a food additive and on roads in the winter. Soda ash, phosphate rock, and potash also have a wide variety of commercial uses. Stone and sand and gravel are used in numerous industries including the construction of roads and buildings.

A detailed economic picture of the M/NM mining industry is difficult to develop because most mines are either privately held corporations or sole proprietorships, or subsidiaries of publicly owned companies. Privately held corporations and sole proprietorships typically do not make their financial data available to the public. Further, parent companies are not required to separate financial data for subsidiaries in their reports to the Securities and Exchange Commission. As a result, financial data are available for only a few M/NM companies, and these data are not representative of the entire industry.

Each commodity has a unique market demand structure. The following discussion focuses on the effects market forces on a few specific commodities of the M/NM industry.

Metal Mining

Historically, the value of metals production has exhibited considerable instability. In the early 1980's, excess capacity, large inventories, and weak demand depressed the international market for metals while the strong dollar placed U.S. producers at a competitive disadvantage with foreign producers. In response, many metal mining companies reduced workforces, eliminated marginal facilities, sold non-core businesses, and restructured. At the same time, new mining technologies were developed and wage increases were restrained. As a result, the metal mining firms now operating are more efficient and have lower break-even prices than those that operated in the 1970's.

For the purposes of this analysis, MSHA used the Standard and Poor's methodology of dividing metal mining into two categories: iron ore and alloying metals, and copper and precious metals. Metal mine production is valued in excess of $13 billion. Copper, aluminum, gold, and iron are the highest revenue producers of the metal industry.

Iron Ore and Alloying Metals

Variations in the prices for iron and alloying metals, such as nickel, aluminum, molybdenum, vanadium, platinum, and lead, coincide closely with fluctuations in the market for durable

goods, such as vehicles and heavy duty equipment. There also exists substantial vulnerability to world economic conditions. As a result, the market for these metals is cyclical in nature and is impacted directly by changes in aggregate demand and the economy in general.

The U.S. was the third largest producer of steel in the world for 1995 and 1996. The U.S. produced 94.7 million metric tons (M mt) of crude steel output in 1996, down slightly from 1995. 1997 levels were predicted to be 99.2 M mt, a 4.8% increase.

The U.S. produced 62.5 million long tons of iron ore in 1995; in 1996, the total was 62 million long tons. Domestic iron ore production, consumption, and trade were largely unchanged in 1996 from the previous year.[28] Production for 1996 was valued at about $1.7 billion. U.S. resources are mainly low-grade taconite-type ores which require beneficiation and agglomeration for commercial use. The construction of mini-mills is expected to add 10 to 15 million tons of capacity to the flat-rolled market by the new millennium. Because of concern over the availability of low residue scrap, investment in alternative iron-making technologies has become of interest to the industry. One alternative to scrap is direct-reduced iron (DRI). U.S. DRI capacity is expected to reach 4 million metric tons a year in the near future.[29]

The U.S. ranks fourth in world production, producing 6% of the world’s iron ore. The top five iron ore producing nations account for nearly two thirds of world production. International

prices increased for the second consecutive year but 1996 prices were considerably lower than those of 1991.[30] 1997 prices were estimated to be slightly below the previous year's, reaching $30.41 per metric ton.

In addition, U.S. steel shipments, a dominant iron ore end-use, increased in 1996 for the fifth consecutive year--a feat which has not happened since the mid-1930's.[31] The 1997 steel shipments were the highest since 1974 according to the American Iron and Steel Institute; U.S. steelmakers shipped 105.5 million tons.[32] Shipments for construction and contractors' products were up by 10 percent but shipments for industrial equipment fell by 7 percent. Steelmakers are hoping for new life in the industry in response to an announcement that ultra-light steel cars, weighing 140 pounds less than a typical production vehicle, are being developed as prototypes. The new body cost was reduced by about $150. This may introduce some concerns for the aluminum industry since aluminum's increased usage in car designs has begun to slow, and it is currently three times as costly as steel.[33]

Both nickel and aluminum have experienced strong price fluctuations over the past few years. In the mid 1990's as the U.S. and world economies recovered from the global recession of the early 1990's, demand for such alloys was improving and prices had begun to recover.

1997 marked the second successive year of price concerns for the nickel market. Supply problems played a major role in this.

Cuba, East Europe, and the Commonwealth of Independent States (CIS) increased their exports in 1997. China reported a substantial export increase and Russia also increased exports. For 1998, Western production is anticipated to rise substantially and modest increases are expected by Cuba, Eastern Europe, and the CIS.[34] A small surplus is expected for 1998 after a much larger surplus the previous year.

Nickel demand is tied to the stainless steel sector; 65% of all primary nickel goes into stainless steel. There was a 9.3% increase in Western stainless steel production in 1997, primarily due to a strong global economy. Nickel production grew 5% in 1997, reaching 998 thousand metric tons (K mt).

The Asian currency crisis has introduced some concerns in the stainless steel market (and, therefore, the nickel market). Some analysts forecast slower production rates at stainless steel mills. Though there exist legitimate concerns, the nickel market is expected to be close to balance during 1998. However, analysts believe the Asian financial crisis will have an impact on nickel and stainless-steel consumption for years to come.[35]

The U.S. leads the world in national production, capacity, and consumption of aluminum. For 1997, U.S. primary aluminum production hit 3,600 K mt, a steady increase since 1994. The 1996 U.S. domestic production stood at 3,155 K mt while the nation’s demand for 1996 was about 5,030 K mt; the excess demand over supply was met by imports (2,490 K mt) along with

recovery/recycling (3,315 K mt) and inventory reductions (150 K mt).[36] Since 1993, some of the biggest import shipments have come from Canada (62%), Russia (18%) and Venezuela (5%).

It must be noted that primary production of aluminum will continue to be impacted by the push to recycle. Recycling of aluminum now accounts for 30% of the aluminum used worldwide (35% in the U.S.) and this percentage is expected to rise in the coming years. Due to the increase in aluminum recycling, prices have been falling and inventories fluctuating since the mid to late 1980's.[37]

For 1996, world primary aluminum demand remained at about 20 M mt; for the last 15 years, consumption of primary aluminum has increased about 5 M mt, or about 2% per year.[38] Industry analysts predict a strong consumption demand for lead and only modest increases in mine and smelter production. With significant reductions in worldwide metal stocks in the London Metals Exchange (LME) and the U.S. Defense Logistic Agency (DLA) stockpile, prices have increased significantly. In 1996, LME lead prices averaged $0.35 per pound.[39] For 1997, the U.S. Geological Survey stated that there was a 3% increase in world primary aluminum demand.

The transportation sector continues to be the dominant U.S. market for aluminum. Until 1995, the packaging industry had dominated the demand market. Transportation constitutes about 32% of domestic consumption; packaging, 26%. The transportation market is expected to grow in foreign markets, particularly in

Western Europe and Japan.[40] Demand and production of aluminum is expected to continue to increase at a slow, steady pace as long as the world economy remains free of economic shocks.

Lead mining smelting and consumption increased in 1996 and were expected to continue to do so in 1997; preliminary 1997 data found mine production at 2.133 M mt. Lead production is marked by significant changes in primary and secondary smelting and refining. U.S. secondary production now accounts for more than 70% of production (for the world, the share is 50%). Secondary capacity continues to expand in the U.S.; in 1997, secondary production was 2.875 M mt up from 2.717 M mt the previous year. Primary production in 1997 was 2.22 M mt. For 1998, experts forecast the primary production market to hit 2.3 M mt, and the secondary production market to be 2.959 M mt. Similarly, demand for lead reached record levels in 1996, growing to 5.302 M mt. This is slightly less than what was predicted to occur for 1997.[41] For 1998, total consumption is forecast to be 5.413 M mt.

In general, the market for lead is anticipated to be free of market fluctuations and shocks. The market is believed to be in modest surplus. LME lead prices are expected to average 25 cents per pound for 1998. In addition, the market is expected to remain in surplus for the year.

The market for other alloying metals is notably divided. Molybdenum’s market for 1996 was characterized by market analysts as one of consolidation and stability.[42] The alloy had been

overproduced in 1995; to meet the 1996 demand, there was a resultant de-stocking (stocks were reduced by about 10%) and overall molybdenum demand declined. 1996 molybdenum prices were predominately stable through the year; however, significant average market price drops were experienced in mid-year 1996.

For 1997, the molybdenum market showed relatively healthy demand and strong prices. Though there were significant price fluctuations during the year, December prices were 15% higher than the previous year. Much of the fluctuation was attributed to international activity.

Foreign exports and imports changed significantly during 1997. In 1996, China shipped 8% of the total annual exports but for 1997 China's share rose to 25%.[43] The Asian financial crisis of late 1997, which continues into 1998, has crippled Asian demand. China is believed to be oversupplying the world market, and some major U.S. mining operations, after experiencing production problems, have increased production. The net effect appears to be a glut in the world market with prices being pulled down after a fairly strong start in 1998. Additionally, analysts are watching for changes in supply within the Commonwealth of Independent States; Armenia and Uzbekistan are investigating production opportunities.

In 1996, the U.S. consumed 6,547 mt of cobalt for use in superalloys, magnets, chemical driers, cemented carbides, and other uses. For 1997, consumption hit 7,080 mt, nearly 3% higher

than what was forecast. Analysts predict 1998 consumption to be 7,362 mt.[44] Growth is mainly attributed to the super-alloy and catalyst areas.

During 1996, cobalt experienced significant price shocks, ending the year at $21.79 per pound. For high grade cobalt, prices fluctuated widely during 1997; analysts saw price differentials as large as $5.50/lb. For 1998, much of the same is expected.[45]

The 1997 market was reflective of the demand levels of the aerospace industry and producer inventories.[46] World consumption hit 27,100 mt in 1997 and is expected to reach 28,600 mt for 1998. World production for 1998 is expected to be 29,502 mt, more than a 5% gain from the previous year. Cobalt production is dependent on nickel and copper production. In addition, about 20% of cobalt consumption (1,500 tons) is recycled each year.[47]

Copper and Precious Metals

The market for copper and precious metals, such as platinum, gold, and silver, is marked by great uncertainty and price volatility. The market for precious metals is particular vulnerable to spikes in the world economic cycle and to supply-side developments.

The copper industry generates about $4.5 billion annually. 1997 copper production in the U.S. is estimated at 1,894 K mt; 1996 mine production stood at 1,839 K mt.[48] Approximately 35% of

the U.S. copper supply is derived from recovered/recycled copper materials.

1997 production provided an oversupply of refined copper because production outstripped demand. The 1996 market was nearly in balance for the first 8 months of the year; copper prices remained relative higher for the first 5 months of 1996.[49] However, the market was thrown into a state of high volatility amid rumors of market manipulation. In June, it was revealed that a Japanese company's head copper trader had amassed a $1.8 billion loss from unauthorized trades over a 10-year period.[50] With this news, prices fell sharply, by as much as 20% for some national markets. In 1997, the prices were modestly higher on the LME. For 1998, modest oversupply is predicted. The continuing strength of the world economy, despite Asian problems, is said to favor new rises in consumption -- probably at a lower rate than in 1997.[51] However, the average 1998 price of copper may be lower than the last year's.

The gold and silver markets continue to be marred by speculative demand spurs; consistent recovery and growth have been difficult to achieve due to the uncertainty of U.S. buyers and shifts in production in South Africa and Russia. Prices for gold and silver fluctuated by as much as 17 and 25%, respectively, during 1993.

The metal is used for the manufacture of photographic products (50% of the refined silver consumption), electrical and

electronic products (20%), electroplated ware, sterling ware and jewelry (10%), and miscellaneous other uses (20%).[52] About 2,000 tons of silver are recovered annually. The U.S. ranks in the top five silver producing countries with an estimated 64 million ounces (M oz) in new mine production and 60 M oz in secondary sources for 1997. Industrial demand for silver in 1996 grew about 3% from the previous year and was estimated to increase about 2% in 1997.[53] Some analysts have contributed the level of international silver demand to a surge in Indian silver demand during the latter half of 1996; Indian imports increased by more than 30% (to 100 M oz). Indian silver demand was fueled by rising consumer demand for silverware and heavy weight silver jewelry (a favored method of saving among rural Indian populations).[54] In fact, India is the world's largest consumer of silver.

U.S. silver production for 1996 of 814 million ounces was valued at $300 million. During 1997, silver started off the year at $4.74/oz (8% less than the previous year); by the end of the year silver had reached $6.39/oz, a nine year high. For 1997, total silver consumption was estimated at 820 M oz, and 840 M oz is predicted to be the 1998 total consumption. In early 1998, the total world silver supply for 1997 was estimated to be 570 M oz.

In early February 1998, silver reached a 9.5 year high after Warren Buffet disclosed his silver purchases.[55] Buffett bought 129.7 million ounces of silver for $858.6 million.[56] Prices went

as high as $7.50 per oz in early February 1998; some analysts even suspect the price could reach $8/oz before year's end.

The U.S. ranks second behind South Africa in national gold production. Approximately 325 mt were produced in the US in 1997, up from 320 mt in 1996; the 1997 production level was estimated to be slightly below the records set in 1992 and 1993 (332.1 mt).[57] Gold production across the globe has fluctuated significantly during the 1990's. In 1993, Russia began to cut back its gold production, which had generated low prices in the global market since 1990; in 1997, Russia's production was up by 15 mt to 135 mt. South Africa's production level was down in 1997 by 8 mt to 490 mt. World production hit 2,300 mt in 1997.

As well on the demand side, hoarding and gold loans were little more than half the previous year's level in 1996; the decline in hoarding occurred primarily in the principal hoarding markets of the Far East and Indian sub-continent.[58] However, the use of gold in fabrication (e.g., jewelry, coinage, electronics, etc.) increased by 0.7% in 1996.

In late October 1997, the gold bullion price hit its lowest level in 12 years.[59] 1997 prices were under pressure for more than a year since the International Monetary Fund (IMF) announced it would sell five million ounces of its reserves to fill a gap in its fund for supporting the world's poorest countries. After that announcement and sales by the Dutch, Australian, and Russian central banks, the price has stagnated.

Gold watchers had been concerned since July 1997 when gold futures prices sank to a 12-year low. That drop was primarily fueled by Australia (the third largest gold-producing nation), which announced that it had sold 68% of its gold reserves to buy U.S., Japanese, and German government bonds. Speculation was rampant that other nations would follow.

By mid November 1997, gold had broken the "psychological benchmark" of $300 an ounce, a feat unaccomplished since March 1985.[60] There had been pressure for months based on concerns that European central banks would start selling their reserves to prepare for the creation of one currency under the European Monetary Union.

By early December, there had been some recovery but the price continued to go down. Speculators were also concerned about the effect of the Asian financial crisis.[61] By January 1998, gold had hit an 18.5 year low of $281.80 per oz.

Some good news for the gold industry came in the form of record purchases for 1997. The World Gold Council reported that demand hit 2,935 tons, a 9% increase from 1996. Developing countries were primarily responsible, increasing their demand by 13% to 2,129 tons. Developed markets increased by only 1% to 806 tons. Overall gold demand is expected to be strong in 1998 despite the Asian financial crisis; analysts cite strong growth in personal incomes in most of the important consuming countries as factors for a strong 1998 demand.[62]

Platinum group metals (PGMs) are considered to be precious metals and industrial metals. Platinum prices fluctuated significantly from 1996 to early 1997. Per ounce prices were off by as much as $80 in early 1997 compared to the same time in 1996.[63] There has been some concerns about the PGM group. Platinum and palladium have been plagued with problems of oversupply until 1997. South Africa during the early 1990's strongly increased production, and Russia has sold large volumes of its stockpiles of platinum, palladium, and rhodium.

For 1998, analysts estimate that there will be a modest oversupply of platinum despite drops in Russian exports.[64] South Africa and the U.S. are anticipated to increase production modestly. About 9% of the annual supply comes from scrap recovery operations (426 K oz).

Palladium hit an 18-year high in early 1998, when the metal hit $232 an ounce.[65] By mid March 1998, the metal reached $275 an ounce. There was widespread speculation on the Russian supply, which accounted for 3.2 million ounces of the 5.65 million ounces used in 1997. Palladium is used mainly in car catalysts to remove noxious exhaust gases and is also used for high-grade electronics and dentistry. Concerns about Russian supply, particularly after Russian President Boris Yeltsin became seriously ill, pushed prices to a new high.[66] By mid April 1998, Russian export delays had pushed palladium to nearly $302 per oz.[67] By the end of

April, prices had risen to $390 per oz as delays continued in Russian exports of palladium and platinum.[68]

Rhodium is the third most important PGM. In 1990, rhodium was the most expensive metal in the world at $7,000 an ounce, but this was short lived. It has a market structure in which supply and demand have been in sync for the last 5 years but supply just exceeded demand for 1997. This is expected to continue in 1998.[69]

Nonmetal Mining, Including Stone and Sand and Gravel

Nonmetal mine production is valued at more than $25.5 billion.[70] Included in this figure is the production of granite, limestone, marble, slate, and other forms of crushed and broken or dimension stone. Other lucrative commodities in the nonmetal category include salt, clay, phosphate rock, and soda ash. Market demand for these products tends not to vary greatly with fluctuations in aggregate demand. Crushed stone is the leading revenue generator with production valued in excess of $7 billion. Construction sand and gravel production is valued at about $4.3 billion.[71]

Evaluating financial information for nonmetal mining operations is particularly difficult. Financial data are available only for relatively large mining operations, and these often engage in a wide variety of business activities, of which mining is typically only a small part. Many large mining firms have financial interests in mines or mills of different commodities, thereby making it difficult to evaluate the financial

aspects of any specific commodity. Publicly held firms are not required to separate financial data for their subsidiaries in their reports to the Securities and Exchange Commission, and financial data are not available for most of the small mines because they are not publicly owned. (About 98% of the small M/NM mining operations are stone, sand and gravel, or other nonmetal operations.)

Sand and gravel and stone products, including cement, have a cyclical demand structure. As a recession intensifies, demand for these products sharply decreases. Some stability in the market was achieved during 1993 and early 1994. Demand for stone, particularly cement, is expected to grow by as much as 4.8%, and demand for sand and gravel is expected to grow by as much as 2.3%.

Natural aggregates consist of crushed stone and sand and gravel. Crushed stone includes limestone and dolomite (71% of U.S. production), granite (15%), taprock (8%) and miscellaneous others (6%), including marble, calcareous marl, slate, shell, and volcanic cinder, and scoria.[72] Aggregates are used in construction and agriculture, as well as for chemical and metallurgical processes. It is estimated that aggregates account for more than two-thirds of the 3.3 billion metric tons of nonfuel minerals produced in the U.S.

Experts predict that sand and gravel will grow by about 0.5% annually until 2020 and stone by 1%.[73] The production of recycled aggregates, mostly from concrete and asphalt, has been increasing.

That trend is expected to continue and increase, especially considering the recent passage of the Intermodal Surface Transportation Efficiency Act of 1998.

Lime is produced at 115 plants in the U.S.; approximately 19.3 million tons were produced in 1997 at a value of about $1.13 billion. U.S. producers enjoy little competition from foreign sources; experts estimate that net import reliance as a percentage of apparent consumption is about 1%.[74] Lime and limestone are substitutes in many uses such as agriculture, fluxing, and sulfur removal. Limestone contains less reactive material and is much less costly than lime. The U.S. ranks second behind China in lime production and limestone reserves.[75] Germany is a distant third.

Domestic salt production decreased slightly in 1997; total production was estimated to be 41,700 K mt with a value of about $960 million.[76] The chemical industry is a leading consumer, totaling 42% of all salt sales. Highway use accounts for 34% of U.S. demand. Because there are no economic substitutes or alternatives, as well as there being a practically unlimited supply, salt has one of the most stable supply structures among nonmetals.

Crude talc ore production for 1997 is estimated to be valued at $33 million. There are 17 talc mines in the U.S., and they produced about 1,060 M mt for 1997, a substantial increased from the previous year. About 197 M mt are exported. The nonmetal is used for various applications ranging from ceramics (34%), paper

(23%), paint (19%), roofing (5%), cosmetics (2%), and other miscellaneous uses (12%).[77]

The U.S. is the largest soda ash producer in the world with its 1997 production reaching a record 11.7 million short tons (M st), a 4.5% increase from the previous year.[78] Soda ash is used in the production of glass, soap and detergents, paper, and food. Both salt and soda ash have a fairly constant demand structure due to the products' uses and the lack of suitable substitutes. The U.S. exports roughly 40% of its total soda ash sales. Shipments to Asia, Europe, and Mexico increased during 1997. U.S. production is dominated by a handful of producers ranging from Solvay Minerals to FMC Corp, with FMC being the largest.

The largest consumer of soda ash is the glass industry, which accounts for 49% of U.S. domestic sales. The increased use of recycled glass has caused less demand for soda ash in the glass market. Overall, the demand for soda ash is relatively strong; it has applications in other areas including a new application in the titanium dioxide industry. Consumption for flue gas scrubbing, water treatment, and other uses remained constant during 1997. The outlook for the industry in 1998 is optimistic. However, it should be noted that aggregate worldwide demand is subject to regional economic effects, and generalizations are difficult to make. The Asian financial crisis is expected to make predictions about that region difficult. The lifting of European Union

tariffs is anticipated to aid exports, but problems may develop with currency exchange rates. U.S. domestic consumption is predicted to be healthy with modest growths predicted. The industry operating rate is expected to increase to 96-97% of effective capacity.[79]

Phosphate rock, which is used primarily to manufacture fertilizer, has an unusual market structure. U.S. production and exports of phosphate rock have declined in recent years, and imports from Morocco increased by 180% from 1991 to 1992. In 1997, however, the U.S. remained the world production leader, with China and Morocco, respectively, being the next largest producers.

Experts estimate that marketable production for 1997 was 42,590 K mt, notably lower than the previous year (45,400 K mt). Domestic consumption was estimated to be 43,190 K mt.[80] International production continued to put U.S. domestic production in a tightening position. The U.S. is the world's largest consumer of phosphate rock, using 30% of all rock produced worldwide. Analysts note that major U.S. fertilizer producers continue to investigate overseas opportunities. In addition, Israel, Jordan, and Thailand had significant production expansion activities during 1997. Other countries, such as South Africa, Tunisia, Syria, and Senegal, have also expanded capacity in recent years.[81]

The remaining nonmetal commodities, which include boron fluorspar, oil shale, and other minerals are typically produced by

a small number of mining operations. Despite this fact, annual production of pumice, perlite, vermiculite, and some others is valued at the tens of millions of dollars for each product.

Overall, the production from nonmetal mining increased from 1991 to 1996; 1996 estimates put capacity utilization for stone and earth minerals at about 97%.[82] The net result for the nonmetal mining industry may be higher demand and increased prices for stone and various related commodities.

III. BENEFITS

INTRODUCTION

Summary

Although the existing training programs have contributed to the reduction in the number of miner fatalities and injuries, MSHA has determined that these numbers can be reduced further through changes that will improve training, making it more responsive to the needs of the industry and more effective for individual miners. This chapter of the final REA contains MSHA's estimate of the numbers of fatalities and injuries that will be prevented by the final rule, and a discussion of other qualitative and quantitative benefits.

Methodology

MSHA reviewed its accident and injury data for the 8-year period of 1990 through 1997 as the basis for determining the numbers of fatalities and injuries occurring to supervisors and to newly-employed experienced miners (NEEMs).

In order to compare supervisor and experienced miner fatalities with those in the general mining population, MSHA estimated the numbers of supervisors and NEEMs from 1986 demographic data on the coal and M/NM mining workforces collected by the former Bureau of Mines.[83] These data contain the percentage of miners by job category and by length of mining experience by commodity, location, and mine size. MSHA used this

survey data because it is the most comprehensive set of data currently available.

MSHA also used data provided by MSHA's Division of Mining Information Systems (MIS) to determine the current numbers of mines and miners by commodity, location, and mine size. Finally, MSHA assumed that the past history of mining fatalities can be used as a basis to project future numbers of mining fatalities. Consequently, the 1990 through 1997 fatality data are averaged to provide an estimate of the annual number of future mining fatalities.

DISCUSSION OF COMMENTS

MSHA has reviewed and, where appropriate, has included information presented in the comments it received on its Preliminary Regulatory Impact Analysis and Regulatory Flexibility Analysis: Proposed Rule on Part 48 Training (PRIA), August 1991.[84] Specifically, MSHA received comments from the mining industry addressing the Agency's conclusion that supervisors and NEEMs have higher than expected fatality rates. One commenter stated that professional managerial personnel with infrequent exposure to mining hazards "do not suffer disproportionate fatality rates" and, in fact, may have "extraordinarily low injury and fatality rates." This commenter stated further that MSHA regulations exempt all State-certified supervisory personnel, in both coal and M/NM.

MSHA’s analysis does not delineate between classes of managerial responsibility based on frequency of exposure. The reasons for this are: (1) MSHA's fatality abstracts do not provide enough information to determine a supervisor's frequency of exposure; and (2) these abstracts show that all job categories of supervisors have experienced fatalities, which means that all job categories of supervisors have been exposed to mining hazards. In this analysis, MSHA compares the percentage of fatalities among coal supervisors to the percentage of fatalities among nonsupervisory miners and finds that supervisors in coal operations experience about 16% more fatalities than expected. If the number of supervisor fatalities were attributed to a smaller portion of supervisors, as commenters suggested, then the number of excess fatalities relative to the number of expected fatalities would increase.

Another commenter stated that attributing a lack of part 48 training to the higher than expected fatality rate among underground coal supervisors or NEEMs is “too simplistic.” This commenter contends that most mines already provide supervisors with some or all of the required part 48 training.

Commenters submitted alternative explanations as to why supervisors and NEEMs have a fatality rate higher than other categories of miners. One commenter stated that many supervisors often do not use the best judgment in every situation; neither do they use necessary safety equipment in all cases. Further this

commenter stated that the higher fatality rate for NEEMs was due, in part, to the fact that some miners were using techniques learned from previous mining experience which might not be appropriate to handle a different mining condition or situation.

In both the PRIA and this REA, MSHA estimates that about 20% of the supervisors at small underground coal mines, 40% of the supervisors at large underground coal mines, and 75% of the supervisors at surface coal mines receive or conduct part 48 annual refresher training. All supervisors at M/NM mines are required to receive part 48 training. Furthermore, in the PRIA, the Agency acknowledged that training, in and of itself, does not prevent accidents. The Agency contends, however, that training contributes to a reduction in accidents, injuries, illnesses, and fatalities by fostering safe work practices, increasing job skills, and enhancing hazard awareness and prevention. The PRIA stated that compliance with the revised part 48 rule would help prevent about 50% of the excess supervisory fatalities and 20% of the excess NEEM fatalities.

In the absence of any comments or data demonstrating a greater or lesser impact, MSHA projects, based on data from 1990-1997, that compliance with this final rule will help reduce the greater than expected number of supervisory and NEEM fatalities for NEEMs by 4 fatalities per year (0.5 supervisor and 3.5 NEEM fatalities).

MSHA contends that effective training, tailored to the needs of individual miners and supervisors, together with reinforcement of management’s policies, procedures, and work practices affecting miners' safety and health, can have a substantial impact on eliminating the unsafe behaviors and work practices described by commenters.

Another commenter stated that "supervisors are generally exposed to the same hazards as are miners." In addition, this commenter stated that "…supervisors direct the work activities of miners and this has an impact on the miners' health and safety environment. In that regard, supervisors should have increased safety training beyond that required…” for miners in part 48 and in other standards under 30 CFR.

As stated by some commenters, supervisors and NEEMs may be exposed to higher levels of risks because of their previous job experience and their perception of what is expected from them in their job. MSHA's underlying basis for the final rule, however, is that supervisors, NEEMs, and all other miners are generally exposed to the same types of mining hazards. Thus, MSHA expects that the percentage of fatalities and injuries for supervisors, for NEEMs, and for all other miners should be similar, if not equal, to their percentage in the population.

If the fatality rates were to differ among these groups, particularly if supervisors and NEEMs were to have a higher percentage of fatalities or injuries than other miners, part of

the explanation for these differences may be the differing frequency of exposure to situations involving higher levels of risk. Part of the explanation, however, also is the differing amounts and types of experience and training received by these groups. In addition, NEEMs may have a lack of familiarity with the specific mine environment and the mine's working and safety procedures. The disproportionate number of fatalities among supervisors and NEEMs suggests that more effective training is necessary to reduce the number of fatalities in these high risk groups. It is generally accepted that effective training of workers, regardless of industry, contributes to an increased acceptance of safe work practices and a reduction in accidents, injuries, and illnesses. The Congress recognized the efficacy of training in the Federal Mine Safety and Health Act of 1977 (Mine Act) by requiring miner training.

POPULATION AT RISK

The population-at-risk are those coal supervisors who do not receive the part 48 training and those NEEMs who do not receive the necessary level of mine-specific training. MSHA estimates that there are about 5,900 coal supervisors and about 17,240 NEEMs (6,910 in coal and 10,330 in M/NM) who will be affected by the changes in the part 48 requirements.

BENEFITS

Definition of Miner

Under existing §§ 48.2(a)(1)(ii) and 48.22(a)(1)(ii), supervisory personnel subject to MSHA-approved State-certification requirements are not considered to be "miners" and, therefore, are not required to receive part 48 training. The final rule removes the exemption for these supervisors, thereby requiring them to receive part 48 training. The final rule will affect coal mine supervisors, particularly underground coal supervisors who are subject to State-certification requirements recognized by Coal Mine Safety and Health. There are few State-certification programs for surface coal supervisors. Because the safety regulations for coal mines already require some supervisory training that duplicates courses in part 48 annual refresher training, MSHA estimates that affected supervisors must receive an average of 5 additional hours of training annually as a result of this final rule. MSHA expects that the final rule will have a negligible effect on M/NM supervisors, because Metal and Nonmetal Mine Safety and Health does not recognize State-certification, and all M/NM supervisors are required to receive part 48 training.

In Table III-1, MSHA presents the numbers of coal supervisors affected by work location and size of the operation, including independent contractors. MSHA used data from the former Bureau of Mines' survey, "Characterization of the 1986 Coal Mining

Workforce,"[85] to estimate the distribution of these supervisors between surface and underground operations.

TABLE III-1: Coal Mine* Supervisory Mine Employment Data

Location & Size	# mines	# miners	# superv (%)	# superv /mine	# superv needing add'l training (%)
<20 miners UG	1,574	8,464	1,822 (21.5%)	1.2	1,458 (80.0%)
≥20 miners UG	628	49,177	4,296 (8.7%)	6.8	2,577 (60.0%)
Total UG	2,202	57,641	6,118 (10.6%)	2.8	4,035 (66.0%)
<20 miners SF	3,498	16,496	3,552 (21.5%)	1.0	888 (25.0%)
≥20 miners SF	755	44,780	3,911 (8.7%)	5.2	978 (25.0%)
Total SF	4,253	61,276	7,463 (12.2%)	1.8	1,866 (25.0%)
Total <20	5,072	24,960	5,374 (21.5%)	1.1	2,346 (43.7%)
Total ≥20	1,383	93,957	8,207 (8.7%)	5.9	3,555 (43.3%)
Total	6,455	118,917	13,581 (11.4%)	2.1	5901 (43.5%)

* Includes contractors. Excludes office workers.

Table III-2 contains the total number of coal supervisory and nonsupervisory fatalities for the period 1990 through 1997. Based on these data, it is evident that underground coal supervisors experience a disproportionate number of fatalities. From 1990 through 1997, 50 coal supervisors (12.9% of all coal fatalities) were killed. Of these, 35 occurred underground. Had the percentage of fatalities been the same for coal supervisors as for non-supervisory coal miners, MSHA projects that 43 coal supervisors (23 of which are underground coal supervisors), rather than 50, would have died during this time period. The average of these higher than expected fatalities is about 0.9 fatalities per year.

TABLE III-2: Coal Supervisory and Nonsupervisory Fatalities* (1990-1997)

Mine Type	# non-superv	# non-superv fatals (% of miners)	# superv	# superv fatals expected	# superv fatals
UG COAL	51,523	197(0.38%)	6,118	23 (0.38%)	35
SF COAL	53,813	143(0.27%)	7,463	20 (0.27%)	15
ALL COAL	105,336	340(0.32%)	13,581	43 (0.32%)	50

* Discrepancies due to rounding.

In analyzing these numbers, another point of interest is that the discrepancy between the actual and the expected number of supervisor fatalities is greater for underground coal supervisors and less for surface coal supervisors. This is the result that would be predicted given that about 66% of underground coal supervisors are not currently required to receive the MSHA part 48 miner training, whereas only about 25% of surface coal supervisors are not required to receive such training. These data are consistent with MSHA's judgment that the lack of part 48 training for State-certified coal supervisors contributes, in part, to the increase in coal supervisor fatalities. To some extent, supervisors may be at greater risk than miners because supervisors are constantly moving around in the active mining areas; are called upon to handle problems or unusually hazardous situations; and, because they perform many different mining-related tasks and are often exposed to a greater variety of potential hazards.[86]

MSHA does not contend that training in and of itself would eliminate all supervisor fatalities. On the basis of its

experience, MSHA anticipates that implementation of this final rule will help reduce the excess number of supervisory fatalities by about 50% (0.5 fatalities) per year, and also will contribute to reducing the overall frequency and severity of accidents.

Experienced Miner Training

The final rule will modify the definition of "experienced miner" to remove an existing restriction on miners whose mining experience may be extensive but not recent. Under the existing rule, a newly-hired person is required to receive new miner training if that person had not received new miner training within the preceding 12 months; or had not accumulated at least 12 months of mining experience during the preceding 3 years. Under the final rule, once a miner has achieved experienced miner status, that miner will always be an "experienced miner" for training purposes. An experienced miner will be: (1) a miner who has completed new miner training within the past 3 years and has at least 12 months of mining experience; (2) a supervisor who is employed at a mine on the publication date of this rule; and (3) any miner who is currently considered by the previous rule to be an "experienced miner" on the date of this rule. MSHA recognizes that some independent contractors may have difficulty accumulating the required 12 months of mining experience. The preamble to this final rule, therefore, explains MSHA’s policy which allows certain independent contractors credit for time worked in environments

similar to mining in acquiring this 12 months of mining experience.

The final rule also includes additional experienced miner training requirements so as to assure relevant, cost-effective training for NEEMs (including both those who have recent experience, as well as those who do not) prior to their beginning work at a new mine.

MSHA used the former Bureau of Mines' 1986 mining workforce data as the basis for the percentages to estimate the current number of NEEMs.[87] Although the total population of miners has been decreasing over the past decade, MSHA believes that these 1986 percentages provide reasonable estimates of the experience distribution among the current mining workforce. MSHA anticipates that, with the recent passage of the Intermodal Surface Transportation Efficiency Act of 1998, there may be a future influx of NEEMs in certain segments of the mining industry.

Based on the former Bureau of Mines' data, excluding office workers and supervisors, MSHA calculated that about 5.3% of miners have had more than 1 year of total mining experience but less than 1 year of experience at the mine where the miner is currently employed. The former Bureau of Mines' data, however, presented this workforce information by work location (i.e., underground, surface, or other) and by mine size, but not by both in the same table. The percentage of NEEMs by mine size is greater in small mines (about 11.5% for coal and 5.8% for M/NM) than in large mines

(about 4.3% for coal and 4.6% for M/NM). The percentage of NEEMs is slightly larger in coal mining (5.8%) than it is in M/NM mining (5.0%). Multiplying these percentages of NEEMs in large mines and small mines by the numbers of miners in surface and underground mines, MSHA obtained an estimate of the distribution of NEEMs in surface and underground mines by mine size.

In Table III-3, MSHA presents current estimates of employment data for NEEMs by mine location and size. MSHA did not determine fatality data by mine size for the period of time covered because fluctuations in employment from year-to-year can change a mine's size category.

TABLE III-3: Newly-Employed Experienced Miner* (NEEMs) Employment Data

Location & Size	# miners*	# NEEMs* (% of miners)
COAL <20 employees UG	8,464	976 (11.5%)
COAL ≥20 employees UG	49,177	2,109 (4.3%)
COAL <20 employees SF	16,496	1,903 (11.5%)
COAL ≥20 employees SF	44,780	1,921 (4.3%)
Subtotal COAL	118,917	6,909 (5.8%)
M/NM <20 employees UG	2,931	170 (5.8%)
M/NM ≥20 employees UG	18,526	846 (4.6%)
M/NM <20 employees SF	64,549	3,752 (5.8%)
M/NM ≥20 employees SF	121,724	5,562 (4.6%)
Subtotal M/NM	207,730	10,330 (5.0%)
TOTAL	326,647	17,240 (5.3%)

* Includes contractors, excludes office workers. Discrepancies due to rounding.

Table III-4 presents expected and actual fatality data for NEEMs compared to fatality data for other miners. The data in

Table III-4 support MSHA's contention that NEEMs incur a disproportionately large number of fatalities.

The percentage of fatalities between 1990 and 1997 for miners who had more than 1 year of total mining experience, but less than 1 year at the mine where the fatality occurred, is greater than the percentage of fatalities for all other miners. During that time period, these newly-employed experienced miners (NEEMS) incurred 174, or 22%, of the 793 fatalities even though NEEMs constitute only about 5.3% of the miner population. Had the percentage of fatalities been the same for NEEMs as the percentage of fatalities for other miners, including new miners and supervisors, MSHA projects that 34 NEEMs, rather than 174, would have died during this time period. The average of the 140 higher than expected fatalities is about 17.5 per year.

TABLE III-4: Expected and Actual Fatality Data for Newly-Employed Experienced Miners (NEEMs) (1990-1997)

Location & Size	# NON-NEEM*	# NON-NEEM fatals (% of miners)*	# NEEMs*	# NEEMs fatals expected	# NEEMs fatals
COAL	112,008	290(0.26%)	6,909	18(0.26%)	100
M/NM	197,400	329(0.17%)	10,330	17(0.17%)	74
TOTAL	309,407	619(0.20%)	17,240	34(0.20%)	174

* Includes contractors, excludes office workers and supervisors. Discrepancies due to rounding.

The final rule includes additional site-specific training requirements to address certain hazards in the mine environment, and the procedures to avoid these particular hazards. These new courses are fundamental for experienced miners who are new to a

mine. The disproportionate number of fatalities among NEEMs, combined with their relative lack of familiarity with the specific mine environment and the mine's working and safety procedures, as well as their differing amounts and types of experience, convinces MSHA that more effective training is necessary to reduce the number of fatalities in this high risk group.

In evaluating the potential effectiveness of these additional training requirements on reducing the number of NEEM fatalities, MSHA relied upon its experience with training programs in general. MSHA concluded that programs designed to meet the specific training needs of the individuals being trained are more effective than generic, introductory programs designed for persons with no relevant experience. On the basis of its experience, MSHA anticipates that implementation of this requirement for additional training for NEEMs will help reduce the total number of excess NEEM fatalities (17.5 fatalities per year) by 20%, or 3.5 fewer NEEM fatalities per year.

Significant Changes in the Mine Environment

The final rule adds a new provision that requires the mine operator to instruct miners about significant changes in the mine environment that could affect the miners' safety or health. This training applies to those miners who return to work after an absence of less than one year and fills the need for more immediate information about potentially significant hazards that develop in the mine environment while the miner is absent and

which may not be immediately obvious to the returning miner. This training does not require a certified or qualified instructor, nor does it require the operator to make a record of such training.

The primary benefit to the returning miner is knowledge of changes in the mining environment that are not immediately obvious and which could adversely impact the miner's safety or health or contribute to an accident. Knowledge of the hazard is fundamental to taking precautions against such hazard. MSHA also expects that this requirement will encourage the mine operator to focus attention on evaluating the mine environment and identifying such changes.

SUMMARY

MSHA believes that, based on the data from 1990 through 1997, compliance with the requirements of this final training rule will reduce the number of fatalities and injuries to supervisors and NEEMs. MSHA estimates that about four fatalities (0.5 supervisors and 3.5 NEEMs) will be prevented per year. Although not quantified, MSHA expects that better trained supervisors will have an overall impact on reducing mining accidents, injuries, fatalities, and illnesses.

IV. COST OF COMPLIANCE

INTRODUCTION

This chapter presents MSHA's analysis of the estimated incremental compliance costs associated with this final rule. The final rule addresses: (1) definition of "miner;" (2) definition of "experienced miner;" (3) experienced miner training courses; (4) training NEEMs returning to mining after an absence of 5 years or more; and (5) training experienced miners returning to work following an absence of 12 months or less.

MSHA describes the data sources and methodology used for estimating the compliance cost, and provides both a summary and a standard-by-standard analysis of these estimates.

DATA SOURCES

MSHA relied upon Western Mining Engineering's Mining Cost Service for its estimates of wage rates and benefits.[88] MSHA determined the number of mines, miners, contractors, and contractor employees using data from MSHA's Office of Program Evaluation and Information Resources (PEIR).[89] For the purpose of this analysis, MSHA included independent contractors and their employees in the numbers of mines and miners. In addition, MSHA based its estimates of the percentage of miners affected by each revision and specific mining practices on MSHA's PRIA, August 1991. That PRIA is part of the public record and was available

for public review and comment. MSHA reviewed these comments and, where appropriate, used the information in this final REA.

METHODOLOGY

This section describes the methodology used to estimate the incremental compliance costs. This description includes the baseline from which the compliance costs are estimated, the types of costs that are estimated, and the labor compensation rates used to estimate the unit costs.

Baseline

MSHA estimated the incremental compliance costs of this final rule using as its baseline full compliance with the existing training regulations and current industry practices. MSHA assessed the potential economic impact on the mining industry based on changes to current mining industry practices that will be required to conform with the final rule.

Types of Cost

MSHA estimated the incremental one-time and annually-recurring costs of full compliance with each provision of the final rule, as applicable. One-time costs are expenditures that are incurred once, usually during the first year of compliance with the new rule. For this rule, one-time costs are expenditures to develop a new training course and expenditures to modify an existing training program. Annually-recurring costs are those

operating expenditures incurred every year. The initial cost is the one-time cost plus the first year's annually-recurring cost.

MSHA used an hourly compensation rate, including non-wage benefits, of $26 for a coal miner; $23 for a M/NM miner; $43 for a coal supervisor or instructor; and $36 for a M/NM supervisor or instructor. These figures do not reflect shift differentials or overtime pay.

Cost Of Compliance Summary

Table IV-1 shows the costs of full compliance with the final rule for both coal and M/NM mines.

TABLE IV-1: Compliance Cost* Summary by Provision for Coal and M/NM Mines

PROVISION	COAL		M/NM		ALL MINES	
	One-Time	Annually Recurring	One-Time	Annually Recurring	One-Time	Annually Recurring
Supervisors as "Miners"	$0	$1,268,709	$0	$0	$0	$1,268,709
Redefine "Exp'd Miner"	$0	($267,443)	$0	($274,309)	$0	($541,752)
Add'l "Exp'd Miner" Training	$337,034	$651,932	$581,148	$820,581	$918,182	$1,472,513
Training "Exp'd Miner" absent ≥5 yrs	$0	($41,580)	$0	($41,758)	$0	($83,338)
Changes in Mine Environ	$0	$164,105	$0	$245,121	$0	$409,227
TOTAL	$337,034	$1,817,304	$501,148	$791,393	$918,182	$2,608,697

* Discrepancies due to rounding.

SECTION-BY-SECTION COSTS

§§ 48.2 and 48.22: Definitions

State-certified Supervisors as "Miners"

Under the existing rule, supervisors who are covered by an MSHA-approved State-certification program had been excluded from

the definition of "miner" and, therefore, were not required to receive part 48 miner training. The final rule, however, removes this exclusion so that all supervisors are required to receive miner training.

This change in the training regulation affects the supervisors in those States that currently have MSHA-approved certification programs. Whereas some States require an applicant for certification to pass an examination, a review of State Certification and Qualification Programs shows that there are no State requirements for periodic recertification of supervisors.[90] These certification programs are primarily targeted at underground coal mine supervisors, although there are programs for surface coal mine supervisors.

Coal Mine Safety and Health recognizes State-certification of supervisors for the purposes of training. As a result, most underground coal supervisors and a few surface coal supervisors currently are not considered to be "miners" and, thus, are not required to receive miner training. Some coal mine operators voluntarily give part 48 miner training to their State-certified supervisors. As determined in the PRIA to the proposed rule,[91] MSHA estimates that mine operators currently provide this training to about 20% of the supervisors in small underground coal mines, 40% of the supervisors in large underground coal mines, and 75% of the supervisors in both small and large surface coal mines and preparation plants.

Table III-1, in the benefits section of this REA, shows the estimated number of all coal mine supervisors and the number of supervisors that will require miner training as a result of the final rule. Numbers are shown for both small and large, and underground and surface operations. Of the estimated 13,581 coal mine supervisors, about 5,901 (44%) will require additional training. Of these 5,901 supervisors, about 4,035 (66%) work at underground coal mines.

MSHA determined that the requirement for these supervisors to take part 48 training will result in an increase in annual costs. Additional instructor time to train the supervisors will be negligible because the supervisors will usually take this training in classes with other miners. There will be a cost for an additional 5 hours that these supervisors will spend in training each year. This 5 hours includes the time (about 3 minutes, or 0.05 hour) for the instructor to fill out a certification of training for each supervisor. MSHA estimates that, although they currently are excluded from the definition of “miner,” these supervisors already receive about 3 hours of the training required for annual refresher training. For the purpose of this analysis, MSHA expects that the State-certified supervisors receive task and hazard training so that they can properly supervise miners.

Table IV-2 indicates the annual incremental cost to train State-certified supervisors who were formerly excluded from part 48 training.

TABLE IV-2: Costs* to Remove Exemption for State-Certified Coal Supervisors in Definition of Miner

Location/Size	Number Needing Training	Annual Cost
UG Small	1,458	$313,442
UG Large	2,577	$554,124
UG Total	4,035	$867,566
SF Small	888	$190,902
SF Large	978	$210,241
SF Total	1,866	$401,143
Total Small	2,346	$504,344
Total Large	3,555	$764,365
TOTAL	5,901	$1,268,709

*Discrepancies due to rounding.

Metal and Nonmetal Mine Safety and Health does not recognize State-certification of supervisors for the purposes of training. As a result, all M/NM supervisors are currently considered to be "miners" and are not affected by the exclusion of State-certified supervisors in the definition of “miner” in part 48. MSHA concluded that no M/NM supervisor will need to receive additional training as a consequence of removing the exclusion for State-certified supervisors from the definition of “miner.”

Requirements for “Experienced Miner” Status

The existing rule defines an "experienced miner" as one: who has received training acceptable to MSHA within the preceding 12 months; or who has had at least 12 months experience working in an underground or surface mine, as appropriate, during the previous 3 years; or who has received the training for a new miner within the preceding 12 months; or who was employed as a miner on October 13, 1978, the effective date of the existing rule. Unlike

the proposed rule which referred to an “experienced miner” as one who has accumulated at least a year of experience in either underground or surface mining,[92] this final rule defines an “experienced miner” as one who has accumulated 12 months of mining experience and has completed new miner training.

As discussed in the August 1991 PRIA,[93] MSHA used the former Bureau of Mines' 1986 demographic survey of the mining workforce[94] for estimating miners' experience, both the number of years at their current company and total mining experience, by commodity and mine size. Based on these data, MSHA estimates that 11.5% of miners at small coal mines, 4.3% of miners at large coal mines, 5.8% of miners at small M/NM mines, and 4.6% of miners at large M/NM mines are NEEMs. Of this number, MSHA estimates that about 5% return to mining after an absence of 3 to 5 years and about 1% return after an absence of 5 or more years. Table IV-3 lists the numbers of NEEMs categorized by their length of absence from mining.

TABLE IV-3: Numbers of Newly-Employed Experienced Miners* (NEEMs)

MINE TYPE	Absent <3 yr	Absent >3 yr	Absent >5 yr	Total
COAL				
UG small <20	918	49	10	976
UG large ≥20	1,983	105	21	2,109
SF small <20	1,789	95	19	1,903
SF large ≥20	1,806	96	19	1,921
All Coal	6,495	345	69	6,909
M/NM				
UG small <20	160	9	2	170
UG large ≥20	796	42	8	846
SF small <20	3,527	188	38	3,752
SF large ≥20	5,228	278	56	5,562
All M/NM	9,711	517	103	10,330
ALL MINES	16,205	862	172	17,240

* Discrepancies due to rounding.

The change in the definition of "experienced miner" removes a potential burden on experienced miners who had not worked 12 months in a mine out of the previous 3 years or who had missed a training deadline, and, as a result, had been re-classified as a "new miner." A "new miner" classification now requires the experienced miner to retake either the 24 or 40 hours of "new miner" training, as appropriate, which is designed for persons without prior mining experience.

The final rule eliminates the existing lapse in "experienced miner" status after an absence of 3 years. Experienced miners returning to mining after an absence of 3 years will no longer have to take "new miner" training, but will have to take the expanded "experienced miner" training. Consequently, the revised

definition will generate a cost savings in current expenditures for "new miner" training.

Table IV-4 lists the annual compliance cost savings resulting from returning experienced miners taking "experienced miner" training rather that "new miner" training.

TABLE IV-4: Cost Savings* Related to the Change in the Definition of "Experienced Miner"

MINE TYPE	Absent >3 yr	Absent >5 yr	Total
COAL			
UG small	($43,154)	($8,123)	($51,277)
UG large	($93,237)	($17,550)	($110,787)
SF small	($44,526)	($7,916)	($52,442)
SF large	($44,947)	($7,991)	($52,938)
ALL COAL	($225,863)	($41,580)	($267,443)
M/NM			
UG small	($6,661)	($1,254)	($7,915)
UG large	($33,097)	($6,230)	($39,327)
SF small	($77,666)	($13,807)	($91,473)
SF large	($115,127)	($20,467)	($135,594)
ALL M/NM	($232,551)	($41,758)	($274,309)
TOTAL	($458,414)	($83,338)	($541,752)

* Discrepancies due to rounding.

MSHA estimates that "experienced miner" training will require an average of 6 hours, including the four new courses added in final §§ 48.6 and 48.26. Mine operators, therefore, will realize a reduction of 34 hours from "new miner" training for underground miners (relative to the current requirement of 40 hours) and a reduction of 18 hours for surface miners (relative to the current requirement of 24 hours), for those miners returning to mining

after an absence of 3 years, but within 5 years. Experienced miners returning to mining after an absence of 5 years or more will have to take a minimum of 8 hours of experienced miner training. This is a reduction of 32 hours of "new miner" training for underground miners and a reduction of 16 hours for surface miners.

§§ 48.5/48.25 Training of New Miners

Paragraph (d) is clarified and updated to allow "new miner" training to be valid for 36 months. With this change, a newly-employed miner can take "experienced miner" training even if that miner has not accumulated the 12 months of mining experience to attain experienced miner status. As MSHA's intent remains the same, there are no incremental compliance costs associated with this provision. Intermittent mine operators and independent contractors, however, by the nature of their operations, may realize an additional cost savings because this added flexibility will allow more miners to attain experienced miner status.

§§ 48.6/48.26 Experienced Miner Training

In paragraph (a), the final rule clarifies MSHA's intention that experienced miner training apply to experienced miners who are: (1) newly-employed by the operator; (2) transferred to the mine; (3) experienced underground miners transferred from surface to underground or experienced surface miners transferred from underground to surface; or (4) returning to the mine after lay-

off, work stoppage, illness, or injury resulting in an absence of more than 12 months.

Development of Training Course

In paragraph (b), the final rule clarifies several existing courses and adds four new courses to "experienced miner" training. With respect to the one-time cost to develop training courses, MSHA determined that there are no developmental costs for three of the four additional "experienced miner" training courses because they are existing courses required in "new miner" training which can be modified to be more relevant to experienced miners. MSHA expects that mine operators will tailor course materials for the prevention of accidents, health, and health and safety aspects of the task to which the experienced miner is assigned. The time to modify these existing courses and to develop the course “emergency medical procedures” will average about 1 hour of a supervisor’s time in small mines and about 2 hours in large mines. Table IV-5 summarizes the additional one-time costs for course development.

TABLE IV-5: One-Time Costs* for Course Development for "Experienced Miner" Training

Mine Type	# Mines	Cost	# Mines	Cost	Total Cost
	COAL		M/NM		ALL MINES
UG small	1,574	$67,682	540	$19,440	$87,122
UG large	628	$54,008	162	$11,664	$65,672
SF small	3,498	$150,414	11,699	$421,164	$571,578
SF large	755	$64,930	1,790	$128,880	$193,810
All Small	5,072	$218,096	12,239	$440,604	$658,700
All Large	1,383	$118,938	1,952	$140,544	$259,482
Total	6,455	$337,034	14,191	$581,148	$918,182

* Discrepancies due to rounding.

Additional "Experienced Miner" Training Costs

Although paragraph (d) is a new provision that requires the mine operator to vary the time spent on instruction of individual subjects based on the training needs of the experienced miners, the additional courses required will increase the time spent on experienced miner training. MSHA estimates that experienced miner training will take an average of 2 additional hours because of these changes. MSHA also included the cost of the additional time spent by the instructor, generally a mine supervisor, in covering the new courses.

Based on a review of the August 1991 PRIA and additional information received, MSHA revised the assumptions used in the PRIA which stated that a small mine would provide this training about once a year and a large mine would provide this training about twice a year. In this analysis, MSHA assumed that small mines typically hire one miner at a time and, therefore, will

provide training frequently throughout the year as each new miner is hired. Also, MSHA assumed that large mines typically hire more than one miner at a time and, consequently, large mines will provide a training class for each group of miners that is hired. For the purpose of this analysis MSHA estimated that large mines (≥20 miners) hire an average of four miners at a time.

Table IV-6 presents MSHA's estimated cost of both the instructor's and the experienced miner's labor time for this additional training. MSHA estimates that the incremental expense for supplies and course materials is negligible.

TABLE IV-6: Estimated Annual Additional Costs* for "Experienced Miner" Training

Mine Type	Miners	Instructors	Total
COAL			
UG small	$47,723	$78,926	$131,289
UG large	$103,109	$42,632	$142,269
SF small	$93,010	$153,824	$247,644
SF large	$93,890	$38,820	$137,599
All Small	$140,732	$232,750	$378,933
All Large	$196,999	$81,451	$279,868
All Coal	$337,731	$314,201	$651,932
M/NM			
UG small	$7,367	$11,530	$18,826
UG large	$36,601	$14,322	$52,267
SF small	$162,235	$253,934	$416,240
SF large	$240,487	$94,104	$333,247
All Small	$169,602	$265,464	$435,066
All Large	$277,088	$108,426	$385,514
All M/NM	$446,691	$373,890	$820,581
TOTAL	$784,422	$688,091	$1,472,513

* Discrepancies due to rounding.

Significant Changes in the Mine Affecting Safety and Health

Paragraph (e) is a new requirement. It requires experienced miners returning to the same mine following an absence of 12 months or less to receive instruction about any significant changes to the mine environment that have occurred while the miner was away that could affect the miner's safety or health. For the purpose of this analysis, MSHA estimates that 20% of miners, who return to work following an absence of 12 months or less, will need instruction to inform them of new, significant safety and health hazards in their workplace. MSHA estimates further that this instruction will be provided orally by the miner's supervisor and one-on-one with the miner. MSHA estimates that it will take about 6 minutes (0.1 hour) on the average for this instruction. Table IV-7 summarizes this cost.

TABLE IV-7: Cost* for Instruction on Significant Changes in the Mine Affecting Safety and Health

Mine Type	# Miners & supervrs	Cost	# Miners & supervrs	Cost	Total Cost
	COAL		M/NM		ALL MINES
UG small	1,693	$11,680	586	$3,459	$15,139
UG large	9,835	$67,864	3,705	$21,861	$89,725
SF small	3,299	$22,764	12,910	$76,168	$98,932
SF large	8,956	$61,796	24,345	$143,634	$205,431
All Small	4,992	$34,445	13,496	$79,626	$114,071
All Large	18,791	$129,661	28,050	$165,495	$295,156
Total	23,783	$164,105	41,546	$245,121	$409,227

* Discrepancies due to rounding.

§§ 48.8/48.28 Annual Refresher Training of Supervisors

The final rule will add new paragraphs §§ 48.8(c) and 48.28(c) to require all supervisors to have annual refresher training. The final rule will not incorporate the 30-day allowance for supervisors to begin annual refresher training as had been proposed. MSHA is allowing the mine operator 12 months from the date of publication of the final rule to provide annual refresher training for supervisors. By allowing 12 months for this training, the final rule facilitates the incorporation of State-certified supervisors into the operator's existing annual refresher training program cycle under part 48.

The costs for supervisors to take annual refresher training are included under the costs for changing the definition of "miner" to include all supervisors who previously had been exempt from part 48.

§§ 75.161, 77.107-1, and 77.1709 Plans for Training Programs

The final rule amends §§ 75.161 and 77.107-1 of the existing rule and deletes existing § 77.1709 because the changes to part 48 in the final rule duplicates the training required in these sections. No incremental costs are associated with these changes.

SUMMARY

The total initial cost of compliance for this final rule is about $3.53 million, of which coal operators incur about $2.15 million and M/NM operators incur about $1.37 million. The initial

cost is equal to the one-time cost of $0.92 million ($337,000 for coal operators and $581,000 for M/NM operators) plus the first year’s annually recurring cost of about $2.61 million ($1.82 million for coal operators and $0.79 million for M/NM operators).

V. EXECUTIVE ORDER 12866 AND REGULATORY FLEXIBILITY ACT

Executive Order (E.O.) 12866 requires that regulatory agencies assess both the costs and benefits of intended regulations. MSHA has determined that this rulemaking is not a significant regulatory action.

The Regulatory Flexibility Act (RFA) requires regulatory agencies to consider a rule's impact on small entities. Under the RFA, MSHA must use the Small Business Administration's (SBA) definition for a small mine of 500 or fewer employees 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 traditionally has considered small mines to be those with fewer than 20 employees. For the purposes of the RFA, MSHA has analyzed the impact of the final rule both on mines with 500 or fewer employees and on those with fewer than 20 employees. MSHA has determined that this final rule will not impose a substantial cost increase on small mines, whether a small mine is defined as fewer than 20 miners or fewer than 500 miners.

MSHA has prepared a Regulatory Economic Analysis (REA) and Regulatory Flexibility Certification Statement to fulfill the requirements of E.O. 12866 and the Regulatory Flexibility Act. This REA is available from the Agency upon request and is posted on MSHA's Homepage at www.msha.gov.

FACTUAL BASIS FOR CERTIFICATION

MSHA used a quantitative approach in concluding that the final rule does not have a significant economic impact on a substantial number of small entities. The Agency performed its analysis separately for two groups of mines based broadly on commodity: the coal mining sector as a whole and the M/NM mining sector as a whole. The Agency reviewed available sources of public economic data on the mining industry and concluded that a quantitative analysis of the impacts on various mining subsectors (i.e., beyond the 4-digit SIC level) is not feasible. MSHA is cognizant of the diversity of mining operations in each sector and has applied that knowledge in developing the final rule.

Under the RFA, MSHA must use the SBA definition for a small mine of 500 employees or fewer 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. For the purpose of this analysis, MSHA analyzed the impact of this final rule for small and large mines using both the traditional Agency definition and SBA's definition of a small mine. The Agency compared the costs of the final rule for small mines in each sector to the revenues for that sector for both size categories analyzed.

The estimated contribution of the mining industry to the gross domestic product is about $58 billion. The estimated cost of the final rule is less than 0.01% of this. When estimated

compliance costs are less than 1% of estimated revenues, it is generally appropriate to conclude that there is no significant impact on a substantial number of small entities. MSHA believes that this analysis provides a reasonable basis for the certification in this case. Table V-1 summarizes the results of this analysis.

TABLE V-1: Annual Costs Compared to Revenues

Mine Type and Size	# Mines	Estimated Costs (millions)	Estimated Revenue (millions)	Estimated cost/mine	Cost as % of revenue
COAL MINES					
Small <20	5,072	$0.81	$4,197.9	$159	0.019%
Large ≥20	1,383	$1.01	$15,802.1	$729	0.006%
Small ≤500	6,447	$1.77	$19,205.3	$275	0.009%
Large >500	8	$0.047	$794.7	$5,921	0.006%
Total Coal	6,455	$1.82	$20,000.0	$282	0.009%
M/NM MINES					
Small <20	12,239	$0.42	$12,344.1	$34	0.003%
Large ≥20	1,952	$0.38	$25,655.9	$193	0.001%
Small ≤500	14,169	$0.75	$35,431.1	$53	0.002%
Large >500	22	$0.040	$2,568.9	$1,820	0.002%
Total M/NM	14,191	$0.79	$38,000.0	$56	0.002%
ALL MINES	20,646	$2.61	$58,000.0	$126	0.005%

The Agency estimated revenues for specific mine size categories as the proportionate share of these mines' contribution to the Gross National Product (from the Department of the Interior, former Bureau of Mines, Mineral Commodity Summaries 1997), based on their proportionate share of total employment.

VI. EXECUTIVE ORDER 12875 AND THE UNFUNDED MANDATES REFORM ACT

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

The final rule will impact about 212 sand and gravel or crushed stone operations that are run by State, local, or tribal governments for the construction and repair of highways and roads. MSHA provided these governments an opportunity to provide meaningful and timely input, at the proposed rule stage, through the promulgation of the proposal for notice and comment. MSHA also mailed a copy of the proposed rule to each mine owned or operated by a State, local, or tribal government. No state or local government commented or requested a waiver of regulatory requirements. MSHA will mail a copy of this final rule to these 212 entities.

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

MSHA has determined that, for purposes of § 202 of the Unfunded Mandates Reform Act of 1995, this final rule does not include any Federal mandate that may result in increased expenditures by State, local, or tribal governments in the aggregate of more than $100 million, or increased expenditures by the private sector of more than $100 million. Moreover, the Agency has determined that for purposes of § 203 of that Act, this final rule does not significantly or uniquely affect these entities.

VII. EXECUTIVE ORDER 13045 (PROTECTION OF CHILDREN FROM ENVIRONMENTAL HEALTH RISKS AND SAFETY RISKS)

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

VIII. EXECUTIVE ORDER 13084 (CONSULTATION AND COORDINATION WITH INDIAN TRIBAL GOVERNMENTS)

MSHA certifies that the final rule does not impose substantial direct compliance costs on Indian tribal governments. Further, MSHA provided the public, including Indian tribal governments which operated mines, the opportunity to comment during the proposed rule's comment period. No Indian tribal government applied for a waiver or commented on the proposal.

IX. PAPERWORK REDUCTION ACT

INTRODUCTION AND SUMMARY

These paperwork requirements have been submitted to the Office of Management and Budget (OMB) for review under section 3504(h) of the Paperwork Reduction Act of 1995 (PRA 95). The final rule contains information collection requirements in §§ 48.2/22, 48.6/26, and 48.8/28. Those required to provide the information are mine operators and individuals who are paid to perform tasks for the mine operator (e.g., instructors). Respondents are not required to respond to any collection of information unless it displays a currently valid OMB control number. The information collection requirements associated with certification of part 48 training are approved under OMB Control Number 1219-0070. Training plan revisions are approved under OMB Control Number 1219-0009. This final rule will require modification of the information collection budget for part 48.

This chapter presents MSHA's analysis of the estimated incremental information collection burden hours and costs associated with the revisions in its experienced miner and supervisor training final rule. These revisions can be separated into the following three categories: (1) revising the definition of "miner;" (2) improving experienced miner training; and (3) requiring experienced miners returning to work following an absence of 12 months or less, to have training on the significant

changes in the mine environment, that are not immediately obvious and that could affect the miners' safety or health, before they start work. Table IX-1 presents the burden hours and associated costs for these provisions.

TABLE IX-1: Summary of Net Information Collection Burden Hours and Associated Costs Imposed by Final Rule

PROVISION & ASSOCIATED TASKS	HOURS		ASSOCIATED COSTS	
	One-Time	Annually Recurring	One-Time	Annually Recurring
Supervisors as "Miners"	0	295	0	$12,687
Add'l "Exp'd Miner" Training	23,981	17,693	$918,182	$688,091
Instruct on Changes in Mine Environ	0	6,533	0	$251,834
TOTAL	23,981	24,521	$918,182	$952,613

* Discrepancies due to rounding.

SECTION-BY-SECTION DISCUSSION

§§ 48.2 and 48.22 Definitions

State-Certified Supervisors as "Miners"

Section 48.2 and 48.22 requires that all supervisors receive miner training. The final rule requires a training certificate for those supervisors who had been exempt from part 48 training under the current standards. The current MSHA-approved training form (5000-23) is constructed for ease in keeping a record of the miners' and supervisors' various training courses. MSHA anticipates that the keeping of this record for supervisors requires only a name, date, and check in the appropriate box to indicate the type of training taken. The burden hour for this

recordkeeping is about 3 minutes (0.05 hour) per supervisor for a total annual burden of 295 hours at an associated coat of $12,687.

Requirements for "Experienced Miner" Status

This final rule changes the requirements to obtain experienced miner status for training purposes. It removes the lapse in "experienced miner" status currently required when a miner has been away from mining for over 3 years. There is no additional or decreased paperwork associated with this change.

§§ 48.6/48.26 Experienced Miner Training

Development of Training Course

The final rule adds four courses to experienced miner training. Three of these four courses are currently included in "new miner" training and need only slight modification to tailor them to the needs of experienced miners. The time to modify these three courses and to develop the fourth course will require about 1 hour of a supervisor’s time in small mines and about 2 hours in large mines. Table IX-2 shows these burden hours and associated costs.

Table IX-2: One-Time Burden Hours and Associated Costs for Training Course Development

Mine Type	# Mines	# Hours	Associated Costs
Coal	6,455	7,838	$337,034
M/NM	14,191	16,143	$581,148
Total	20,646	23,981	$918,182

Additional "Experienced Miner" Training

MSHA estimates that the four additional required courses will increase the time spent on experienced miner training by an average of 2 additional hours. Table IX-3 shows the estimated burden hours and costs for the instructor's time for this additional training. MSHA estimates that the incremental expense for supplies and course materials are negligible.

TABLE IX-3: Annual Burden* for Additional Experienced Miner Training

Mine Type	# Instructors	# Hours	Associated Cost
All Coal	3,654	7,307	$314,201
All M/NM	5,193	10,386	$373,890
TOTAL	8,847	17,693	$688,091

* Discrepancies due to rounding.

Significant Changes in the Mine Affecting Safety and Health

The final rule requires operators to provide instruction about any significant changes in the mine environment that have occurred while the miner was away that could affect the miner's safety or health. For the purpose of this analysis, MSHA estimates that 20% of miners, who return to work following an absence of 12 months or less, will need such instruction. MSHA estimates further that this instruction will be provided orally by the miner's supervisor and will take about 6 minutes (0.1 hour) of the miner's and supervisor's time, on the average. Table IX-4 summarizes the burden hours and associated costs for instruction to alert returning miners to changes in the mine environment.

TABLE IX-4: Cost* for Instruction on Significant Changes in the Workplace that Affect Safety and Health

Mine Type	# Miners & Supervisors	# Hours	Associated Cost
Coal	23,783	2,378	$102,254
M/NM	41,546	4,155	$149,580
Total	65,329	6,533	$251,834

* Discrepancies due to rounding.

§§ 48.8/48.28 Annual Refresher Training of Supervisors

The burden hours and associated costs for supervisors to take annual refresher training are included under the costs for changing the definition of "miner" to include all supervisors who previously had been exempt from part 48.

X. ENDNOTES

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