

Final Regulatory Impact Analysis

For

Safety Program for Surface Mobile Equipment

Final Rule

(RIN 1219-AB91)

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Mine Safety and Health Administration
Office of Standards, Regulations, and Variances

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EXECUTIVE SUMMARY

The Mine Safety and Health Administration (MSHA) is promulgating a final rule that requires operators to develop, implement, and update, periodically or when necessary, a written safety program for surface mobile equipment (excluding belt conveyors) at surface mines and surface areas of underground mines. This rulemaking is one of several actions the Agency is taking to reduce accidents involving surface mobile equipment and improve miner safety and health.

Under the final rule, operators are required to develop, implement, and update, at least annually and when necessary, a written safety program for surface mobile equipment used at their mines. As defined in this rule, surface mobile equipment refers to wheeled, skid-mounted, track-mounted, or rail-mounted equipment capable of moving or being moved, and any powered equipment that transports people, equipment, or materials, excluding belt conveyors, at surface mines and surface work areas of underground mines.

The required written safety program for surface mobile equipment must include the actions that operators will take to identify and analyze hazards and reduce the risks related to equipment movement and operation. It must also include actions operators will take to develop and maintain procedures and schedules for routine maintenance and non-routine repairs. Operators are also required to include the actions they will take to identify currently available and newly emerging feasible technologies that can enhance safety and evaluate whether to adopt them. Finally, the rule requires that the program include actions operators will take to train miners and other persons at the mine who are necessary to perform work to identify and address or avoid hazards related to surface mobile equipment.

Once the written safety program is developed and implemented, a responsible person is required to evaluate and update it for the mine at least annually, as well as when mining conditions or practices change in ways that may adversely affect the health and safety of miners or other persons, when accidents or injuries occur, or when surface mobile equipment changes or modifications are made. While providing operators flexibility to devise a safety program that is appropriate for their specific mining conditions and operations, the final rule also requires operators to solicit input from miners and their representatives as they develop and update the written safety program.

MSHA believes that a safety program that identifies actions operators will take to address surface mobile equipment hazards will reduce accidents, illnesses, injuries, and fatalities that continue to occur despite MSHA addressing identification and correction of hazards and training of miners. The final rule provides operators with a proactive, holistic approach to addressing surface mobile equipment hazards and one that will result in a positive safety culture at the mine.

This Final Regulatory Impact Analysis (FRIA) presents the costs and benefits associated with the final rule. MSHA estimated the costs associated with the final rule's requirements by adding the estimated costs of the following. First, the estimated costs include developing the written safety program, including the actions operators will take to follow better safety procedures and practices by identifying and analyzing hazards, evaluating currently available and

emerging technologies, developing and maintaining maintenance and repair schedules and procedures, and training miners and others to identify and address hazards, and including miners in developing and updating the program. Second, the estimated costs include updating the written safety program at least annually and under certain circumstances, such as when new equipment is brought to the mine or when accidents or changes in mining conditions or practices occur that may adversely affect the safety and health of miners. The first component is a one-time, initial compliance cost in the first year, whereas the second component represents the recurring compliance costs for subsequent years. Estimated costs also include providing copies of the written safety program to miners and their representatives upon request.

MSHA calculated these compliance costs based on the estimated time spent by individuals to develop and update the written safety program, multiplied by their wage rates. MSHA assumed that mine supervisors, safety professionals, and maintenance workers, and other miners would participate in the creation and updates of the written safety program. MSHA further assumed that the time needed to develop and update the written safety program would vary by the number of unique surface mobile equipment units at each mine, which would be related to a mine's production (i.e., tonnage) and employment. Based on these factors, MSHA grouped operators into three categories and estimated the compliance costs by category and totaled those costs to estimate the industry-wide compliance costs for the rule. Consistent with MSHA's experience under existing standards, MSHA expects that a majority of part 45 independent contractors will develop a written safety program.

The total compliance cost estimates are shown in Table ES-1. The undiscounted compliance costs for the 10-year period of analysis (i.e., 10-year implementation period) are estimated to be \$126 million (in 2021 dollars), while the discounted 10-year compliance costs using 3 percent and 7 percent discount rates are approximately \$111 million and \$95 million, respectively.

**Table ES-1: Yearly Compliance Cost Estimates
(Millions of 2021 Dollars)**

Implementation Year	Total Compliance Costs		
	Discounted at		
	0%	3%	7%
Year 1	\$37.0	\$36.0	\$34.6
Year 2	\$9.9	\$9.4	\$8.7
Year 3	\$9.9	\$9.1	\$8.1
Year 4	\$9.9	\$8.8	\$7.6
Year 5	\$9.9	\$8.6	\$7.1
Year 6	\$9.9	\$8.3	\$6.6
Year 7	\$9.9	\$8.1	\$6.2
Year 8	\$9.9	\$7.8	\$5.8
Year 9	\$9.9	\$7.6	\$5.4
Year 10	\$9.9	\$7.4	\$5.0
10-Year Total	\$126.4	\$111.0	\$95.1
Annualized	\$12.6	\$13.0	\$13.5

Note: Totals may not equal the sum of the components due to rounding.

This final rule is expected to yield numerous benefits, including reduction in illnesses, injuries, and fatalities, fostering of a positive safety culture at the mine, reductions in worker-compensation and other insurance premiums, and decreases in down-time (non-production time) due to accidents.¹ Among these benefits, MSHA focused on estimating the number of surface mobile equipment fatalities and injuries prevented due to this final rule and the monetized cost savings (benefits) of those fatalities and injuries. The Value of a Statistical Life (VSL) was used to estimate the monetized benefits of fatalities prevented; and miner wage rates and workdays lost from injuries were used to estimate the monetized benefits of injuries prevented. The Agency also performed a sensitivity analysis covering different scenarios that would lead to different percentages of fatalities and injuries prevented, and thus to different levels of benefits depending on the assumptions made.

To estimate the monetized benefits of fatalities and injuries prevented, MSHA first examined historical fatality and injury data and fatal accident investigation reports from the 2011-2020 period. MSHA found that over that 10-year period, there were 113 surface mobile equipment fatalities. MSHA observed that in the case of 63 (about 56 percent) of the 113 fatalities involving surface mobile equipment, deficiencies in training, hazard identification, or maintenance or any combination of these three factors contributed to the fatality. MSHA also counted 13,753 non-fatal injuries involving surface mobile equipment and 454,076 workdays lost due to surface mobile equipment related, non-fatal injuries during the 10-year period.

¹ The reduction in worker-compensation and other insurance premiums may be seen as an ultimate benefit to society due to a related reduction in medical expenses.

Training, hazard identification, or maintenance deficiencies were due to violations of existing requirements. MSHA expects that a program that describes the actions operators will take to comply with these requirements will reduce the incidence of these continuing injuries and fatalities. Based on this historical analysis, MSHA projected the numbers of surface mobile equipment fatalities, non-fatal injuries, and lost workdays that would be expected due to training, hazard identification, or maintenance deficiencies, in the absence of the final rule. MSHA compared those projections (“projected baseline”) with the projections of the same types of fatalities, non-fatal injuries, and workdays lost, with the final rule in effect. The difference between the two was used as the basis for calculating benefits of the final rule.

MSHA projected that in the absence of the final rule, over a 10-year period, there would be 60 fatalities attributable to training, hazard identification, or maintenance deficiencies. Similarly, MSHA projected 7,298 injuries due to these same types of deficiencies, and 240,954 days lost due to those injuries over 10 years. MSHA estimated that the final rule would reduce the projected baseline fatalities, injuries, and workdays lost, by about 75 percent for each year the rule is in effect, beginning in the second year. (In the first year, because the rule will be effective for only half the year, MSHA estimates that there would be a 37.5 percent, rather than a 75 percent reduction in that year.) MSHA performed a sensitivity analysis with two additional scenarios – a 50 percent reduction and a 25 percent reduction. All the projections here assume a mining workforce of approximately 253,401 (each working 2,000 hours a year) each year.

**Table ES-2: Projected Fatalities in the Absence of
and With the Final Rule**

Implementation Year	In the Absence of Final Rule	With Final Rule		
	Projected Surface Mobile Equipment Fatalities due to Deficiencies in Training, Hazard Identification, or Maintenance	Fatalities Prevented - Projections		
	Baseline	Program Effectiveness at 75% (Expected Scenario)	Program Effectiveness at 50%	Program Effectiveness at 25%
Year 1*	6.00	2.2	1.5	0.7
Year 2	6.00	4.5	3.0	1.5
Year 3	6.00	4.5	3.0	1.5
Year 4	6.00	4.5	3.0	1.5
Year 5	6.00	4.5	3.0	1.5
Year 6	6.00	4.5	3.0	1.5
Year 7	6.00	4.5	3.0	1.5
Year 8	6.00	4.5	3.0	1.5
Year 9	6.00	4.5	3.0	1.5
Year 10	6.00	4.5	3.0	1.5
10-Year Total	60.0	42.7	28.5	14.2

Notes: Totals may not equal the sum of the components due to rounding.

* Due to delayed compliance in the first year of implementation, MSHA estimates that there will be fewer fatalities prevented in the first year than in each subsequent year. For example, under the expected scenario, MSHA estimates that 4.5 lives will be saved in a full year after implementation, but given the 6-month delayed compliance date, a half of 2.2 lives is assumed to be saved in the first year.

**Table ES-3: Projected Injuries in the Absence of and
With the Final Rule**

Implementation Year	In the Absence of Final Rule	With Final Rule		
	Projected Surface Mobile Equipment Injuries due to Deficiencies in Training, Hazard Identification, or Maintenance	Injuries Prevented - Projections		
	Baseline	Program Effectiveness at 75% (Expected Scenario)	Program Effectiveness at 50%	Program Effectiveness at 25%
Year 1 *	730	273.7	182.5	91.2
Year 2	730	547.4	364.9	182.5
Year 3	730	547.4	364.9	182.5
Year 4	730	547.4	364.9	182.5
Year 5	730	547.4	364.9	182.5
Year 6	730	547.4	364.9	182.5
Year 7	730	547.4	364.9	182.5
Year 8	730	547.4	364.9	182.5
Year 9	730	547.4	364.9	182.5
Year 10	730	547.4	364.9	182.5
10-Year Total	7,298	5,200	3,467	1,733

Notes: Totals may not equal the sum of the components due to rounding.

* Due to delayed compliance in the first year of implementation, MSHA estimates that there will be half as many injuries prevented in the first year than in each subsequent year.

The monetary value of the reduction in fatalities and injuries related to surface mobile equipment is calculated as follows. First, to develop a monetized benefit estimate of fatality reduction, MSHA used the Value of a Statistical Life (VSL) adopted by other federal agencies like the Department of Transportation and the Department of Homeland Security, after adjusting that VSL to reflect subsequent increases in the real per-capita Gross Domestic Product (GDP), presented in 2021 dollars. Second, to estimate the monetized benefit of injury reduction, MSHA used the projected reduction in the number of workdays lost due to injuries, multiplied by the average wage of miners. The 10-year monetized benefit totals, in 2021 dollars, are calculated at

\$522 million at a 3 percent discount rate and \$424 million at a 7 percent discount rate. MSHA performed a sensitivity analysis with two additional scenarios – a 50 percent reduction and a 25 percent reduction in fatalities involving deficiencies in training, hazard identification, or maintenance and injuries involving surface mobile equipment.²

Table ES-4 presents the monetized net benefits for the first 10 years of implementation of the final rule. The 10-year net benefit totals in 2021 dollars are \$411 million at a 3 percent discount rate and \$329 million at a 7 percent discount rate. An annualized net benefit is estimated at \$48.2 million and \$46.8 million, respectively, at a 3 percent discount rate and at a 7 percent discount rate.

Table ES-4: Monetized Net Benefits (Millions of 2021 Dollars)

	Expected Scenario			Low Net-Benefit Scenario			Lowest Net-Benefit Scenario		
	Discounted at			Discounted at			Discounted at		
	0%	3%	7%	0%	3%	7%	0%	3%	7%
10-year Total*	\$493	\$411	\$329	\$286	\$237	\$188	\$80	\$63	\$46
Annualized	\$49.3	\$48.2	\$46.8	\$28.6	\$27.8	\$26.7	\$8.0	\$7.4	\$6.6

Notes: Totals may not equal the sum of the components due to rounding.

* MSHA assumed that a full-year worth costs would be incurred, while projecting a half of the full-year monetized benefits in the first year, due to the timing of implementation (6-month delayed compliance).

Executive Orders 12866, 14094 and 13563

Under Executive Order (E.O.) 12866 (as supplemented by E.O. 14094), the Office of Management and Budget (OMB)’s Office of Information and Regulatory Affairs (OIRA) determines whether a regulatory action is significant and, therefore, subject to the requirements of the E.O. and review by OMB. 58 FR 51735, 51741 (1993). As supplemented by E.O. 14094, section 3(f) of E.O. 12866 defines a “significant regulatory action” as a regulatory action that is likely to result in a rule that may: (1) have an annual effect on the economy of \$200 million or more; or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, territorial, or tribal governments or communities; (2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; (3) materially alter the budgetary impact of entitlements, grants, user fees or loan programs or the rights and obligations of recipients thereof; or (4) raise legal or policy issues for which centralized review would meaningfully further the

² Because surface mobile equipment fatalities related to deficiencies in training, hazard identification, or maintenance are estimated to represent 55.75 percent of all surface mobile equipment fatalities and injuries, the low scenario estimate amounts to a 25 percent reduction of 55.75 percent of the surface mobile equipment fatalities and injuries, or equivalently, a 14 percent reduction in surface mobile equipment fatalities and injuries overall (since 25 percent of 55.75 percent is 13.94 percent). Likewise, the middle scenario estimate translates to a 28 percent (50 percent of 55.75 percent) reduction in surface mobile equipment fatalities and injuries, and the expected scenario estimate translates to a 42 percent (75 percent of 55.75 percent) reduction in surface mobile equipment fatalities and injuries.

President's priorities or the principles set forth in the E.O. OMB has determined that this rule is a significant regulatory action under E.O. 12866.

E.O. 13563 directs agencies to propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs; the regulation is tailored to impose the least burden on society, consistent with achieving the regulatory objectives; and in choosing among alternative regulatory approaches, the agency has selected those approaches that maximize net benefits. 75 FR 3821 (2011). E.O. 13563 recognizes that some benefits are difficult to quantify and provides that, where appropriate and permitted by law, agencies may consider and discuss qualitative values that are difficult or impossible to quantify, including equity, human dignity, fairness, and distributive impacts.

As shown above, this final rule is estimated to have an annualized net benefit of \$49.3 million (undiscounted), \$48.2 million (at 3 percent discount rate), and \$46.8 million (at 7 percent discount rate), under the expected scenario.

OIRA has determined that this rule is significant under E.O. 12866, and accordingly it has been reviewed by OMB.

Regulatory Flexibility Analysis

The Regulatory Flexibility Act (RFA) of 1980, as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA), requires regulatory agencies to consider a rule's economic impact on both private and public small entities. For the mining industry, the Small Business Administration (SBA) defines a small business by the North American Industry Classification System (NAICS) code. MSHA has reviewed the final rule to assess and take appropriate account of its potential impact on small businesses, small governmental jurisdictions, and small organizations. Based on its small-entity impact analysis, MSHA believes that this final rule would not have a significant economic impact on a substantial number of small entities (small-entity mine controllers and small-entity mining contractors). The analysis found that the compliance costs fall below one percent of the labor costs of small entities, and that such costs are lower as a proportion of the revenues of these small entities. MSHA, therefore, concluded that the final rule does not have a significant impact on a substantial number of small entities.

1. INTRODUCTION

MSHA is promulgating a final rule that requires operators to develop and implement a written safety program for surface mobile equipment (excluding belt conveyors) at surface mines and surface areas of underground mines. This rulemaking is one of several actions the Agency is taking to reduce accidents involving surface mobile equipment and improve miner safety and health.

The written safety program must identify actions that operators will take to identify risks to eliminate or reduce hazards, accidents, injuries, and fatalities related to surface mobile equipment. The final rule will provide operators flexibility to develop a safety program that is appropriate for their mining conditions and operations. The final rule will apply to surface mines and surface areas of underground metal and nonmetal (MNM) and coal mines.

As part of its overall effort to improve safety in the use of surface mobile equipment at surface mines and surface areas of underground mines, MSHA published a request for information (RFI) entitled *Safety Improvement Technologies for Mobile Equipment at Surface Mines, and for Belt Conveyors at Surface and Underground Mines* (83 FR 29716) on June 26, 2018. MSHA considered all comments and information received and proposed a rule that would require written safety programs for surface mobile equipment at surface mines and surface areas of underground mines with six or more miners. MSHA published the proposed rule, *Safety Program for Surface Mobile Equipment* (86 FR 50496) on September 9, 2021. In addition to information in response to the RFI, the proposed rule was based on best practices and guidance on workplace safety programs.³ The Preliminary Regulatory Impact Analysis (PRIA) was made publicly available at that time.

Like the proposal, the final rule requires operators to develop a written safety program in which they will describe actions they will take to identify and evaluate the risks of surface mobile equipment used at their mines, in order to eliminate or mitigate safety hazards and thereby reduce or eliminate the likelihood of accidents, injuries, and fatalities. Since each mine has a unique environment, MSHA is providing each operator with the flexibility to develop a safety program that addresses its specific types of surface mobile equipment and its unique mining conditions and operations. The final rule requires written safety programs to include actions the operator will take to: (1) identify and analyze hazards, (2) develop and maintain procedures and schedules for maintenance and repairs, (3) identify and evaluate technologies, and (4) train miners. The final rule also requires the responsible person (as defined in the rule) to evaluate and update the written safety program annually and whenever necessary to appropriately manage safety risks associated with surface mobile equipment at the mine. Also,

³ As part of the proposed rule, MSHA reviewed safety program guidance materials from several types of organizations: (1) consensus standards organizations (e.g., American Society of Safety Professionals (ASSP), Occupational Health and Safety Management Systems, ANSI/ASSP Z10-2012 (R2017); and the International Standards Organization (ISO), Occupational Health and Safety Management Systems – Requirements With Guidance for Use (ISO 45001:2018)); (2) industry organizations (e.g., the National Mining Association’s CORESafety and Health Management System); and (3) government agencies (e.g., the Department of Transportation, 49 CFR part 270). The Department of Labor’s Occupational Safety and Health Administration (OSHA) also has developed recommended practices for developing safety and health programs (<https://www.osha.gov/shpguidelines/>). 86 FR 50498.

the final rule excludes belt conveyors in the definition of surface mobile equipment, requires the written safety program to cover surface mobile equipment operated at surface mines and surface areas of underground mines, and does not require MSHA's approval of the written safety program.

1.1. Changes from the Proposed Rule

The final rule is changed from the proposed rule in two ways. First, the final rule applies to all surface mines and underground mines with surface areas, regardless of size. While the proposed rule originally excluded small mines (mines with five or fewer miners) from its requirements, many commenters stated that all operators should be required to have a written safety program and miners at small operations need the same protections as miners at larger operations. Similarly, one commenter stated that regardless of whether a facility employs one miner or one hundred miners, each individual should be protected equally. In response to comments, MSHA reviewed recent data from 2011 to 2020 on fatalities and injuries and accident investigation reports. Based on that review, MSHA determined that the fatality rate for mines with five or fewer miners is greater than that for larger mines. MSHA found that from 2011 to 2020, the average fatality rates (or fatal incidence rate) per 200,000 working hours were as follows: 0.0227 at mines with 5 or fewer employees; 0.0167 at mines with 6 to 20 employees; 0.0103 at mines with 21 to 100 employees, and 0.0079 at mines with more than 100 employees.⁴

Based on the analysis and comments, the final rule requires a written safety program for all surface mines and underground mines with surface areas, regardless of size. MSHA agrees with the comments that the Mine Act requires safety and health protection for all mines and that applying the final rule to all mines will provide improved safety for all mines. In the final rule, the requirement to develop a written safety program is applicable to all mines, regardless of mine size.

Second, the final rule makes explicit that operators must solicit input from miners and their representatives in developing and updating the written safety program. In response to the proposal, commenters observed that, in many cases, the safety program requires operators simply to describe what they will do to comply with existing requirements related to surface mobile

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	Mine Size (Based on all mine employees)			
	5 or Fewer employees	6 to 20 employees	21 to 100 employees	101 or More employees
Fatalities at Surface Mines and Surface Areas of Underground Mines (10-year total)	25	65	47	44
Hours worked at Surface Mines and Surface Areas of Underground Mines (10-year total in millions)	220.5	776.9	912.6	1,110.6
Fatal Incidence Rate (or fatality rate) per 200,000 Working hours	0.0227	0.0167	0.0103	0.0079

1. Includes fatalities of miners (including contract miners and office workers) that occurred at surface mines and at surface areas of underground mines.
2. Includes hours worked by miners (excluding contract miners) at surface mines and at surface areas of underground mines. Does not include hours worked at facilities.
3. $(\text{Number of Fatalities} \times 200,000) / \text{Hours Worked} = \text{Fatality Rate}$

Note: Table excludes fatalities and work hours reported at facilities.

equipment. Under existing requirements, operators already must (in many cases) provide miners and miners' representatives the opportunity to comment or otherwise participate in these existing processes. See e.g., 30 CFR 46.3(g), 48.23(d) and (j)(1), and 56/57.18002. As these existing processes are expected to be referenced in developing and updating the written safety program, miners and their representatives similarly should be consulted in developing and updating the program. In drafting the proposal, it was MSHA's intention that operators would seek input from miners and their representatives in the development and updating of a written safety program. MSHA includes this new provision in the final rule to recognize the comments, and to be consistent with the Agency's intent in the proposal and with the Mine Act.

1.2. Data and Methodological Changes from the Preliminary Regulatory Impact Analysis (PRIA)

While the PRIA used data from 2003 to 2018, the FRIA used data from 2011 to 2020 on fatalities and non-fatal injuries involving surface mobile equipment. MSHA used more recent data and more comprehensive information for the FRIA, including qualitative information concerning accidents, fatalities, and injuries that better reflect current and future circumstances associated with more modern equipment than older data.

In addition, while the methodology in the PRIA involved the forecasting of incidences of fatalities and injuries without including the mines employing five or fewer miners, the recent 10-year data (2011-2020) did not show a clear trend, either upward or downward, in these incidences. Therefore, based on what MSHA learned from the more recent, and more comprehensive data, MSHA assumed these rates would remain constant over the 10-year implementation period.

Through the recent surface mobile equipment fatalities and injuries, MSHA determined that 113 out of 326 fatalities that occurred between 2011 and 2020 involved surface mobile equipment. MSHA also observed that 63 (approximately 56 percent) of the 113 surface mobile equipment fatality cases had identified deficiencies in training, hazard identification, or maintenance, or any combination thereof. As documented in the fatal accident investigation reports, these deficiencies were considered by investigators to be contributory factors to the fatality that occurred. This FRIA uses the figures observed from the recent 10-year data.

Furthermore, as MSHA expects a majority of independent contractors to develop a written safety program for the use and operation of their surface mobile equipment, the FRIA includes the estimated costs incurred by the independent contractors. The assumptions behind the cost estimates are explained in the compliance costs section later.

2. INDUSTRY PROFILE

A total of 12,434 mines in the U.S. reported their working hours in 2021. Over 301,000 individuals worked at those mines. Table 2-1 shows which types of mines the miners and other workers worked.

Table 2-1: Mines and Employment by Surface or Underground Location in 2021

Commodity	Location	Mines ¹	Miners	Total Mine Workers ²	Contract Miners	Total Contract Workers ²	Total Workers ³
MNM	Surface Including Facilities	11,236	128,156	149,846	60,120		
	Underground	235	18,223	20,712	7,047		
	Total	11,471	146,379	170,558	67,167	69,433	239,991
Coal	Surface Including Facilities	750	18,294	19,200	11,887		
	Underground	213	21,323	21,916	7,664		
	Total	963	39,617	41,116	19,551	20,288	61,404
All Mines	Surface Including Facilities	11,986	146,450	169,046	72,007		
	Underground	448	39,546	42,628	14,711		
	Total	12,434	185,996	211,674	86,718	89,721	301,395

Source: MSHA MSIS Data (reported on MSHA Form 7000-2), Accessed on April 7, 2022.

Notes: All Miners and workers are calculated using employers' headcount reports; some miners and workers may be counted more than once, if they work at more than one mine.

1. Of the 12,434 mines, 40 did not have any employment in surface areas; they were thus excluded from the analysis.
2. Total mine workers and total contract workers include both miners and office/administrative workers.
3. Total workers include total mine workers and total contract workers.

Table 2-2 presents an estimated revenue generated by the mining industry and the total hours of miners worked in 2021.

Table 2-2: Mine Revenue and Miner Work Hours in 2021

Commodity	Estimated Revenues (2021 dollars, billions)	Miner Work Hours (millions)
MNM	\$94.6	353.8
Coal	\$21.0	104.7
Total	\$115.6	458.5

Sources: MSHA MSIS Data (reported on MSHA Form 7000-2), Accessed on 4/27/2023; Revenue data are from the USGS Mineral Commodities Summaries, 2023 Report; Table 1. U.S. Mineral Industry Trends, 2021.

Notes: 1. Totals may not equal the sum of the components due to rounding.

2. Miner work hours include reported work hours of miners and contract miners and exclude any work hours by office/administrative staff.

3. COMPLIANCE COSTS

The following presents MSHA's estimates of compliance costs associated with the final rule, along with the Agency's assumptions and methodology.

3.1. Introduction

The final rule requires operators to develop, implement, and update a written safety program for surface mobile equipment at surface mines and surface areas of underground mines to reduce accidents, injuries, and fatalities. The final rule applies to operators and part 45 independent contractors (independent contractors) at surface mines and surface work areas of underground mines. Under §§ 56.23003(a), 57.23003(a), and § 77.2103(a), the operator of each mine is required to develop and implement a written safety program for surface mobile equipment that includes the actions the operator will take to:

- (1) Identify and analyze hazards and reduce the resulting risks related to the movement and the operation of surface mobile equipment;
- (2) Develop and maintain procedures and schedules for routine maintenance and non-routine repairs for surface mobile equipment;
- (3) Identify currently available and newly emerging feasible technologies that can enhance safety at the mine and evaluate whether to adopt them; and
- (4) Train miners and other persons at the mine necessary to perform work to identify and address or avoid hazards related to surface mobile equipment.⁵

In addition, §§ 56.23003(b), 57.23003(b), and § 77.2103(b) require that once a written safety program is developed, the "responsible person" (as defined in §§ 56.23001, 57.23001, and 77.2101) is required to evaluate and update it at least annually, or as mining conditions or practices change that may adversely affect the health and safety of miners or other persons, as accidents or injuries occur, or as surface mobile equipment changes or modifications are made.

The quantified costs associated with this final rule are divided into two categories: (1) the costs of the development of a written safety program in the first year after the effective date of the final rule, and (2) the costs of evaluating and updating the written safety program in subsequent years.

MSHA assumed that both categories of compliance costs would primarily include time spent by miners (e.g., safety specialists) to develop, evaluate, and update a safety program in writing. This assumption is because existing standards already require operators to identify and analyze hazards specific to their mine sites. Additionally, many operators and independent contractors already have schedules and procedures for maintenance activities related to their equipment and provide training to their miners.⁶ Thus, with these activities already included in

⁵ MSHA did not include familiarization costs among the costs of the rule because the rule requires a minimum level of familiarization, especially given the flexibility that operators have in writing their own safety program.

⁶ For example, under 30 CFR parts 56 and 57, MNM operators are required to inspect certain machinery and mobile equipment before its operation and to correct safety defects before the equipment is used. Sections 56.14101,

the baseline of the analysis, MSHA anticipated that the costs of this rule are determined largely by the time required for mine operators to develop and update a written safety program for surface mobile equipment. Furthermore, MSHA assumes that operators will solicit input from miners and their representatives in developing and maintaining all aspects of the written safety program, and MSHA included the time for their collaboration in its cost estimates.

3.2. Safety Program Development Cost – Initial One-Time Cost

Under this final rule, operators and independent contractors must develop written safety programs that are tailored to their operations and/or build on existing programs. The final rule allows operators flexibility to adapt written safety programs to the many different mine operations, with varying mining methods, mine environments, types of surface mobile equipment used, and mined commodities. The cost of program updating includes costs associated with soliciting input from miners and their representatives as required under §§ 56.23003(c), 57.23003(c), and 77.2103(c).

Grouping Mines

Given the diversity of mining operations, MSHA categorized operators into six groups. All mines were first divided into two commodity categories – metal and nonmetal (MNM) and coal. For each commodity category, MSHA then placed mines into three groups based on the size of employment and production, if known.⁷

- Group 1 includes large mines employing 91 or more miners.

56.14102, 57.14101, and 57.14102 require brakes on self-propelled mobile equipment and rail equipment to be inspected and properly maintained, and sections 56.14130, 56.14131, 56.14132, 57.14130, 57.14131, and 57.14132 require appropriate roll-over protection, seat belts, and audible warning devices, respectively, be installed on haulage trucks and mobile equipment to protect miners from accidents.

At coal mines, under 30 CFR part 77, mining equipment is required to be properly maintained and operated. Sections 77.404 and 77.502 require mobile and stationary machinery and electric equipment to be maintained in safe operating condition and require operators to remove equipment in unsafe condition from service immediately. These sections also require coal miners who operate and service such equipment to be trained. Section 77.1606 requires loading and haulage equipment to be inspected before operation and for any safety defects to be corrected before the equipment's use. Also, section 77.1607 requires miners to observe and follow several safe operating procedures and best practices when operating loading and haulage equipment.

Under existing training requirements in 30 CFR parts 46 and 48, all miners that are assigned to new tasks must receive task training. That means if a miner is assigned to operate a piece of equipment that the miner has not used before, the miner must be trained on the operation of that equipment before the miner can use it. In addition, any persons exposed to mining hazards or persons that are not identified as a miner under the existing requirements must have site specific hazard training. Sections 46.11 and 48.31 require site specific hazard training to address information or instructions on the hazards a person could be exposed to while at the mine including unique recognition and avoidance of hazards from electrical and powered haulage hazards, among other hazards.

⁷ The PRIA made general assumptions about how many pieces of unique equipment mines had based on the mining methodology and type of mine (coal or MNM). The methodology for the FRIA estimates the number of unique surface mobile equipment units based on a detailed analysis. In this analysis, estimates were made on the number of unique units that would be expected in different categories of mines and based on the number of mines in these categories (see Appendix A of this FRIA for more details on this methodology).

- Group 2 includes medium-size mines employing 6 to 90 miners.
- Group 3 includes small mines employing 5 or fewer.

MSHA estimated, based on its data on contractors and their employment, that there were approximately 6,318 independent contractors. MSHA assumed that about 75 percent, or 4,739 of those independent contractors would develop and update a written safety program of their own. MSHA further assumed that these independent contractors employ 1 to 90 miners. Independent contractors perform mine development (including shaft and slop sinking), demolition of mine facilities, dam construction, excavation, drilling, and blasting. The 4,739 independent contractors are regarded as one group that is separate from operators.

Four Components of Written Safety Program Development Cost

To develop and implement a written safety program, operators are required to identify actions they will take to conduct the following types of activities, most of which already are required. First, an operator is required to identify actions it will take to identify hazards and manage risks related to the movement and the operation of surface mobile equipment. Second, the operator must describe actions it will take to develop and maintain procedures and schedules for routine maintenance and non-routine repairs for surface mobile equipment. Third, the operator must describe actions it will take to identify currently available and newly emerging feasible technologies that can enhance safety at the mine and evaluate whether to adopt them. Fourth, the operator is required to describe the actions it will take to train miners and others performing work at the mine to identify and address hazards related to surface mobile equipment. Each of the four resulting cost components is discussed below.

Estimating Unique Units of Surface Mobile Equipment

Before proceeding to the cost estimates, it is important to note that the costs to develop, implement, or update a safety program depend on the number of unique units of equipment at the mine. This is because generally, it is assumed that a written safety program includes actions the operator will take to address the hazard and risk analysis, maintenance schedules, currently available and newly emerging feasible technologies that can enhance safety at the mine and evaluation for adoption, and training for each unique unit of equipment. MSHA considered a unit to be unique (with respect to other units at the same mine) if both its make and model do not match the make and model of any other unit at the same mine. For example, if three units of surface mobile equipment are at a mine and all three are identical in make and model, then the mine has only one unique unit counted for the three of them. If the operator then purchases four other units that are all identical to each other but different from the first three, then the mine will have only two unique units.

Based on its experience and expertise, along with the information in its inspection reports, MSHA developed estimates of the total number of unique units of surface mobile equipment for each group of mines. (See Appendix A for more details on methodology.) Table 3-1 shows the estimated average counts of unique pieces of surface mobile equipment for each group of mines.

Table 3-1: Estimated Unique Units of Surface Mobile Equipment at Mines

Commodity	Size Category	Number of mines	Estimated Average of Unique Surface Mobile Equipment Units (per Mine)	Total
MNM	Group 1 (Large)	217	47	10,199
MNM	Group 2 (Medium)	4,430	14	62,020
MNM	Group 3 (Small)	6,803	3	20,409
Coal	Group 1 (Large)	112	47	5,264
Coal	Group 2 (Medium)	454	14	6,356
Coal	Group 3 (Small)	378	3	1,134
MNN/Coal	Contractors	4,739	3	14,217
Total		17,133		119,599

Note: 4,739 independent contractors are assumed for the compliance cost estimates.

Cost Related to the Actions Operators Will Take to Identify and Analyze Hazards and Identify and Evaluate Technology (§§ 56.23003(a)(1) and (3), 57.23003(a)(1) and (3), and 77.2103(a)(1) and (3))

MSHA estimated the total time needed for operators to meet the requirements under §§ 56.23003(a)(1) and (3), 57.23003(a)(1) and (3), and § 77.2103(a)(1) and (3) to be between 1.25 and 3.0 hours per unique unit of equipment, taking into account that the actions operators will take to identify, analyze, and mitigate risk also depend on the total number of unique units of equipment. MSHA believes these two requirements would be met at the same time because operators would often look to technology to mitigate hazards. The 1.25 to 3.0 hours per unique unit of equipment is the time they would need to identify the actions they will take to identify and analyze hazards associated with the movement and operation of each piece of mobile equipment onsite and the movement and operations of all equipment, the time they would identify and evaluate if any emerging technology would address the hazards. Operators in the smaller categories were assumed to need more time per unique unit of surface mobile equipment than would larger mining operations, because MSHA assumed smaller mines were more likely to lack existing written documentation and templates to comply with other MSHA safety requirements than larger operators. Conversely, for large operators, MSHA assumed that less time per piece of surface mobile equipment would be necessary to bring their mines into compliance with the rule, because those mines would already have documentation and templates that they have generated to comply with other MSHA requirements (see Footnote 6). However, because those larger mines have larger numbers of unique pieces of surface mobile equipment onsite their overall time burdens (regarding all unique surface mobile equipment at a mine) for program development and implementation costs were estimated to be greater.

MSHA estimated the costs for the implementation of the final rule based on the fully loaded hourly wage rates (which include salaries, fringe benefits, and overhead costs) for a mine supervisor, occupational safety professional, and maintenance workers. MSHA determined that small mines, Group 3, would be reliant on the mine supervisor for the development of the safety program and for training, while mines in Group 1 would employ a safety professional, or similar

occupation, to perform this task, and mines in Group 2 could employ either.⁸ MSHA also determined that, in addition to the individuals working in these two job categories, maintenance workers would develop or revise maintenance schedules, if needed to comply with other MSHA requirements. The hourly wage rates for these categories of employees are shown in Table 3-2.⁹

Table 3-2: Hourly Labor Costs

Occupation	Hourly Wage Rate (2021 \$) ¹		
	MNM	Coal	Contract
Maintenance Worker	\$42.22	\$47.70	\$43.43
Safety Professional	\$59.06	\$68.29	\$61.09
Mining Supervisor	\$61.41	\$71.79	\$63.70
Clerk	\$35.58	\$35.01	\$35.45

1. These are loaded wage rates which include benefits. They also include an overhead rate of 1% that MSHA applies to its labor cost estimates in mining operations.

Table 3-3 shows MSHA's cost estimate for describing actions the operator will take to conduct hazard analysis and technology identification and evaluation for surface mobile equipment in the first year.

⁸ In the case of the mines with between 35 and 69 miners, MSHA determined that either a safety professional or a supervisor could be employed to implement the rule requirements. In this case, MSHA took averages between the two occupations for this one category. For the preparation of the written safety program, MSHA assumed, on average, that for each unique unit (for mines in this category) it would take 1 hour of a safety professional's time and 1.25 hours of a supervisor's time. Regarding training, MSHA estimated that it was equally likely that a safety professional or a supervisor would conduct the training. For this mine category, MSHA used an average salary between the two occupations, based on these assumptions.

⁹ Hourly wage rates are derived from the OEWS May 2021 survey. NAICS 212100 was used for Coal Mining wages, while 212200 and 212300 were combined for Metal and Non-Metal Mining wages. MSHA multiplied the mean wage rate by a benefit factor of 1.488 to obtain the fully loaded wage. The occupation codes used for each occupation are as follows: Occupational Health & Safety Specialist (19-5011), Mining Supervisor (47-1011, 49-1011, 51-1011, 53-1047), and Maintenance and Mechanics (49-9071, 49-9098, 49-9099, 49-3031, 49-3042, 49-9041). MSHA also increased wages by 1 percent to include overhead costs.

Table 3-3: Estimated Cost of Operators' Actions to Analyze Hazards and Identify and Evaluate Technology, Year 1 (2021 Dollars)

Operator Category		Hours to Analyze Hazards and Evaluate Technology (per Unit)	Total Number of Units	Total Hours	Hourly Wage Rate ¹	Cost
Commodity	Size Category					
MNM	Group 1	1.60	10,199	16,318	\$59.06	\$963,743
MNM	Group 2	2.90	62,020	179,858	\$61.41	\$11,045,606
MNM	Group 3	3.00	20,409	61,227	\$61.41	\$3,760,129
Coal	Group 1	1.60	5,264	8,422	\$68.29	\$575,198
Coal	Group 2	2.80	6,356	17,797	\$71.79	\$1,277,569
Coal	Group 3	3.00	1,134	3,402	\$71.79	\$244,218
Contractors	Contractors	0.75	14,217	10,663	\$63.70	\$679,165
					Total Cost	\$18,545,627

Note: Totals may not equal the sum of the components due to rounding.

1. These are loaded wage rates which include benefits. They also include an overhead rate of 1% that MSHA applies to its labor cost estimates in mining operations.

Cost Related to Identifying Actions the Operator Will Take to Develop and Maintain Procedures and Schedules for Maintenance and Repair (§§ 56.23003(a)(2), 57.23003(a)(2), and 77.2103(a)(2))

Under existing standards, operators are required to maintain their equipment. MSHA anticipates that this safety program will enhance compliance with existing requirements and improve safety. MSHA estimated the amount of time required for operators to identify the actions it will take to develop, revise, or maintain procedures and schedules for equipment maintenance under §§ 56.23003(a)(2), 57.23003(a)(2), and 77.2103(a)(2) to be between 1 and 2 hours for each unique piece of surface mobile equipment, with these time estimates dependent on the size of the mine.

MSHA assumed smaller operators would need more time per piece of surface mobile equipment, due to the lack of an existing template or record. Operators at large mines would need less time per piece of surface mobile equipment for compliance efforts because of the information and schedules that are already readily available to them. Below Table 3-4 shows MSHA's cost estimate for identifying actions operators will take to develop maintenance and repair schedules in the first year.

**Table 3-4: Estimated Cost of Describing or Identifying
Operators' Actions to Develop a Maintenance Schedule, Year 1
(2021 Dollars)**

Operator Category		Hours to Develop Maintenance Schedule (per Unit)	Total Number of Units	Total Hours	Hourly Wage Rate ¹	Cost
Commodity	Size Category					
MNM	Group 1	1.50	10,199	15,299	\$42.22	\$645,938
MNM	Group 2	3.40	62,020	210,868	\$42.22	\$8,903,338
MNM	Group 3	4.00	20,409	81,636	\$42.22	\$3,446,862
Coal	Group 1	1.50	5,264	7,896	\$47.70	\$376,608
Coal	Group 2	3.30	6,356	20,975	\$47.70	\$1,000,415
Coal	Group 3	4.00	1,134	4,536	\$47.70	\$216,349
Contractors	Contractors	3.00	14,217	42,651	\$43.43	\$1,852,186
Total Cost						\$16,441,698

Note: Totals may not equal the sum of the components due to rounding.

1. These are loaded wage rates which include benefits. They also include an overhead rate of 1% that MSHA applies to its labor cost estimates in mining operations (which have relatively little overhead costs).

*Cost Related to Identifying the Actions Operators Will Take to Train Miners (§§
56.23003(a)(4), 57.23003(a)(4), and 77.2103(a)(4))*

MSHA's existing standards require that miners be trained. MSHA anticipates that the safety program will enhance existing training compliance and improve safety. The time estimates for each size category of mine are summarized in Table 3-5. Below, Table 3-5 shows MSHA's cost estimate for describing the actions the operator will take to comply with existing training requirements in the first year.

Table 3-5: Estimated Cost of Identifying Operators' Actions to Develop Training, Year 1 (2021 Dollars).

Operator Category		Number of Mines ¹	Hours per Mine for Identifying Training Actions	Hourly Wage Rate ²	Cost
Commodity	Size Category				
MNM	Group 1	217	9.30	\$59.06	\$119,186
MNM	Group 2	4,430	2.00	\$61.41	\$544,119
MNM	Group 3	6,803	2.00	\$61.41	\$835,584
Coal	Group 1	112	9.30	\$68.29	\$71,135
Coal	Group 2	454	2.00	\$71.79	\$65,182
Coal	Group 3	378	2.00	\$71.79	\$54,271
Contractors	Contractors	4,739	1.00	\$63.70	\$301,851
				Total Cost	\$1,991,328

Note: Totals may not equal the sum of the components due to rounding.

1. Mines include independent contractors impacted by the final rule.

2. These are loaded wage rates which include benefits. They also include an overhead rate of 1% that MSHA applies to its labor cost estimates in mining operations.

Cost Related to Making Available and Copying the Written Safety Program (§§ 56.23004(b), 57.23004(b), and 77.2104(b))

Final §§ 56.23004(b), 57.23004(b), and 77.2104(b) require that operators provide, at no cost, a copy of the written safety program to miners or their representative upon request. MSHA estimates that all operators will need to provide a copy of the written safety program upon request every year to miners or their representative. MSHA assumes that 50 percent of operators will provide a copy to the miners or their representative upon request each year, or will post the safety program on the mine bulletin board. MSHA estimates that copying the written safety program will take a clerk, earning an average hourly wage of \$35.58, \$35.01, or \$35.45 at MNM, Coal, or Contract mine operations, (respectively), approximately three minutes to complete the task. MSHA estimates there is a \$1 per copy of printing cost. Table 3-6 below summarizes these annual costs.

**Table 3-6: Estimated Cost to Make Available and Copy the Written Safety Program,
Annual (2021 Dollars)**

Commodity	Number of Mines	Copies per Mine	Minutes per Copy	Total Hours	Hourly Wage Rate¹	Copying Cost²	Labor Cost
MNM	11,450	1.5	3	859	\$35.58	\$17,175	\$30,554
Coal	944	1.5	3	71	\$35.01	\$1,416	\$2,479
Contractor	4,739	1.5	3	355	\$35.45	\$7,109	\$12,601
Subtotal						\$25,700	\$45,634
Total						\$71,333	

Note: Totals may not equal the sum of the components due to rounding.

1. These are loaded wage rates; they include benefits and an overhead rate of 1%.

2. Copying costs includes a \$1.00 per copy for ink, paper, and use of printer.

Total Safety Program Development Cost in Year 1

Based on the findings shown in Tables 3-3, 3-4, 3-5, and 3-6, MSHA estimated the total cost for operators to develop the written safety program in the first year after the rule takes effect to be \$37 million (in 2021 dollars). Table 3-3 includes the cost of listing actions the operator will take to analyze hazards and evaluate technology as \$19 million. This includes additional hazard analysis due to lack of compliance with existing requirements and the new technology evaluation requirement. Table 3-4 provides the estimated additional costs of listing the actions the operator will take to develop maintenance schedules for all unique units as \$16 million. Table 3-5 shows MSHA's estimates of the training costs as \$2 million for first-year training, based on the estimated hours per mine that would be needed to conduct currently-required training that is not being done, and Table 3-6 provides the estimated cost to make available and copy the written safety program. These costs combine for a total of \$37 million for operators to develop the written safety program in the first year after the rule takes effect.

3.3. Recurring Costs for Subsequent Years

MSHA also estimated the recurring costs associated with the final rule. Two types of required activities are expected to incur recurring costs: (1) annual updates to the safety program, including changes due to the replacement of equipment, and (2) other updates needed to reflect changing mining practices, environment, or technologies, or to improve safety programs following accidents or injuries related to surface mobile equipment.

Cost Related to Annual Updates of Safety Program (§§ 56.23003(b), 57.23003(b), and 77.2103(b))

For the first component, the cost of annual updates to safety programs, MSHA assumed that existing mining equipment would be replaced by newer pieces of equipment at the rates that

are generally accepted for industrial mobile equipment. Specifically, MSHA estimated that across all types of mobile equipment included in the final rule, the average product lifecycle for each piece of mobile equipment on the mine site will be 10 years.¹⁰ The cost of program updating includes costs associated with soliciting input from miners and their representatives as required under §§ 56.23003(c), 57.23003(c), and 77.2103(c).

MSHA estimated that annual revisions to the written safety program would need to reflect the 10 percent of unique units that will be replaced each year. MSHA also included additional time for operators to modify training plans or conduct training associated with surface mobile equipment replacement (increased compliance with existing requirements). One to two hours per mine were assumed for this activity.

Table 3-7 presents the cost estimate to update the written program including training as necessary. The table is similar to Table 3-3, except that the number of unique units for each group is only 10 percent of the comparable numbers in Table 3-3. As shown in the table, these annual costs totaled \$3.7 million. The cost estimated to update the safety program due to new equipment is 10 percent of the costs of preparing the safety program in the first year.

**Table 3-7: Estimated Cost for Annual Program Updates
Including Training and New and Replaced Equipment, Years
2-10 (2021 Dollars)**

Operator Category		Number of Mines ¹	Hours for Annual Updates to Safety Program (per Mine)	New and Replaced Units per Year ²	Hours to Update (per unit)	Hourly Wage Rate ³	Annual Cost
Commodity	Size Category						
MNM	Group 1	217	2.00	1,020	1.60	\$59.06	\$122,006
MNM	Group 2	4,430	2.00	6,202	2.90	\$61.41	\$1,648,679
MNM	Group 3	6,803	2.00	2,041	3.00	\$61.41	\$1,211,597
Coal	Group 1	112	2.00	526	1.60	\$68.29	\$72,818
Coal	Group 2	454	2.00	636	2.80	\$71.79	\$192,939
Coal	Group 3	378	2.00	113	3.00	\$71.79	\$78,692
Contractors	Contractors	4,739	1.00	1,422	0.75	\$63.70	\$369,768
Total							\$3,696,498

Note: Totals may not equal the sum of the components due to rounding.

1. Mines include contractors impacted by the final rule.

2. 10% of total estimated units.

3. These are loaded wage rates which include benefits. They also include an overhead rate of 1% that MSHA applies to its labor cost estimates in mining operations.

Cost Related to Update for Changing Conditions (§§ 56.23003(b), 57.23003(b), and 77.2103(b))

¹⁰ This is a conservative estimate of the lifecycle of equipment so as not to underestimate costs. In many cases equipment is kept for over 10 years, especially if the equipment had not been heavily utilized, and thus, had not substantially depreciated due to wear-and-tear.

For the second component, the cost of other updates, MSHA estimated the time requirements for the operator to update the written safety program due to changing mine conditions and new technologies. Such conditions include the identification of new hazards or new considerations stemming from any accidents that have occurred in that year (including accidents may have taken place in other mines, but that may have raised awareness of issues needing greater attention). The cost of program updating includes costs associated with soliciting input from miners and their representatives in updating the written safety program under §§ 56.23003(c), 57.23003(c), and 77.2103(c). These time requirements per mine were estimated to be larger for larger mines. They range from 2 hours per year for contractors, to 13.5 hours per year in large mines. Table 3-8 presents the derivation of this recurring cost component, which totaled \$6.2 million per year.

Table 3-8: Annual Estimated Cost to Update for Changing Conditions, Years 2-10 (2021 Dollars)

Operator Category		Number of Mines¹	Hours to Update	Hourly Wage Rate²	Annual Costs
Commodity	Size Category				
MNM	Group 1	217	13.50	\$59.06	\$173,012
MNM	Group 2	4,430	7.10	\$61.41	\$1,931,621
MNM	Group 3	6,803	7.00	\$61.41	\$2,924,545
Coal	Group 1	112	13.50	\$68.29	\$103,260
Coal	Group 2	454	7.10	\$71.79	\$231,396
Coal	Group 3	378	7.00	\$71.79	\$189,947
Contractors	Contractors	4,739	2.00	\$63.70	\$603,702
				Total	\$6,157,484

Note: Totals may not equal the sum of the components due to rounding.

1. Mines include contractors impacted by the final rule.

2. These are loaded wage rates which include benefits. They also include an overhead rate of 1% that MSHA applies to its labor cost estimates in mining operations.

Cost Related to Copying and Providing Updated Written Safety Program (§§ 56.23004(b), 57.23004(b), and 77.2104(b))

MSHA estimates that in Years 2-10 all operators will need to make available by posting the safety program and/or provide an updated copy of the written program to miners or miners' representatives, and that 50 percent of operators will receive requests for a copy. MSHA estimates that it will take a clerk 3 minutes to produce and provide copies. The resulting recurring costs to copy and post the written safety program in Years 2-10 is the same as reported in Table 3-6, \$71,333 a year.

Using these estimates, the total estimated recurring cost per year (after the first year) is the sum of the cost of annual updates (\$3.7 million in Table 3-7), the cost of other updates (\$6.2

million in Table 3-8), and copying the written programs (\$0.1 million in Table 3-6), amounting to a total annual cost of approximately \$9.9 million per year.¹¹

3.4. Summary of Costs

The total undiscounted costs over the 10-year implementation period amount to \$126 million (in 2021 dollars). Costs discounted by 3 percent are \$111 million, and costs discounted by 7 percent are \$95 million. Table 3-9 below provides a year-by-year summary of the costs of the rule, summing up each cost component and showing the discounting of the cost per year by 3 and 7 percent over 10 years.

Table 3-9: Summary of Total Compliance Costs, by Year (Millions of 2021 Dollars)

Year	Annual Costs		
	Discounted at		
	0%	3%	7%
1	\$37.0	\$36.0	\$34.6
2	\$9.9	\$9.4	\$8.7
3	\$9.9	\$9.1	\$8.1
4	\$9.9	\$8.8	\$7.6
5	\$9.9	\$8.6	\$7.1
6	\$9.9	\$8.3	\$6.6
7	\$9.9	\$8.1	\$6.2
8	\$9.9	\$7.8	\$5.8
9	\$9.9	\$7.6	\$5.4
10	\$9.9	\$7.4	\$5.0
10 Year Total	\$126.4	\$111.0	\$95.1
Annualized	\$12.6	\$13.0	\$13.5

Note: Totals may not equal the sum of the components due to rounding.

¹¹ MSHA kept a constant, real hourly wage rate based on the rate observed in 2021 and on the absence of any changes in real wages over a long period of time. This was based on a comparison between the real wages of mine employees in 1990 and 2021, adjusted by the Consumer Price Index for All Urban Consumers (CPI-U). The wage series was for occupations NAICS Code 212 (Mining, except oil and gas) – BLS Series ID CEU1021200008. These data on wages and the CPI were obtained from the Bureau of Labor Statistics, “Databases, Tables & Calculators by Subject,” extracted on August 10, 2022, <https://www.bls.gov/data/>. The wage rate of \$37.29 was estimated as a weighted average of the rate for coal miner workers (\$42.45 per hour) and MNM mine workers (\$36.48) based on the observed proportions of these workers in 2020 (14.0 percent and 86.0 percent respectively). These hourly rates were derived from the OEWS May 2021 survey. NAICS 212100 was used for Coal Mining wages, while 212200 and 212300 were combined for Metal and Non-Metal Mining wages. MSHA multiplied the mean wage rate by a benefit factor of 1.488 to obtain the fully loaded wage, and also added 1 percent of the wage for overhead costs. The occupation codes used for each occupation are as follows: Miner, MNM (47-5022, 47-5041, 47-5043, 47-5044, 47-5049, 47-5051, 47-5081, 57-5099, 49-9071, 51-9021, 51-9192, 53-7011) and Miner, Coal (47-5022, 47-5041, 47-5043, 47-5044, 47-5049, 47-5081, 47-5099, 49-9071, 51-9021, 53-7000).

4. BENEFITS

4.1. Introduction

The final rule requires a written safety program for surface mobile equipment that includes the actions that operators will take to identify and analyze hazards and reduce the risks related to equipment movement and operation. It must also include actions operators will take to develop and maintain procedures and schedules for routine maintenance and non-routine repairs. Operators are also required to include the actions they will take to identify currently available and newly emerging feasible technologies that can enhance safety and evaluate whether to adopt them. Finally, the rule requires that the program include actions operators will take to train miners and other persons at the mine who are necessary to perform work to identify and address or avoid hazards related to surface mobile equipment.

Once the written safety program is developed and implemented, a responsible person is required to evaluate and update it for the mine at least annually, as well as when mining conditions or practices change in ways that may adversely affect the health and safety of miners or other persons, when accidents or injuries occur, or when surface mobile equipment changes or modifications are made. The final rule also requires operators to solicit input from miners and their representatives as they develop and update the written safety program.

MSHA anticipates the final rule will improve compliance with existing standards to improve miner safety and health, and reduce injuries, illnesses, and fatalities. MSHA also anticipates that the new technology review requirement will reduce fatalities and injuries. MSHA estimated the benefits of the final rule by estimating the number of fatalities and injuries that will be prevented by the final rule. MSHA performed a sensitivity analysis under different assumptions that would lead to different percentages of fatalities and injuries prevented, and to different levels of benefits.

The safety program creates benefits through several mechanisms. First, operators and independent contractors will establish and maintain a written safety program that includes actions the operator or independent contractor will take to identify risks related to the movement and operation of surface mobile equipment and to eliminate or mitigate those risks. This is expected to reduce injuries, illnesses, and fatalities in mining. Second, MSHA believes the process of developing and maintaining the safety program will lead to a stronger safety culture at the mine, also reducing injuries, illnesses, and fatalities. Third, MSHA believes that the collaborative focus on safety by operators and miners will lead to additional unquantifiable financial benefits, such as reduced insurance premiums and decreased downtime from accidents.

4.2. Historic Background on Fatalities and Injuries Involving Surface Mobile Equipment

To estimate the baseline value of surface mobile equipment fatalities and injuries, MSHA compiled information on all reported fatalities and injuries in surface MNM and coal mining activities—at surface mines and in surface work areas of underground mines—over the 10-year

period from 2011 through 2020 (the most recent 10-year period for which complete data were available). MSHA reviewed and analyzed this information.

The data collected and analyzed for the 2011-2020 period involved a more thorough process than the prior data collection (for the years 2003-2018) that had been done for the Preliminary Regulatory Impact Analysis (PRIA). MSHA developed the 2011 to 2020 data by examining all the sources of information from these fatalities, with more detail and with the benefit of additional expertise in safety precautions from MSHA safety inspectors. MSHA examined the detailed fatal accident investigation reports during these years to determine the extent to which each fatality could be attributed to factors associated with surface mobile equipment, and MSHA considered which factors that could possibly be corrected from a safety program. MSHA's more current analysis extended to a detailed review of the specific citations listed in association with these accidents, which would then play an important role in MSHA's estimation of how many fatalities might be reduced from the safety program. Along the same lines, with regard to the overlapping years between the two analyses (2011-2018) MSHA's most recent data for these overlapping years were different from the data used in the previous study because of the additional level of detail in the recent analysis. Thus, the older data prior to 2011, which had been collected for the earlier PRIA, was also not used because it was not comparable, and it was not as current and thus not as reflective of existing mining practices with surface mobile equipment. MSHA therefore based the analysis for the FRIA on the most current 2011-2020 data.

MSHA identified and further analyzed the fatalities and injuries associated with surface mobile equipment. MSHA determined which fatalities were associated with surface mobile equipment by reviewing the fatal accident investigation reports and determining which indicated that surface mobile equipment was involved. Of the 326 total fatalities occurring at MNM and coal mines between 2011-2020, 113 involved surface mobile equipment.^{12, 13} Similarly for the 10-year injury data, MSHA identified all injuries and accidents reported as occurring on the surface mines or surface areas of underground mines that involved surface mobile equipment. From this dataset, MSHA observed a total of 13,753 injuries related to surface mobile equipment and 454,076 lost working days related to those injuries over the 2011-2020 period.

¹² MSHA classifies accidents based on the Agency's "Accident Investigation Procedures Handbook," which is available on MSHA's website at <https://arlweb.msha.gov/readroom/handbook/handbook.htm>. Most accidents involving surface mobile equipment fall under the accident classifications of "powered haulage" accidents and "machinery" accidents, which are defined in the handbook.

¹³ In the period 2011-2020, fatalities involving surface mobile equipment occurred with the following 35 types of equipment: bulldozer, cargo truck, crane, dragline, dump truck with trailer, electric shovel, excavator, flatbed truck, forklift, front end loader, fuel service truck, fuel truck, fuel/lube service truck, grader, haul truck, highwall mining machine, personnel lift (manbasket), pickup truck, railcar, rigging truck, rock truck, self-propelled saw, service truck, tracked drill, ATV (all-terrain vehicle), auger, boat, bulk tanker truck, tractor-trailer, trolley hoist, truck with hydroseeder, truck-mounted drill, water truck, wheeled drill, and wrecker truck.

Table 4-1: Historic Fatalities and Non-Fatal Injuries, 2011-2020 10-Year Totals

	Fatalities	Non-Fatal Injuries	Workdays Lost
Related to Surface Mobile Equipment	113	13,753	454,076
Other	213	67,357	247,603
Total	326	81,110	701,679

Note: Totals may not equal the sum of the components due to rounding.

From this injury data, MSHA examined the data on the incidence of permanent disabilities related to surface mobile equipment. The term “permanent disability” has a broad definition, covering injuries that vary greatly in severity. Given this huge variance, and given that little data is available on these disabilities, MSHA did not monetize the costs associated with permanent disabilities. In addition, accidents or improper procedures with surface mobile equipment can sometimes result in illnesses, as opposed to injuries. Such illness could occur, for example, if miners are exposed to hazardous fumes while operating a vehicle, or if the accident causes a miner to fall into a toxic area, or if the miner sustains injuries that may later become confounded with an illness such as arthritis. However, MSHA was not able to acquire data on such illness that result from accidents or improper procedures with surface mobile equipment. Because MSHA encountered a similar challenge regarding the medical costs of injuries and illnesses, the Agency did not monetize them either.

By excluding the monetized values of prevented permanent disabilities and medical costs, this analysis underestimates the monetized benefits of the final rule. The estimated benefits from reduced fatalities alone far exceed the estimated costs to operators of complying with the final rule. MSHA determined that for this benefit-cost analysis, qualitative recognition of these additional benefits of reduced medical costs, permanent disabilities, and administrative costs incurred by employers would be sufficient.

After compiling these estimates of fatalities and workdays lost due to surface mobile equipment injuries, MSHA examined changes in those totals over the 2011-2020 timespan to determine if there are any clear and discernable trends of these incidences improving or worsening. MSHA was unable to observe a clear trend.

4.3. Forecasting Fatalities and Injuries Involving Surface Mobile Equipment

Since MSHA did not see a clear trend in fatality and injury rates related to surface mobile equipment from 2011 to 2020, the agency forecast future fatalities and injuries using the same incidence rates observed over that 10-year period.¹⁴ Based on the historical analysis described in

¹⁴ In 2011 to 2020 the number of surface mobile equipment fatalities per year, respectively were 7, 9, 11, 18, 12, 8, 12, 12, 12, and 12. That is, the last four years had seen precisely 12 surface mobile equipment fatalities each, and there were 12 surface mobile equipment fatalities per year for 5 of the last six years. The first couple years saw smaller numbers (7 and 9), while the third year had 11 surface mobile equipment fatalities, and the fourth year saw a spike to 18 surface mobile equipment fatalities. MSHA therefore concluded, from these 10 data points, that there is no clear trend in surface mobile equipment fatalities over this 10-year period.

the previous section, MSHA calculated the following incidence rates: 4.24 surface mobile equipment fatalities and 17,056 workdays lost due to surface mobile equipment injuries per 100,000 miners working full time (with “full time” assumed to equal 2,000 hours a year).

To project the overall number of fatalities and injuries related to surface mobile equipment over the next 10 years, MSHA applied these rates to the total of 253,401 miners working in the mining industry as a whole.¹⁵ MSHA estimates that there would be a total of about 10.8 fatalities related to surface mobile equipment and 43,221 lost workdays each year over the next 10 years. These forecasts assumed constant levels of employment in MNM and coal mining activities over the 10-year implementation period. To derive the total number of miner working hours used as the baseline, MSHA calculated the annual of total hours worked by all miners (including contract miners) over the 2015-2019 period, because this more recent period may be more indicative of future employment levels. Although not employed by operators, contract miners perform a variety of work duties at mines, and in multiple fatalities and injuries from the surface mobile equipment datasets, the victims were identified as contract miners. For this reason, contract miners were included as part of the affected population in this analysis.

To estimate which of these fatalities could be prevented by this final rule, MSHA reviewed the published fatal accident investigative reports of the 113 fatalities involving surface mobile equipment (see Appendix Table B-1 for more information). During the investigation of each fatality, the circumstances surrounding and contributing to the fatality had been identified and described. In this review, MSHA found that 63 of the 113 fatalities (55.75 percent) had identified deficiencies in training, hazard identification, or maintenance, or any combination of these three factors, that had contributed to the fatality. MSHA judged that these deficiencies related to training, hazard identification, or maintenance are those that would be most directly affected by the safety rule requirement.¹⁶

To estimate reductions in injuries, MSHA made the simplifying assumption, for the purpose of estimating benefits, that the proportion of non-fatal surface mobile equipment injuries that were related to deficiencies in training, hazard identification, or maintenance is the same proportion as for surface mobile equipment fatalities: 55.75 percent. The Agency made this assumption because, while MSHA did have some data on non-fatal injuries sustained during the

¹⁵ MSHA’s estimate of 253,401 miners is based on the average number of miners per year during the five years prior to the COVID pandemic (2015-2019).

¹⁶ Deficiencies in training, hazard identification, or maintenance had not been previously examined in the PRIA. Rather, in the PRIA MSHA relied on basic assumptions on the percentage of surface mobile equipment-related, prevented fatalities and injuries that would result from the safety program rule, with that expected scenario in the PRIA assuming reductions of 80 percent each. MSHA based these assumptions in the PRIA on the idea that the safety program would promote a stronger safety culture, and thereby influence miners’ behavior in a way that would reduce the likelihood of surface mobile equipment accidents. In this FRIA, MSHA based its estimates on the same principle, but MSHA now used additional, detailed data about the circumstances surrounding accidents that resulted in fatalities to learn more about what particular factors might better explain how miners’ behaviors associated with safety measures could be influenced by the safety program. MSHA’s reliance on this evidence-based analysis of the factors that influence safety improves the reliability of the benefits estimates, relative to the benefits estimates in the PRIA that were based on assumed percent reductions, and it is in response to comments suggesting that a more detailed consideration of safety factors would improve the analysis.

use of surface mobile equipment, these data included much less detail than the fatality, making it impossible to estimate injuries caused by deficiencies in training, hazard identification, or maintenance. Because the monetized cost of fatalities (discussed in the next section) represented approximately 92 percent of the total monetized cost of fatalities and injuries, the estimated benefits of the proposed rule are not very sensitive to this assumption.

While the safety programs under the final rule should substantially reduce fatalities and injuries related to deficiencies in training, hazard identification, or maintenance, MSHA considered it unrealistic to assume that all such surface mobile equipment fatalities and injuries related to deficiencies in training, hazard identification, or maintenance would be eliminated. Furthermore, MSHA concluded that any attempt to estimate precisely the reduction in these fatalities and injuries would be unreliable, due to uncertainties about the future and about human behavior.

As an alternative to estimating a precise percentage reduction in fatalities and injuries, MSHA performed a sensitivity analysis that included three scenarios. Each scenario assumed a different reduction in surface mobile equipment fatalities and injuries related to deficiencies in training, hazard identification, or maintenance: 25 percent in the lowest-benefit scenario, 50 percent in the low-benefit scenario, and 75 percent in the expected scenario.¹⁷

Tables 4-2 through 4-4 display the projections of fatalities, injuries and lost workdays prevented from non-fatal injuries, under these three different scenarios. They show the reduction in the first year as being less than the reduction in each of the nine subsequent years of the ten-year period. The reason for this difference in the first year is that operators will not be required to have a safety program fully in effect until 6 months after the final is promulgated. MSHA assumed that, throughout the first year after promulgation, the safety program will have only been in effect for half of a year, and its expected benefits could then be estimated as being half of a full year's benefits.

¹⁷ In each case, the expected reduction is applied to the 55.75 percent of surface mobile equipment-related fatalities and injuries that stem from deficiencies in training, hazard identification, or maintenance.

**Table 4-2: Projected Fatalities in the Absence of
and With the Final Rule**

Implementation Year	In the Absence of Final Rule	With Final Rule		
	Projected Surface Mobile Equipment Fatalities due to Deficiencies in Training, Hazard Identification, or Maintenance	Fatalities Prevented - Projections		
	Baseline	Program Effectiveness at 75% (Expected Scenario)	Program Effectiveness at 50%	Program Effectiveness at 25%
Year 1*	6.00	2.2	1.5	0.7
Year 2	6.00	4.5	3.0	1.5
Year 3	6.00	4.5	3.0	1.5
Year 4	6.00	4.5	3.0	1.5
Year 5	6.00	4.5	3.0	1.5
Year 6	6.00	4.5	3.0	1.5
Year 7	6.00	4.5	3.0	1.5
Year 8	6.00	4.5	3.0	1.5
Year 9	6.00	4.5	3.0	1.5
Year 10	6.00	4.5	3.0	1.5
10-Year Total	60.0	42.7	28.5	14.2

Note: Totals may not equal the sum of the components due to rounding.

* Due to delayed compliance in the first year of implementation, MSHA estimates that there will be fewer fatalities prevented in the first year than in each subsequent year. Specifically, under the expected scenario MSHA estimates that 2.2 lives will be saved, which is half as many as would be saved in any subsequent year, because of the 6-month (half-year) delay in the compliance date after implementation.

Table 4-3: Projected Injuries in the Absence of and With the Final Rule

Implementation Year	In the Absence of Final Rule	With Final Rule		
	Projected Surface Mobile Equipment Injuries due to Deficiencies in Training, Hazard Identification, or Maintenance	Injuries Prevented - Projections		
	Baseline	Program Effectiveness at 75% (Expected Scenario)	Program Effectiveness at 50%	Program Effectiveness at 25%
Year 1 *	730	273.7	182.5	91.2
Year 2	730	547.4	364.9	182.5
Year 3	730	547.4	364.9	182.5
Year 4	730	547.4	364.9	182.5
Year 5	730	547.4	364.9	182.5
Year 6	730	547.4	364.9	182.5
Year 7	730	547.4	364.9	182.5
Year 8	730	547.4	364.9	182.5
Year 9	730	547.4	364.9	182.5
Year 10	730	547.4	364.9	182.5
10-Year Total	7,298	5,200	3,467	1,733

Notes: Totals may not equal the sum of the components due to rounding.

* Due to delayed compliance in the first year of implementation, MSHA assumes that there will be fewer injuries prevented in the first year than in each subsequent year.

**Table 4-4: Projected Workdays Lost in the Absence
of and With the Final Rule**

Implementation Year	In the Absence of Final Rule	With Final Rule		
	Projected Surface Mobile Equipment Lost Workdays due to Deficiencies in Training, Hazard Identification, or Maintenance	Workdays Lost Prevented - Projections		
	Baseline	Program Effectiveness at 75% (Expected Scenario)	Program Effectiveness at 50%	Program Effectiveness at 25%
Year 1 *	24,095.4	9,035.8	6,023.9	3,011.9
Year 2	24,095.4	18,071.6	12,047.7	6,023.9
Year 3	24,095.4	18,071.6	12,047.7	6,023.9
Year 4	24,095.4	18,071.6	12,047.7	6,023.9
Year 5	24,095.4	18,071.6	12,047.7	6,023.9
Year 6	24,095.4	18,071.6	12,047.7	6,023.9
Year 7	24,095.4	18,071.6	12,047.7	6,023.9
Year 8	24,095.4	18,071.6	12,047.7	6,023.9
Year 9	24,095.4	18,071.6	12,047.7	6,023.9
Year 10	24,095.4	18,071.6	12,047.7	6,023.9
10-Year Total	240,954.5	171,680.1	114,453.4	57,226.7

Note: Totals may not equal the sum of the components due to rounding.

* Due to delayed compliance in the first year of implementation, MSHA estimates that there will be half as many workdays lost prevented in the first year than in each subsequent year.

4.4. Monetization of Estimated Benefits

In monetizing the costs of surface mobile equipment fatalities, MSHA gave equal weight to each fatality in any given year based on the Value of a Statistical Life (VSL). Following recent Department of Labor policy, MSHA assumed the same Value of a Statistical Life (VSL) that is currently adopted by the Department of Transportation and the Department of Homeland Security.¹⁸ Consistent with the methodology used by other agencies, the VSL was assumed to grow at the same proportional rate as the real, per-capita Gross Domestic Product (GDP) of the

¹⁸ Department of Transportation, "Departmental Guidance on Valuation of a Statistical Life in Economic Analysis," Effective Date: March 4, 2022. <https://www.transportation.gov/office-policy/transportation-policy/revised-departmental-guidance-on-valuation-of-a-statistical-life-in-economic-analysis>.

United States.¹⁹ MSHA applied a growth rate of real per-capita GDP of 1.75 percent, based on the trend observed over the 50-year period from 1971 to 2021.²⁰

To monetize the benefit of reductions in surface mobile equipment injuries resulting from deficiencies in training, hazard identification, or maintenance, MSHA first calculated the total cost of lost workdays by multiplying the workdays lost due to such injuries by labor wage rates.²¹ MSHA assumed a constant hourly wage rate of \$37.80 in 2021 dollars per mine employee for the 10-year implementation period.²² MSHA observed that the estimated cost of injuries per year was approximately 10 percent of the cost of fatalities per year. This figure underestimates the true costs of injuries, because it does not include the additional loss to those injured from any permanent disabilities suffered as a result of the accident. In addition, the current treatment of injuries does not include the costs of medical expenses or the costs to the firm associated with the injury (such as administrative costs in responding to the injury, associated legal costs, etc.).

Tables 4-5 and 4-6 below display MSHA's monetization of the estimated benefits of the rule. These benefits do not include the reduction in costs associated with reductions in injuries, such as reductions in the costs of permanent disabilities, reductions in medical expenses, and reductions in costs to operators associated with injuries occurring in the mine (such as lost

¹⁹ The economic terminology for this assumption is that the elasticity of the real VSL with respect to real per capital income is 1.

²⁰ The growth rate was derived on the basis of real GDP per capita, in chained 2012 dollars, seasonally adjusted annual rate, from the Federal Reserve Economic Data (FRED), updated January 27, 2022, <https://fred.stlouisfed.org>.

²¹ MSHA interpreted this cost in lost workdays as a cost to society in terms of lost production, under the assumption that the value of labor that is foregone by these injuries is reflected by the daily wage rate times the number of lost workdays. In many cases, employees continue to collect wages while they are on leave due to a workplace injury, and may often receive worker's compensation allowances as well. The cost of lost workdays is thus best interpreted as a societal cost in this analysis, which is not to diminish the hardships that these injuries impose on mine employees, regardless of whether they receive compensation for them. In terms of lost production, or actual costs to the employees themselves when they are not compensated, the cost may be seen as lost value of labor, where labor is valued by the salary of the worker. In this calculation, MSHA did not include an overhead cost with the salary estimate, because, when a worker's labor is lost, the firm benefits from not having to pay for an overhead cost that it would have to pay for otherwise. If the overhead cost were included as part of the cost of lost labor, it would be counterbalanced as a benefit to the employer in terms of cost savings. Furthermore, to any extent that workers may not be compensated for a lost workday, and may thus incur the cost of their lost labor, they are losing their basic salaries, but no one is losing the overhead costs that would have been incurred by the employer if they were working.

²² MSHA kept a constant, real hourly wage rate based on the rate observed in 2021 and on the absence of any clear pattern of changes in real wages over a long period of time. The rate of \$37.80 was estimated as a weighted average of the rate for coal miners (\$42.45 per hour) and MNM mines (\$36.48) based on the observed proportions of these workers in 2021. These hourly rates were derived from the OEWS May 2021 survey. NAICS 212100 was used for Coal Mining wages, while 212200 and 212300 were combined for Metal and Non-Metal Mining wages. MSHA multiplied the mean wage rate by a benefit factor of 1.488 to obtain the fully loaded wage. The wage, with fringe benefits included, were interpreted as the cost to the workers for having lost workdays (or to any other entities that might compensate them for that loss in income). However, the employer does not incur overhead costs from the absence of workers, so MSHA did not include overhead costs in this wage-cost estimation. The occupation codes used for each occupation are as follows: Miner, MNM (47-5022, 47-5041, 47-5043, 47-5044, 47-5049, 47-5051, 47-5081, 57-5099, 49-9071, 51-9021, 51-9192, 53-7011) and Miner, Coal (47-5022, 47-5041, 47-5043, 47-5044, 47-5049, 47-5081, 47-5099, 49-9071, 51-9021, 53-7000).

productivity and damaged equipment). The magnitudes of these benefits, under the alternative scenarios, are discussed in the context of net benefits in the next section.

Table 4-5: Yearly Monetized Benefits as a Result of the Rule (Millions of 2021 Dollars)

Implementation Year	Monetized Benefits					
	From Fatalities Prevented ¹	From Days Lost Prevented ²	From Fatalities Prevented ¹	From Days Lost Prevented ²	From Fatalities Prevented ¹	From Days Lost Prevented ²
	Expected Scenario (Program Effectiveness 75%)		Low Benefits Scenario (Program Effectiveness 50%)		Lowest Benefits Scenario (Program Effectiveness 25%)	
Year 1*	\$27.47	\$2.73	\$18.31	\$1.82	\$9.16	\$0.91
Year 2	\$55.90	\$5.46	\$37.27	\$3.64	\$18.63	\$1.82
Year 3	\$56.88	\$5.46	\$37.92	\$3.64	\$18.96	\$1.82
Year 4	\$57.88	\$5.46	\$38.58	\$3.64	\$19.29	\$1.82
Year 5	\$58.89	\$5.46	\$39.26	\$3.64	\$19.63	\$1.82
Year 6	\$59.92	\$5.46	\$39.95	\$3.64	\$19.97	\$1.82
Year 7	\$60.97	\$5.46	\$40.65	\$3.64	\$20.32	\$1.82
Year 8	\$62.04	\$5.46	\$41.36	\$3.64	\$20.68	\$1.82
Year 9	\$63.12	\$5.46	\$42.08	\$3.64	\$21.04	\$1.82
Year 10	\$64.23	\$5.46	\$42.82	\$3.64	\$21.41	\$1.82

Notes: * Due to delayed compliance in the first year of implementation, MSHA estimates that there will be half as many fatalities prevent and workdays lost prevented in the first year than in each subsequent year.

1. The monetized value of fatalities prevented increases each year due to an estimated annual increase of the real VSL.

2. Days lost refers to workdays lost resulted from surface mobile equipment non-fatal injuries due to deficiencies in training, hazard identification, or maintenance.

Table 4-6: Monetized Benefits (Millions of 2021 Dollars)

Implementation Year	Expected Scenario			Low Net-Benefit Scenario			Lowest Net-Benefit Scenario		
	Discounted at			Discounted at			Discounted at		
	0%	3%	7%	0%	3%	7%	0%	3%	7%
10-Year Total¹	\$619.2	\$522.5	\$423.9	\$412.8	\$348.3	\$282.6	\$206.4	\$174.2	\$141.3
Annualized	\$61.9	\$61.3	\$60.4	\$41.3	\$40.8	\$40.2	\$20.6	\$20.4	\$20.1

Note: Totals may not equal the sum of the components due to rounding.

1. MSHA assumed that a full-year worth costs would be incurred, while projecting a half of the full-year monetized benefits in the first year, due to the timing of implementation (6-month delayed compliance).

5. NET BENEFITS

This chapter presents a summary of MSHA’s estimates of the net benefits of the final rule. Under the Mine Act, MSHA is not required to use the estimated net benefits as the basis for its regulatory decisions. However, it is providing the analysis in accordance with E.O.12866, as supplemented by E.O. 14094, and E.O. 13563, which direct agencies to assess all costs and benefits of available regulatory alternatives and, if regulation is necessary, to select regulatory approaches that maximize net benefits (including potential economic, environmental, public health and safety effects, distributive impacts, and equity).

5.1. Final Net Benefits

Table 5-1 summarizes the results of the sensitivity analysis in terms of the monetized net benefits. As discussed above, these benefits do not include the additional benefits associated with reductions in permanent disabilities, reduced health-care costs from reduced injuries and illnesses, and reduced administrative costs to the operators. Three levels of benefits were estimated for each scenario: undiscounted benefits (over the 10-year implementation period), benefits discounted at a 3-percent rate, and benefits discounted at a 7-percent rate. Across these different scenarios and discounting methods, the estimated net benefits of the program range from a minimum of \$46 million in 2021 dollars (from the lowest scenario, discounted at 7 percent), to a maximum of \$493 million (from the expected scenario, undiscounted).

Table 5-1: Monetized Net Benefits (Millions of 2021 Dollars)

Implementation Year	Expected Scenario			Low Net-Benefit Scenario			Lowest Net-Benefit Scenario		
	Discounted at			Discounted at			Discounted at		
	0%	3%	7%	0%	3%	7%	0%	3%	7%
10-Year Total¹	\$493	\$411	\$329	\$286	\$237	\$188	\$80	\$63	\$46
Annualized	\$49.3	\$48.2	\$46.8	\$28.6	\$27.8	\$26.7	\$8.0	\$7.4	\$6.6

Note: Totals may not equal the sum of the components due to rounding.

¹MSHA assumed that a full-year worth costs would be incurred, while projecting a half of the full-year monetized benefits in the first year, due to the timing of implementation (6-month delayed compliance).

Conceptually, MSHA believes that the net-benefits of the rule are understandable, because the costs of the safety program are modest relative to the much-higher value of the estimated reduction in fatalities.

5.2. Break-Even Analysis

OMB Circular A-4 permits use of a break-even or threshold analysis when there are non-quantified benefits or issues of uncertainty related to the cost and benefit estimates. As discussed above, MSHA’s estimates of the benefits of the rule are based on the projected reduction in the number of fatalities and injuries. The break-even point is when net benefits (monetized benefits minus costs) equal zero.

More precisely, the break-even point calculated by MSHA for this rule is the answer to the following question: By how much would the safety program need to reduce surface mobile equipment fatalities and injuries in order for the benefits of the program to be equal to its costs? MSHA estimated the undiscounted costs of the program, over 10 years, to be \$126 million (2021 dollars), and the total undiscounted monetized valuation of the projected baseline fatalities and lost workdays over the same period to be \$1,553 million (2021 dollars). The break-even point would thus be the value of X such that $126 = 1,553 \times X$. The break-even point, therefore, was found to be 8.1 percent. Note that this 8.1 percent figure is an overestimate of the break-even point, because as noted above, the monetized benefits exclude the benefits of reductions in permanent disabilities, medical costs, and reductions in costs incurred by operators when injuries, illnesses, and fatalities occur.

In other words, the benefits of the program are estimated to outweigh the costs even if the program leads to only an 8.1 percent reduction in fatalities and injuries associated with surface mobile equipment. MSHA estimated that the rule would most likely lead to a reduction in surface mobile equipment fatalities and injuries that is much larger than 8.1 percent, as previously discussed in the section of the sensitivity analysis that MSHA performed.

6. REGULATORY FLEXIBILITY ANALYSIS

6.1. Introduction

MSHA has reviewed the final rule to assess and take appropriate account of its potential impact on small businesses, small governmental jurisdictions, and small organizations. Pursuant to the Regulatory Flexibility Act (RFA) of 1980, as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA), MSHA analyzed the impact of the final rule on small entities. Based on that analysis, MSHA certifies that this final rule does not have a significant economic impact on a substantial number of small entities. The factual basis for this certification is presented in this section..

6.2. Definition of Small

Under the RFA, when analyzing the impact of a rule on small entities, MSHA must use the Small Business Administration's (SBA's) definition for a small entity or after consultation with the SBA Office of Advocacy, establish an alternative definition for the mining industry by publishing that definition in the Federal Register for notice and comment. The SBA uses North American Industry Classification System (NAICS) codes, generally at the 6-digit NAICS level, to set thresholds for small business sizes for each industry.²³

6.3. Factual Basis for Certification

Following SBA guidance on carrying out a threshold analysis. MSHA evaluates the impacts on small entities by comparing the estimated compliance costs of a rule for small entities in the sector affected by the rule to the estimated revenues for the affected sector. In developing its threshold analysis MSHA considers data availability as well as the degree of representativeness of any disaggregated data. When estimated compliance costs are less than 1 percent of the estimated industry revenues, it is generally appropriate to conclude that there is no significant economic impact on a substantial number of small entities. In addition to assessing the overall impact on small entities, MSHA examines data for the NAICS codes that have much higher impact ratios (cost/revenue) than others to ensure that the first level screening is representative.

As the first step, MSHA identified all small-entity controllers in the mining industry on the basis of the small entity thresholds.

²³ Small Business Administration, *Table of Size Standards: Effective July 14, 2022*.
<https://www.sba.gov/document/support-table-size-standards>.

Description and estimate of the number of small entities to which the proposed rule would apply

The MNM and coal mining operations affected by the rule fall into two general categories: (1) controllers (parent companies) that own or operate mines, which is the appropriate unit for this RFA analysis (based on SBA guidance),²⁴ and (2) mining contractors (independent contractors designated under part 45 of 30 CFR), hired by operators to work at mines, that operate their own surface mobile equipment. MSHA identified and analyzed the effect of the rule on small entity controllers of mines (or “small-entity controllers” for short), and on small entity mining contractors (or “small-entity contractors” for short).

To determine the number of small entities subject to the final rule, MSHA reviewed the NAICS, the standard used by federal statistical agencies in classifying business establishments, as well as information from the Office of Advocacy of the SBA. MSHA used MSIS Data to identify the responsible party for each mine, as well as the contractors hired to do work on mines. MSHA then combined that information with the size classification information. The two sections in the following describe MSHA’s analysis of controllers and mining contractors, respectively.

6.4. Analysis of the Impact on Mining Controllers

In analyzing controllers of mines, MSHA determined that mining operations that fall into 19 NAICS-based industry classifications may be subject to the final rule. These industry categories and their accompanying six-digit NAICS codes are shown in Table 6-1.²⁵ MSHA then matched the NAICS classifications with SBA small-entity size standards (based on number of employees) to determine the number of small-entity controllers within each of the respective NAICS codes. See Table 6-1.

²⁴ A controller is a parent company owning or controlling one or more mines, whereas a mine is an establishment of that parent company. Small entities, subject to requirements of the Regulatory Flexibility Act, are entities that are parent companies only and not establishments. See Small Business Administration, Office of Advocacy, How to Comply with the Regulatory Flexibility Act, August 2017. Sec. 3(d) of the Mine Act defines “operator” as “any owner, lessee, or other person who operates, controls, or supervises a coal or other mine.” 30 U.S.C. 802(d). Under 30 CFR part 41, an operator must file a legal identity report with MSHA and with this report, MSHA identifies a controller for each mine. 30 U.S.C. 819(d) (each operator shall file the name and address of the “person who controls or operates the mine.”). In the IRFA, MSHA considered the controller of a mine and then determined whether the mine, not the controller, was a small entity. In the FRFA, consistent with the SBA guidance and the Mine Act, MSHA determines whether a controller is a small entity.

²⁵ The NAICS classifications used in this analysis are drawn from the latest version of the NAICS which was effective in July 2022. MSHA also used, in the analysis, an earlier the version of NAICS categories that were effective in August 2019. When developing the analysis, MSHA had begun the work prior to the most current NAICS being effective. The older NAICS categories were still used in the part of the current analysis that estimated revenues. This is because the older categories were still needed in order for MSHA to cross-tabulate (or crosswalk) its data on mines and controllers with Bureau of Census data on revenues by NAICS codes, where these Census data were organized by the same NAICS codes that were in the earlier version. No comparable revenue data, at this writing, had yet been revised to the most recent NAICS categories..

MSHA counted the number of small entity controllers in each NAICS code, after determining that a controller owns or controls a mine. Table 6-1 shows the count of all controllers and a count of small-entity controllers in each NAICS code.²⁶

Based on this methodology, MSHA estimated that in 2021, there were a total of 5,879 controllers, 5,462 of them were small-entity controllers. Many controllers owned one or two mines, while some controllers owned hundreds of mines nationwide (or worldwide).²⁷

²⁶ Some controllers” own mines with more than one NAICS code if those mines produce different commodities. For this analysis, however, MSHA counted each “unique” controller only once. In other words, there is no double-counting of the same controller if a controller produces in more than one NAICS code. It is not uncommon for firms to produce different products falling under more than one six-digit NAICS codes, especially if the firm is large. In any case, no single NAICS code is attributed to any controller that has more than one NAICS code. Rather, the analysis takes all of any one controller’s multiple NAICS codes into account without losing any of the information about the NAICS codes. Specifically, that one controller’s revenues and employees are partitioned among each of that one controller’s production by NAICS code, and then aggregated for that one controller.

²⁷ The number of controllers and mines examined in this regulatory flexibility analysis are those specifically known to operate in 2021. The year 2021 is the most current year for which complete information was available. Such information about controllers as parent companies might include, for example, knowledge of whether the parent company is a large, multinational corporation, which has bearing on this regulatory flexibility analysis. The key factor for this regulatory flexibility analysis is the estimated ratio of the regulatory cost per revenue for controllers, as reflected by the most current data. The estimation of this ratio is robustly addressed in MSHA’s analysis of the 5,879 controllers in 2021 (which is not impacted by the exclusion of other years in this analysis).

Table 6-1: Small Entities Affected by the Final Rule: Number of Controllers and Small-Entity Controllers by NAICS Code*

NAICS Code	Industry Description	SBA Size Standards in Maximum Number of Employees*	Number of All Controllers	Number of Small-Entity Controllers
211120	Crude Petroleum Extraction***	1,250	4	3
211130	Natural Gas Extraction***	1,250	1	0
212114	Surface Coal Mining	1,250	282	237
212115	Underground Coal Mining	1,500	122	99
212210	Iron Ore Mining	750	31	26
212220	Gold Ore and Silver Ore Mining	1,500	142	108
212230	Copper, Nickel, Lead, and Zinc Mining	750	45	33
212290	Other Metal Ore Mining	750	29	22
212311	Dimension Stone Mining and Quarrying	500	491	432
212312	Crushed and Broken Limestone Mining and Quarrying	750	820	738
212313	Crushed and Broken Granite Mining and Quarrying	750	182	165
212319	Other Crushed and Broken Stone Mining and Quarrying	500	760	704
212321	Construction Sand and Gravel Mining	500	3,221	2,984
212322	Industrial Sand Mining	500	172	155
212323	Kaolin, Clay, and Ceramic and Refractory Minerals Mining	500	161	143
212390	Other Nonmetallic Mineral Mining and Quarrying	500	151	123
327310	Cement Manufacturing	1,000	74	53
327410	Lime Manufacturing	750	58	49
331313	Primary production of alumina and aluminum	1,300	3	3

* Each mine is assigned only one NAICS (as its major product) but some controllers that own more than one mine own mines that are in different NAICS. Consequently, some controllers have more than one NAICS (when they own mines with different NAICS) and they are therefore counted more than once in this table. See Table 6-2 for the distribution of controllers by the NAICS code for which they have the most employees, which will then show only one NAICS code for each controller.

**SBA, effective *July 14, 2022*.

*** These categories are commonly associated with mines with activities involving crude petroleum or natural gas extraction, but the mines in these categories that are counted here, and included in this analysis, also involve

mining operations that would fall under MSHA's jurisdiction. This analysis does not include crude petroleum or natural gas extraction (and the mines that perform them exclusively) since MSHA does not regulate these activities.

Each mine is assigned only one NAICS code, with that code reflecting what that mine produces the most. There are several cases in which more than one mine, owned by the same controller, have different NAICS codes, and as a result that one controller has multiple NAICS codes. For this reason, some controllers are counted more than once in this Table 6-1 (as also explained in a footnote in the table). In particular, of the 5,879 unique controllers identified in 2021, 608 of them each owned multiple mines with different NAICS codes. In theory, this could present an ambiguity as to whether a controller, with more than one NAICS code, should be considered a small entity or not. Since NAICS codes vary by their small-entity thresholds, it is theoretically possible for a controller with more than one NAICS code to be a small entity according to the threshold for one of its NAICS codes, while not being a small entity under the lower threshold that applies to another of its NAICS codes. However, this situation was not found to occur for any of the controllers; all controllers that were determined to be small entities met the conditions for a small entity for each of their NAICS codes.

While some controllers are in more than one mining NAICS code, the distribution of controllers by their most significant NAICS code may also provide useful information about the general structure of the industry. Therefore, MSHA also prepared Table 6-2 to present the distribution of controllers by the one NAICS code under which the largest number of employees are reported. This table then assigns only one NAICS code for each controller, allowing for a count of controllers by their (mutually exclusive) most significant NAICS code in mining.²⁸

²⁸ Note that many of the controllers also own operations in other, non-mining industries, and in other mining operations in other nations.

Table 6-2: Small Entities Affected by the Final Rule: Distribution of Controllers by NAICS Category, with One NAICS Code Per Controller*

NAICS Code	Industry Description	SBA Size Standards in Maximum Number of Employees**	Number of All Controllers	Number of Small-Entity Controllers
211120	Crude Petroleum Extraction***	1,250	3	3
211130	Natural Gas Extraction***	1,250	1	0
212114	Surface Coal Mining	1,250	246	218
212115	Underground Coal Mining	1,500	93	75
212210	Iron Ore Mining	750	19	18
212220	Gold Ore and Silver Ore Mining	1,500	98	82
212230	Copper, Nickel, Lead, and Zinc Mining	750	31	25
212290	Other Metal Ore Mining	750	14	12
212311	Dimension Stone Mining and Quarrying	500	415	382
212312	Crushed and Broken Limestone Mining and Quarrying	750	716	675
212313	Crushed and Broken Granite Mining and Quarrying	750	133	130
212319	Other Crushed and Broken Stone Mining and Quarrying	500	617	596
212321	Construction Sand and Gravel Mining	500	3,046	2,839
212322	Industrial Sand Mining	500	120	113
212323	Kaolin, Clay, and Ceramic and Refractory Minerals Mining	500	108	101
212390	Other Nonmetallic Mineral Mining and Quarrying	500	108	95
327310	Cement Manufacturing	1,000	61	49
327410	Lime Manufacturing	750	48	47
331313	Primary production of alumina and aluminum	1,300	2	2
Total			5,879	5,462

** Each controller is assigned the one NAICS code for which it devotes the most employees, based on the employees at its mines and each of its mines being associated with only one NAICS code.

**SBA, effective *July 14, 2022*.

*** These categories are commonly associated with mines with activities involving crude petroleum or natural gas extraction, but the mines in these categories that are counted here, and included in this analysis, also involve mining operations that would fall under MSHA's jurisdiction. This analysis does not include crude petroleum or natural gas extraction (and the mines that perform them exclusively) since MSHA does not regulate these activities.

MSHA estimated the costs of the rule for small-entity controllers by summing the costs for each of these controller's mines. The estimated cost for each mine was based on the number of miners at that mine, and the mine's industry category. Thus, if two mines, belonging to the same controller, had different NAICS codes, both of those NAICS codes would be accounted for, and the total cost to the controller would be calculated as the total cost for all of that controller's mines. Similarly, the estimated revenues of controllers were derived as the sum of the revenues of each of their mines, which was, in turn, dependent on the NAICS codes associated with those mines. Thus, all of NAICS codes for all of the mines, and all of the mines under all of the NAICS codes, were accounted for in the estimates of the costs and revenues of controllers.

As shown in Table 6-2, MSHA determined that, in 2021, there were a total of 5,879 controllers, 5,462 of which were small-entity controllers. These small-entity controllers owned a total of 9,395 mines out of a total of 12,529 mines owned by all controllers in 2021.

6.5. Estimation of the Burden on Small-Entity Controllers

Table 6-3 presents a summary of the main findings regarding small-entity controllers. As shown, MSHA estimated the total cost of the rule to all 5,462 small-entity controllers to be \$26.69 million in the first year, and \$8.170 million in each subsequent year in 2021 dollars.

²⁹Per small-entity controller, this amounted to an average compliance cost of \$4,886 in the first year and \$1,496 in each year thereafter. MSHA estimated the total revenues of the 5,462 small-entity controllers to be \$33,720 million (in 2021 dollars). As a result of these estimates, MSHA found the compliance cost of the final rule to small entities, as a percent of revenues, on average, to be 0.165 percent in the first year, and 0.069 percent of revenue in each subsequent year. Among the small-entity controllers examined, the compliance cost as a percent of controllers' revenues ranged from near zero to a maximum of 0.341 percent in the first year, and 0.175 percent in each year thereafter. On the basis of these findings, MSHA determined that the final rule does not have a significant impact on small-entity controllers in the mining industry.

²⁹ To estimate the costs for the small-entity controllers, MSHA first estimated the costs for the mines that were owned by small-entity controllers, and then the cost for each small-entity controller was estimated as the sum of the estimated costs for each of the mines that the small-entity controller owned.

Table 6-3: Main Findings for 5,462 Small-Entity Controllers

Economic Measure	First Year	Each Subsequent Year
Total Compliance Costs (in Millions of 2021 Dollars)	\$26.69	\$8.17
Total Revenue (in Millions of 2021 Dollars)	\$33,720	\$33,720
Average Compliance Cost per Small-Entity Controller (in 2021 Dollars)	\$4,886	\$1,496
Ratio of Total Compliance Cost / Total Revenue (in Percent)	0.079	0.024
Average of the Ratios of Compliance Cost/Revenue (in Percent)	0.165	0.069

6.6. Analysis of the Impact on Small-Entity Contractors

For its analysis of independent contractors designated under part 45 of 30 CFR, MSHA used its MSIS Data to first derive a list of all mining contractors in the year 2021. The list contained a total of 6,318 contractors. While these contractors varied greatly in terms of their corresponding NAICS codes, MSHA determined that the most relevant NAICS codes for characterizing the mining contractors, were the NAICS Codes for (1) “Support Activities for Coal Mining” (213113), (2) “Support Activities for Metal Mining” (213114), and (3) “Support Activities for Nonmetallic Minerals” (213115). MSHA did not have data on parent companies of these contractors. However, MSHA analyzed data on enterprises and establishments in these NAICS codes from the Census Bureau, Statistics of U.S. Businesses (SUSB).³⁰ The SUSB data on entities in these three NAICS codes indicated that the vast majority of contractors (which would be listed separately in MSHA’s data) are parent companies. Specifically, based on the SUSB data on parent companies and the enterprises that belong to them, MSHA observed that the number of enterprises, in these three NAICS codes, on average, exceeded the number of parent companies by only about 9 percent. Therefore, the vast majority (over 91 percent) of parent companies that are mining contractors have only one establishment, implying that the vast majority of listed contractors are themselves parent companies, rather than subsidiaries of larger companies. Based on these findings, MSHA assumed in its analysis that the contractors on its list are parent companies.

Based on this assumption that each of the listed mining contractors in 2021 is not a subsidiary of a larger company, MSHA estimated how many of them would be considered small-entity contractors under the RFA. To make this determination, MSHA applied the size thresholds for the three NAICS categories for support activities for mining (213113, 213114, and 213115). Small entities in NAICS 213113 (support activities for coal mining) are those with annual revenues below the threshold of \$27.5 million in 2022 dollars, while those in NAICS 213114 (support activities for metal mining), and NAICS 213115 (support activities for nonmetallic minerals) have annual revenues of less than \$41.0 million, and \$20.5 million, respectively.³¹ In estimating how many contractors are small entities, MSHA conservatively applied the \$20.5 million (in 2022 dollars) threshold, so as not to underestimate the number of small entities.³² Entities in NAICS 213113 and 213114 (support activities for coal mining and nonmetallic mineral mining, respectively) both have the same threshold level of annual revenues less than \$22 million in 2017 dollars. NAICS 213115 (Support Activities for Nonmetallic Minerals) have a lower threshold level of \$8 million in 2017 dollars.³³ MSHA applied the \$22 million threshold to estimate how many contractors are small-entity contractors, so as not to underestimate that number. MSHA’s estimation of the number of small entity

³⁰ Census Bureau, Statistics of U.S. Businesses. <https://www.census.gov/data/tables/2017/econ/susb/2017-susb-annual.html>.

³¹ Small Business Administration, *Table of Size Standards: Effective July 14, 2022*. <https://www.sba.gov/document/support-table-size-standards>.

³² MSHA translated the threshold of \$20.5 million in 2022 dollars to \$17.4 million in 2017 dollars based on the Bureau of Economic Analysis’ GDP Price Index.

³⁴ It is important to note that, although, contractor revenues may be close in magnitude to their costs, those costs often far exceed their labor costs, and therefore their revenue per employee would be expected to far exceed their average salaries. Such additional costs, besides labor costs, include the costs of equipment, fuel, overhead, taxes, etc.

contractors may therefore be an overestimation; however, MSHA still believes it is a close approximation to the number of small-entity contractors that would be determined if more detailed data were available.

From the employment and revenue data in the SUSB tables for the three NAICS Codes for support activities for mines, MSHA estimated that mining contractors have, on average, revenues of approximately \$315,000 (in 2017 dollars) per employee.³⁴

MSHA's data on mining contractors included the number of employees working for each contractor. MSHA was able to estimate the revenue of each contractor by multiplying its number of employees by the average revenue per employee of \$315,000 from the SUSB data. From these estimates of each contractor's revenue, MSHA estimated that approximately 4,469 contractors out of a total of 4,739 contractors affected by the rule (or about 94.3 percent of those contractors) are potentially small entities, under the threshold of \$17.4 million (in 2017 \$) in annual revenue.

Table 6-4 presents a summary of the main findings on mining contractors that would be affected by the rule. As shown, MSHA estimated the total cost to all 4,469 potential, small-entity contractors of the rule to be \$2.69 million in the first year, and \$0.95 million in each subsequent year. Per small-entity contractor, this amounted to an average cost of \$453 in the first year and \$212 in each year thereafter. MSHA estimated the total revenues of the 4,469 potential small-entity contractors to be \$12,783 million (in 2021 dollars). As a result of these estimates, MSHA found the cost of the final rule to small-entity contractors, as a percent of revenue, to be, on average across the contractors, 0.0211 percent of revenue in the first year, and 0.0074 percent of revenue in each subsequent year. On the basis of these findings, MSHA determined that the final rule does not have a significant impact on small-entity contractors in the mining industry.

³⁴ It is important to note that, although, contractor revenues may be close in magnitude to their costs, those costs often far exceed their labor costs, and therefore their revenue per employee would be expected to far exceed their average salaries. Such additional costs, besides labor costs, include the costs of equipment, fuel, overhead, taxes, etc.

Table 6-4: Main Findings for 4,469 Small-Entity Contractors

Economic Measure	First Year	Each Subsequent Year
Total Compliance Costs (in Millions of 2021 Dollars)	\$2.69	\$0.95
Total Revenue (in Millions of 2021 Dollars)	\$12,783	\$12,783
Average Compliance Cost Per Small-Entity Contractor (in 2021 Dollars)	\$453	\$212
Ratio of Total Compliance Cost / Total Revenue (in Percent)	0.0211	0.0074
Average of the Ratios of Compliance Cost/Revenue (in Percent)	0.0460	0.0212

6.7. Conclusion

In conclusion, MSHA determined that this final rule does not have a significant effect on either small-entity controllers or small-entity contractors. MSHA therefore certifies that this rule does not have a significant economic impact on a substantial number of small entities.

7. REGULATORY ALTERNATIVES

MSHA considered two regulatory alternatives to the final rule. One alternative was to require operators to identify specific safety technologies for different types of surface mobile equipment and to require these specific technologies to be in place on surface mobile equipment used in mines. The other alternative was to exclude mines with five or fewer employees from the scope of the final rule. The regulatory alternatives are discussed below.

7.1. Regulatory Alternative 1 – Requirement for Specific Safety Technologies

Under Alternative 1, MSHA considered prescribing specific safety technologies. MSHA explored various approaches to hazards associated with surface mobile equipment. The RFI (83 FR 29716), and stakeholder meetings (83 FR 35157) held throughout the country, yielded a great deal of information about available and emerging technologies, and the pace at which such technological developments have been occurring. In the PRIA, MSHA estimated an average cost of \$500 per unit of equipment for the cost of both new technology purchases and existing technology repairs and modifications in the first year.

During the public comment period, some commenters expressed concern that the requirement is too vague for operators to evaluate currently available and emerging technologies and to determine precisely what technological improvements would be required. Likewise, one commenter expressed the view that technological improvements to equipment, in general, involve costs much greater than \$500 per unit.

Based on public comments and information gained through the stakeholder meetings, MSHA has concluded that requiring specific safety technology would not be feasible or practical, given the pace of the emergence of new safety and other technologies. The rapid development and distribution of such technology made a prescriptive approach less than optimal. If MSHA required specific technologies or specify a one-size-fits-all approach, new developments and unique characteristics and conditions in mines could quickly render such a standard obsolete or inappropriate. This final rule does not require operators to adopt any specific safety technologies. This FRIA includes no estimated costs and benefits that might arise from operators' adoption of new technologies that would be attributable to this rule alone.

7.2. Regulatory Alternative 2 – Exclusion of Mines with Five or Fewer Miners from Complying with the Final Rule

MSHA estimated the benefits of Alternative 2 by estimating the number of fatalities and injuries that will be prevented by the alternative, excluding mines with five or fewer employees. This would occur through similar mechanisms as in the final rule. Operators would be required to establish and maintain a written safety program that includes actions the operator will take to identify risks and eliminate or mitigate those risks related to the movement and operation of surface mobile equipment. This is expected to reduce individual injuries and fatalities.

The differences between the final rule and Alternative 2 relate to which mines are covered by the rule. Under Alternative 2, mines with five or fewer miners are excluded. This

alternative also excludes all independent contractors.³⁵ This alternative is the same as the proposed rule in its coverage of mines and independent contractors.

Table 7-1 displays a summary of the costs of the alternative over the 10-year period. In the alternative rule, costs would be less because no costs would be incurred by mines with five or fewer miners and no costs would be incurred by independent contractors. As shown in Table 7-1, over the 10-year period, undiscounted costs for Alternative 2 would be \$65.9 million (in 2021 dollars).

Table 7-1: Summary of Total Costs of Operators' Actions to Identify, Develop, and Update the Written Safety Program for Surface Mobile Equipment under Regulatory Alternative 2, 10-Year Total (Millions of 2021 Dollars)

Hazard Analysis and Technology Evaluation (Year 1)	Development of Maintenance Schedule (Year 1)	Training for the Safety Program (Year 1)	Annual Recurring Cost of Annual Updates (Years 2-10)	Annual Recurring Cost of Other Updates (Years 2-10)	10-Year Total, Discounted at¹		
					0%	3%	7%
\$13.9	\$10.9	\$0.8	\$18.3	\$22.0	\$66.2	\$58.9	\$51.4

Note: Totals may not equal the sum of the components due to rounding.

1. The 10-year total (undiscounted) includes the cost of making available and copying the written safety program, approximately \$0.3 million.

Table 7-2 below displays MSHA's estimates of the benefits under this alternative. By these estimates, over the first 10 years of the alternative rule's promulgation, approximately 33 fatalities and 131,886 lost workdays would be prevented, yielding a total monetary benefit of approximately \$476 million (undiscounted) over the 10-year period. These estimates are based on the expected scenario, from the final rule, of a 75 percent reduction in fatalities involving deficiencies in training, hazard identification, or maintenance related to surface mobile equipment.

Table 7-2: Monetized Benefits of Regulatory Alternative 2, 10-Year Total (Millions of 2021 Dollars)

Fatalities Prevented over 10 Years	Value of Fatalities Prevented over 10 Years	Lost Workdays Prevented over 10 Years	Value of Lost Workdays Prevented over 10 Years	10-Year Total, Discounted at		
				0%	3%	7%
32.8	\$435.8	131,886	\$39.9	\$475.7	\$401.4	\$325.6

Note: Totals may not equal the sum of the components due to rounding.

³⁵ Contract employees are still covered by Alternative 2.

Table 7-3 shows a comparison of the fatalities prevented, lost workdays, and net benefits of Alternative 2 and of the final rule over the 10-year period. As shown, MSHA found the final rule to be more beneficial by averting about 10 more fatalities, averting about 40,000 more lost workdays, and having a higher monetized benefit of about \$83 million (undiscounted). The entire difference in fatalities and lost workdays prevented is a result of small mines accruing no benefits under Alternative 2.

**Table 7-3: Comparison of Final Rule and Regulatory
Alternative 2 –Fatalities and Lost Workdays Prevented
over the 10-Year Period (Millions of 2021 Dollars)**

	Fatalities Prevented over 10 Years	Lost Workdays Prevented over 10 Years	Monetized Net Benefits Over 10 Years		
			Undiscounted	Discounted 3 Percent	Discounted 7 Percent
Final Rule	42.7	171,680	\$492.8	\$411.5	\$328.8
Reg. Alternative 2	32.8	131,886	\$409.5	\$342.4	\$274.2

Note: Totals may not equal the sum of the components due to rounding.

8. PAPERWORK REDUCTION ACT OF 1995

8.1. Introduction

This section shows the estimated paperwork burden hours and related burden costs for the operators affected by the final rule. The burden hour and cost estimates presented in this chapter use the detailed analysis of all costs over 10 years presented in Chapter 3. This chapter provides only information collection costs for the first 3 years after the rule promulgation, presented as average annual values. The cost items in this chapter are a subset of the total costs in Chapter 3, and only relate to information collection requirements.

8.2. Summary of Paperwork Burden Hours and Related Costs

This final rule creates new information collection burdens for the mining community. The final rule requires written safety programs to include actions the operator will take to: (1) identify and analyze hazards, (2) develop and maintain procedures and schedules for maintenance and repairs, (3) identify and evaluate technologies, and (4) train miners. Operators also must provide copies of the safety program upon request.

MSHA presents the estimates of information collection burden and costs related to the requirements in the final rule. MSHA expects that some operators may use existing information collections to help the development or implementation of a written safety program at their mines, since operators would have the flexibility to develop and implement a written safety program tailored to their mining conditions and operations. However, the final rule contains no changes that transfer burden from, or add burden to, existing information collections. In other words, there is no change to existing information collections. New information collection burden and costs associated with new requirements in the final rule are discussed below.

MSHA estimates that there will be 17,133 respondents (12,394 operators and 4,739 part 45 independent contractors).

MSHA determined the hourly wage rates through data from the U.S. Department of Labor, Bureau of Labor Statistics (BLS), Occupational Employment and Wage Statistics (OEWS) published May 2021.³⁶ Hourly wage rates were obtained for the occupations relevant to the implementation of the rule and adjusted for benefits to obtain a loaded hourly wage for all occupations, both at coal mines and MNM mines (see Table 8-1).^{37, 38}

³⁶ Options for obtaining OEWS data are available at item “E3. How to get OEWS data. What are the different ways to obtain OEWS estimates from this website?” at https://www.bls.gov/oes/oes_ques.htm.

³⁷ The benefit multiplier comes from BLS Employer Costs for Employee Compensation accessed by menu at <http://data.bls.gov/cgi-bin/srgate> or directly with <http://download.bls.gov/pub/time.series/cm/cm.data.0.Current>. Insert series ID CMU2030000405000D and CMU2030000405000P, which is divided by 100 to convert to a decimal value. MSHA used the latest 4-quarter moving average to determine what percent of total loaded wages are benefits. MSHA computes the benefit multiplier with a number of detailed calculations, but it may be approximated with the formula $1 + (\text{benefit percentage} / (1 - \text{benefit percentage}))$.

³⁸ 24. Wage inflation is the change in Series ID: CIS2020000405000I; Seasonally adjusted; Series Title: Wages and salaries for Private industry workers in Construction, extraction, farming, fishing, and forestry occupations, Index at <https://data.bls.gov/cgi-bin/srgate>. Inflation multiplier = (current quarter cost index value / OEWS wage base quarter index value).

Table 8-1: Hourly Wage Rates, 2021

Occupation	NAICS Code	Mean Wage Rate	Benefit Multiplier	Overhead Multiplier	Loaded Hourly Wage Rate
Mining Supervisor, MNM ¹	212200 & 212300	\$41.00	1.488	1.01	\$61.41
Mining Supervisor, Coal ¹	212100	\$47.92	1.488	1.01	\$71.79
Maintenance and Mechanic, MNM ²	212200 & 212300	\$28.19	1.488	1.01	\$42.22
Maintenance and Mechanic, Coal ²	212100	\$31.84	1.488	1.01	\$47.70
Occupational Health & Safety Specialist, MNM ³	212200 & 212300	\$39.43	1.488	1.01	\$59.06
Occupational Health & Safety Specialist, Coal ³	212100	\$45.59	1.488	1.01	\$68.29
Clerk, MNM ⁴	212200 & 212300	\$23.75	1.488	1.01	\$35.58
Clerk, Coal ⁴	212100	\$23.37	1.488	1.01	\$35.01
Clerk, Contractor ⁵	212100, 212200, 212300				\$35.45
Mining Supervisor, Contractor ⁵	212100, 212200, 212300				\$63.70
Maintenance and Mechanic, Contractor ⁵	212100, 212200, 212300				\$43.43
Occupational Health & Safety Specialist, Contractor ⁵	212100, 212200, 212300				\$61.09

Note: An overhead cost equal to 1% of the mean wage rate is included in the loaded hourly wage rate.

1. The Standard Occupation Codes (SOC) used for this occupation are (47-1011), (49-1011), (51-1011), and (53-1047).

2. The SOC used for this occupation are (49-3031), (49-3042), (49-9041), (49-9071), (49-9098), and (49-9099).

3. The SOC used for this occupation is (19-5011).

4. The SOC used for this occupation are (43-3021), (43-3031), (43-3051), (43-3061), (43-4171), (43-5061), (43-5071), and (43-9061).

5. These wages are a weighted average of the corresponding MNM and Coal professions, distributed by the proportion of MNM contractor hours (0.78) and Coal contractor hours (0.22) reported in 2021. There is no hour burden for this occupation.

8.3. Development of a Written Safety Program

Operators and certain contractors shall develop and implement a written safety program (§ 56.23003(a), § 57.23003(a), § 71.2103(a)) that includes actions the operator will take to:

1. Identify and analyze hazards specific to the mine and reduce the resulting risks related to the movement and operation of surface mobile equipment.

2. Develop and maintain procedures and schedules for routine maintenance and non-routine repairs for surface mobile equipment.
3. Identify currently available and newly emerging feasible technologies that can enhance safety at the mine and evaluate whether to adopt.
4. Train miners and other persons at the mine necessary to perform work to identify and address or avoid hazards related to surface mobile equipment.

Additionally, final §§ 56.23004(b), 57.23004(b), and 77.2104(b) require that operators provide, at no cost, a copy of the written safety program to miners or their representatives upon request. MSHA estimates that all operators will need to provide a physical copy of the written safety program to post at the mine site every year since the rule promulgation. Additionally, 50% of operators will provide a copy to miners or their representatives upon request each year. MSHA estimates that copying and distributing the written safety program will take a clerk approximately three minutes to complete the task.

MSHA estimated the information collection cost for Year 1 as these components: identifying actions the operator will take to conduct hazard analysis and technology evaluation for the written safety program at each mine site, develop a maintenance and repair schedule for surface mobile equipment units, and train miners. Operators also must copy distribute of the written safety program. MSHA estimates these cost components will incur an average burden of 39.85 hours per respondent for a total of 682,833 annual hours at an estimated cost of \$35.03 million.

Table 8-2: Estimated Respondent Hour and Cost Burden, Year 1

Actions the Operator Will Take to:	Number of Respondents	Average Burden per Respondent	Annual Burden (Hours)	Burden Costs (Millions of 2021 Dollars)
Conduct Hazard Analysis and Technology Evaluation	17,133	17.38	297,687.35	\$18.56
Develop a Maintenance Schedule (if needed)	17,133	22.40	383,860.30	\$16.44
Train Miners ¹	-	-	-	-
Make Available and Copy Written Safety Program	17,133	0.08	1,284.98	\$0.05
Subtotal, Year 1	17,133	39.85	682,832.63	\$35.03

Note: Totals may not equal the product of the components due to rounding.

Note 1: MSHA estimated that no additional costs will be generated by the activities associated with training; this activity is already being performed during compliance efforts for existing standards.

8.4. Annual and Other Updates of the Written Safety Program

With regard to the annual update of the written safety program (§ 56.23003(b), § 57.23003(b), § 71.2103(b)) the final rule requires:

“The responsible person shall evaluate and update the written safety program for the mine at least annually, and when a change at the mine creates an identified hazard or risk, such as when mining conditions or practices change, as accidents or injuries occur, or as surface mobile equipment changes or modifications are made.”

Additionally, §§ 56.23004(b), 57.23004(b), and 77.2104(b) require that operators provide, at no cost, a copy of the written safety program to miners or their representatives upon request. MSHA estimates that in Years 2 and 3 all operators will need to provide an updated physical copy of the written safety program to post at the mine site, and that 50 percent of operators will provide such a copy to miners or their representatives upon request each year. MSHA assumes that these producing and providing these copies will take a clerk three minutes of each copy.

MSHA estimated the cost for Year 2 and Year 3 from three components: annual updates to include new and replaced equipment, annual updates for changing conditions at mine sites, as well as costs arising from the copying and distributing of the written safety program. MSHA estimates these cost components will incur an average burden of 7.58 hours per respondent for a total of 129,917 annual hours at an estimated cost of \$8.06 million.

Table 8-3: Estimated Annual Respondent Hour and Cost Burden – Years 2 and 3

Activity	Number of Respondents	Average Burden per Respondent	Annual Burden (Hours)	Burden Costs (Millions of 2021 Dollars)
Changing Conditions Update	17,133	5.77	98,862.90	\$6.16
Surface Mobile Equipment Unit Update	17,133	1.74	29,768.74	\$1.85
Make Available and Copy Written Safety Program	17,133	0.08	1,284.98	\$0.05
Subtotal (Annual)	17,133	7.58	129,916.61	\$8.06

Note: Totals may not equal the sum/product of the components due to rounding.

8.5. Total Estimated Cost Burden

MSHA estimated that for the first 3 years of implementation, 17,133 respondents would incur, on average, an annual collection burden of 314,222 hours with an associated annual cost of \$17.05 million (Table 8-4).

Table 8-4: 3-Year Total Estimated Respondent Hour and Cost Burden

Year	Number of Respondents	Number of Responses	Total Burden (Hours)	Total Burden Cost (Millions of 2021 Dollars)
Year 1	17,133	17,133	682,833	\$35.03
Year 2	17,133	17,133	129,917	\$8.06
Year 3	17,133	17,133	129,917	\$8.06
3-Year Total	17,133	51,399	942,666	\$51.15
Annual Average	17,133	17,133	314,222	\$17.05

Note: Totals may not equal the sum of the components due to rounding.

9. OTHER REGULATORY CONSIDERATIONS

National Environmental Policy Act of 1969

The National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 *et seq.*), requires each Federal agency to consider the environmental effects of final actions and to prepare an Environmental Impact Statement on major actions significantly affecting the quality of the environment. MSHA has reviewed the final rule in accordance with NEPA requirements, the regulations of the Council on Environmental Quality (40 CFR part 1500), and the Department of Labor's NEPA compliance procedures (29 CFR part 11). As a result of this review, MSHA has determined that this final rule will not have a significant environmental impact. Accordingly, MSHA has not conducted an environmental assessment nor provided an environmental impact statement.

The Unfunded Mandates Reform Act of 1995

The Unfunded Mandates Reform Act of 1995 (Act) (2 U.S.C. 1501 *et seq.*) requires Federal agencies to assess the effects of their discretionary regulatory actions. In particular, the Act addresses actions that may result in the expenditure by State, local, or tribal governments, in the aggregate, or by the private sector, of \$100 million (adjusted annually for inflation) or more in any 1 year. MSHA has reviewed the final rule and has determined that it does not result in such an expenditure. Accordingly, the Unfunded Mandates Reform Act of 1995 requires no further Agency action or analysis.

The Treasury and General Government Appropriations Act of 1999: Assessment of Federal Regulations and Policies on Families

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

Congressional Review Act

The Congressional Review Act (5 U.S.C. 801 *et seq.*) allows Congress to review "major" rules issued by federal agencies. The Congressional Review Act states that, before a rule may take effect, the agency issuing the rule must submit the rule, and certain related information, to each House of Congress and the Comptroller General. 5 U.S.C. 801(a)(1). The Congressional Review Act defines a major rule as one that has resulted in or is likely to result in (1) an annual effect on the economy of \$100 million or more; (2) a major increase in costs or prices for consumers, individual industries, federal, state, or local government agencies, or geographic regions; or (3) significant adverse effects on competition, employment, investment, productivity, or innovation, or on the ability of United States-based enterprises to compete with foreign-based enterprises in domestic and export markets. 5 U.S.C. 804(2).

Pursuant to the Congressional Review Act, this rule is not a “major rule,” as defined by 5 U.S.C. 804(2). However, pursuant to the Congressional Review Act, MSHA will submit a copy of this final rule to both Houses of Congress and to the Comptroller General.

Executive Order 12630: Government Actions and Interference with Constitutionally Protected Property Rights

E.O. 12630 requires Federal agencies to “identify the takings implications of proposed regulatory actions” MSHA has determined that the final rule does not include a regulatory or policy action with takings implications. Accordingly, E.O. 12630 requires no further Agency action or analysis.

Executive Order 12988: Civil Justice Reform

Section 3 of E.O. 12988 contains requirements for Federal agencies promulgating new regulations or reviewing existing regulations to minimize litigation by eliminating drafting errors and ambiguity, providing a clear legal standard for affected conduct rather than a general standard, promoting simplification, and reducing burden. MSHA has reviewed the final rule and has determined that it meets the applicable standards provided in E.O. 12988 to minimize litigation and undue burden on the Federal court system. Accordingly, the final rule meets the applicable standards provided in E.O. 12988, Civil Justice Reform.

Executive Order 13045: Protection of Children from Environmental Health Risks and Safety Risks

E.O. 13045 requires Federal agencies submitting covered regulatory actions to OMB’s Office of Information and Regulatory Affairs (OIRA) for review, pursuant to E.O. 12866, to provide OIRA with (1) an evaluation of the environmental health or safety effects that the planned regulation may have on children, and (2) an explanation of why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the agency. In E.O. 13045, “covered regulatory action” is defined as rules that may (1) be significant under E.O. 12866, supplemented by E.O. 14094, (i.e., a rulemaking that has an annual effect on the economy of \$200 million or more or would adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local or tribal governments or communities), and (2) concern an environmental health risk or safety risk that an agency has reason to believe may disproportionately affect children. Environmental health risks and safety risks refer to risks to health or to safety that are attributable to products or substances that the child is likely to come in to contact with or ingest through air, food, water, soil, or product use or exposure.

This final rule is not subject to E.O. 13045 because it is not economically significant as defined in E.O. 12866, and because it does not concern an environmental health risk or safety risk that may disproportionately affect children. This final rule is requiring that operators develop, implement, and update a written safety program for surface mobile equipment (excluding belt conveyors) at surface mines and surface areas of underground mines. The

written safety program includes actions operators will take to identify hazards and risks to reduce accidents, injuries, and fatalities related to surface mobile equipment. This rule does not concern risks to health or to safety that are attributable to products or substances that children are likely to come in to contact with or ingest through air, food, water, soil, or product use or exposure. Accordingly, E.O. 13045 requires no further Agency action or analysis.

Executive Order 13132: Federalism

MSHA has determined that the final rule does not have federalism implications because it does not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. Accordingly, E.O. 13132 requires no further Agency action or analysis.

Executive Order 13175: Consultation and Coordination with Indian Tribal Governments

MSHA has determined that the final rule does not have tribal implications because it does not have substantial direct effects on one or more Indian tribes, on the relationship between the Federal Government and Indian tribes, or on the distribution of power and responsibilities between the Federal Government and Indian tribes. Accordingly, E.O. 13175 requires no further Agency action or analysis.

Executive Order 13211: Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use

E.O. 13211 requires agencies to publish a Statement of Energy Effects for “significant energy actions” which are agency actions that are “likely to have a significant adverse effect on the supply, distribution, or use of energy” including a “shortfall in supply, price increases, and increased use of foreign supplies.” MSHA reviewed the final rule for its impact on the production of coal and uranium mining. The final rule results in annualized costs of approximately \$12.6 million (in 2021 dollars, undiscounted) to covered surface mines and surface areas of underground mines, though most of these costs will be incurred in MNM mining that does not involve uranium mining (nor coal mining). MSHA therefore determined that such costs do not have any substantive effect on coal and uranium mining. Because the final rule does not result in a significant adverse effect on the supply, distribution, or use of energy, it is not a “significant energy action.” Accordingly, E.O. 13211 requires no further Agency action or analysis.

Executive Order 13985: Advancing Racial Equity and Support for Underserved Communities Through the Federal Government; Executive Order 14091: Further Advancing Racial Equity and Support for Underserved Communities Through the Federal Government

E.O. 13985 provides “that the Federal Government should pursue a comprehensive approach to advancing equity for all, including people of color and others who have been

historically underserved, marginalized, and adversely affected by persistent poverty and inequality.” E.O. 13985 defines “equity” as “consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality.” To assess the impact of the final rule on equity, MSHA considered two factors: (1) the racial/ethnic distribution in mining in NAICS 212 (which does not include oil and gas extraction) compared to the racial/ethnic distribution of the U.S. workforce (Table 9-1), and (2) the extent to which mining may be concentrated within general mining communities (Table 9-2).

In 2008, NIOSH conducted a survey of mines, which entailed sending a survey packet to 2,321 mining operations to collect a wide range of information, including demographic information on miners. NIOSH’s 2012 report, entitled “National Survey of the Mining Population: Part I: Employees” reported the findings of this survey.³⁹ Race and ethnicity information about U.S. miners including administrative and office workers at mines is presented in Table 9-1. Of all those working at mines, 93.4 percent were white, compared to 80.6 percent of all U.S. workers.⁴⁰ There were larger percentages of American Indian or Alaska Native and Native Hawaiian or Other Pacific Islander people in the mining industry compared to all U.S. workers, while there were smaller percentages of Asian, Black, or African American, and Hispanic/Latino people in the mining industry compared to all U.S. workers.

Section 6 of E.O. 14091 further provides that agencies are “to create equitable economic opportunity and advance projects that build community wealth” in rural America. The final rule helps miners in rural areas by improving safety and health at their mines. Table 9-2 shows that there are 22 mining communities, defined as counties where at least 2 percent of the population is working in the mining industry.⁴¹ Although the total population in this table represents only 0.15 percent of the U.S. population, it represents 12.0 percent of all miners including administrative and office workers at mines. The average per capita income in these communities in 2020, \$47,977,⁴² was lower than the U.S. average, \$59,510, representing 80.6 percent of the U.S. average. However, each county’s average per capita income varies substantially, ranging from 56.4 percent of the U.S. average to 146.8 percent.

This final rule is requiring that operators develop, implement, and update a written safety program for surface mobile equipment (excluding belt conveyors) at surface mines and

³⁹ National Institute for Occupational Safety and Health (NIOSH), “National Survey of the Mining Population: Part I: Employees,” June 2012. <https://www.cdc.gov/niosh/mining/works/cover-sheet776.html>.

⁴⁰ National data on workers by race were not available for the year 2008; comparable data for 2012 are provided for comparison under the assumption that there would not be major differences in distributions between these 2 years.

⁴¹ Although 2 percent may appear to be a small number for identifying a mining community, one might consider that if the average household with one parent working as a miner has five members in total, then approximately 10 percent of households in the area would be directly associated with mining. While 10 percent may also appear small, this refers to the county. There are likely particular areas that have a heavier concentration of mining households.

⁴² This is a simple average rather than a weighted average by population.

surface areas of underground mines. The written safety program includes actions operators will take to identify hazards and risks to reduce accidents, injuries, and fatalities related to surface mobile equipment. MSHA determined that the final rule is consistent with the goals of E.O. 13985 and supports the advancement of equity for all miners including administrative and office workers at mines, including those who are historically underserved and marginalized.

Table 9-1: Racial and Ethnic Distribution of Miners* (2012)

	Number of Miners in Mining (except oil and gas) (NAICS 212)	As a Percent of Total Miners Who Self-Identified in These Categories (Latest Data for 2008)	Percent of All Workers in the United States for Comparison (Latest Data 2012)****
Ethnicity			
Hispanic/Latino	26,622	12.1	15.0
Non-Hispanic or Latino	192,839	87.9	85.0
Total	219,461	100.0	100.0
Race**			
American Indian or Alaska Native***	4,050	1.9	0.8
Asian	183	0.1	5.4
Black or African American	8,893	4.3	13.0
Native Hawaiian or Other Pacific Islander	634	0.3	0.2
White	194,016	93.4	80.6
Total	207,776	100.0	100.0

* The term “miners” includes miners and other workers at mines such as administrative employees.

** Does not include miners who did not self-report in one of these categories. Some of the surveyed miners may not have self-reported in one of these categories if they are affiliated with more than one race, or if they chose not to respond to this survey question.

*** Includes miners who self-identified as an American Indian or Alaskan Native as a single race, not in combination with any other races. No other data on miners in this racial group were available from this source. In other employment statistics often reported on American Indians and Alaska Natives, their population is based on self-reporting as being American Indian or Alaska Native in combination with any other race, which has resulted in the reporting of much higher employment levels. See BLS, *Monthly Labor Review*, “Alternative Measurements of Indian Country: Understanding Their Implications for Economic, Statistical, and Policy Analysis,” <https://www.bls.gov/opub/mlr/2021/article/alternative-measurements-of-indian-country.htm>.

**** More recent data from the 2020 Decennial Census were not available in September 2022.

Sources: National Institute for Occupational Safety and Health (NIOSH). 2012a. National Survey of the Mining Population Mining Publication: Part 1: Employees, DHHS (NIOSH) Pub. No. 2012-152, June 2012; U.S. Census Bureau, 2012 American Community Survey (ACS).

Table 9-2: Mining Counties: Counties in the United States with Relatively High Concentrations of Miners* (At Least 2 Percent of the County Population)

#	County	Number of Miners (First Quarter 2022)	Population of County (Latest Data in 2021)	Estimated Percent of Population Who Are Miners
1	White Pine County, Nevada	1,288	9,182	14.0
2	Pershing County, Nevada	771	6,741	11.4
3	Humboldt County, Nevada	1,549	17,648	8.8
4	Campbell County, Wyoming	3,547	46,401	7.6
5	Winkler County, Texas	513	7,415	6.9
6	Mercer County, North Dakota	555	8,323	6.7
7	Chase County, Kansas	166	2,598	6.4
8	Shoshone County, Idaho	723	13,612	5.3
9	Logan County, West Virginia	1,643	31,909	5.1
10	Sweetwater County, Wyoming	2,050	41,614	4.9
11	Glasscock County, Texas	56	1,149	4.9
12	Livingston County, Kentucky	431	8,959	4.8
13	Buchanan County, Virginia	946	19,816	4.8
14	McDowell County, West Virginia	660	18,363	3.6
15	Big Horn County, Wyoming	413	11,632	3.6
16	Sevier County, Utah	601	21,906	2.7
17	Boone County, West Virginia	582	21,312	2.7
18	Moffat County, Colorado	349	13,185	2.6
19	Nye County, Nevada	1,062	43,946	2.4
20	Raleigh County, West Virginia	1,647	73,771	2.2
21	Wyoming County, West Virginia	456	21,051	2.2
22	Elko County, Nevada	1,090	53,915	2.0
Total		20,963	494,448	4.2
All U.S. Counties		174,387	331,893,745	
Miners in Mining Counties as a Percent of All U.S. Miners		12.0%		
Population of Mine Counties as a Percent of U.S. Population			0.15%	

* The term “miners” includes miners and other workers at mines such as administrative employees.

Source: Bureau of Labor Statistics (BLS), Quarterly Employment and Wages First Quarter 2022 (2022); Bureau of Economic Analysis, Personal Income by County, Metro, and Other Areas 2020 (2020); U.S. Census Bureau, “Annual Estimates of the Resident Population for Counties: April 1, 2020, to July 1, 2021 (CO-EST2021-POP).” *Census.gov*. Accessed DATE. Available at: <https://www.census.gov/data/tables/time-series/demo/popest/2020s-counties-total.html>; U.S. Census Bureau, Quick Facts, available at: <https://www.census.gov/quickfacts/fact/table/US/PST045221> (accessed DATE).

APPENDICES

Appendix A

Methodology for Estimating Unique Surface Mobile Equipment

As mentioned in the section above on Compliance Costs in the Final Regulatory Impact Analysis (FRIA), MSHA categorized operators into six groups. All mines were first divided into two commodity categories – metal and nonmetal (MNM) and coal. For each commodity category, MSHA then placed mines into three groups based on the number of employed miners and on production output, if known:

- Group 1 includes large mines employing 91 or more miners and producing 8,000 to 74,000 metric tons per day for coal mines and 10,000 to 80,000 metric tons per day for MNM mines.
- Group 2 includes medium-size mines employing 6 to 90 miners with production levels between 1,000 and 8,000 metric tons per day for coal mines and between 1,000 and 10,000 metric tons per day for MNM mines.
- Group 3 includes small mines employing 5 or fewer mines with production levels not exceeding 1,000 metric tons per day.

MSHA developed these groups based on the cost estimation chapter of the Society for Mining, Metallurgy, and Exploration Handbook.⁴³ MSHA then also used this handbook to estimate the kinds and amounts of surface mobile equipment that the mines in different groups would be expected to have.

To obtain more accurate estimates for Group 1 and Group 2 mines, MSHA's estimation procedure further involved the creation of subdivisions of Group 1 and Group 2 mines. Subgroup 1.1 of Group 1 included the largest of the Group 1 mines, with over 380 miners, and with production levels (in terms of the amount of material that is mined) in relatively high ranges as specified in the handbook. Subgroup 1.2 of Group 1 mines had between 262 and 380 miners, with relatively moderate production levels as specified in the handbook. Subgroup 1.3 of Group 1 had between 91 and 261 miners, with relatively low production levels. Subgroup 2.1 of Group 2 had between 70 and 90 miners, with relatively low levels of production. Subgroups 2.2 and 2.3 had between 35 and 69 miners, and between 6 and 34 miners respectively, with the lowest levels of production.

MSHA counted mines that were surface mines or had surface areas of underground mines and that reported any working hours in 2021. (Of the 12,434 mines shown in Table 2-1 of the FRIA, 40 did not have any employment in surface areas; they were thus excluded.)

The written safety program requires the operators to identify actions operators will take to train miners to identify and address or avoid hazards related to surface mobile equipment.

⁴³ Stebbins, S.A., and Leinart, J.B. 2011. Cost estimating for surface mines. In SME Mining Engineering Handbook, 3rd ed. Edited by P. Darling.

While the actual training is required already, the safety program is expected to increase compliance with existing training requirements, both with respect to the hazards of all surface mobile equipment at the mine and on each unique unit of equipment. Therefore, MSHA estimated the number of unique units for each type of mine. To do so, MSHA identified and examined three prototype mines for each of the commodities (MNM and coal) for each of the Groups 1 through 3. Prototype mines were identified and analyzed, as well, for subgroups of Groups 1 and 2.

For each of the selected prototype mines that MSHA examined, the Agency reviewed their inspection records to develop data on the amount of surface mobile equipment they possessed. During regular inspections of MNM mines, an MSHA inspector will document each piece of surface mobile equipment that is encountered while on inspection. Mine inspection reports for each selected mine were reviewed, and each piece of equipment that was documented during the regular inspection activities was recorded. Those pieces of surface mobile equipment that were documented by inspectors as being onsite and owned by outside contractors were included in the count of onsite equipment. MSHA grouped these pieces of equipment according to type, manufacturer, and model. New task training under existing 30 CFR §§ 46.7 and 48.27(a)(3) requires that each piece of equipment that is different in make or model be treated as a unique piece, which necessitates training in its safe operation. Appendix Table A-1 provides an example of the determination of unique pieces of equipment for an MNM mine in the Group 2 category.

Table A-1: Example of the Total Number of Unique Pieces of Surface Mobile Equipment at a Prototype Low-Scale MNM Mine (with a 5-year Average of 23 Employees)

Type	Make and Model	Unique (1 = yes, 0 = no)
Dozer	Komatsu 65PX	1
Excavator	Cat LE	1
Excavator	Komatsu 270	1
Excavator	Komatsu 400	1
Excavator	Komatsu 490	1
Fuel Truck	Ford	1
Haul Truck	Komatsu HM400	1
Haul Truck	Komatsu HM400	0
Loader	Cat 980H	1
Loader	Komatsu WA270	1
Loader	Komatsu WA500	1
Loader	Komatsu WA500	0
Loader	Komatsu WA500	0
Loader	Komatsu WA500	0
Loader	Komatsu WA500LG	0
Loader	Komatsu WA600	1
Service Truck	Ford F250	1
Service Truck	Ford F550	1
Service Truck	Ford F550	0
Service Truck	Ford Super Duty ST	0

Service Truck	GMC 2500	1
Skid Steer	New Holland LS160	1
Skid Steer	New Holland LS170 ST	1
Tractor	New Holland 175ST	1
Total Unique Pieces of Equipment		17

Appendix B

Surface Mobile Equipment Fatalities Over the Period of 2011 to 2020

MSHA reviewed the published fatal accident investigation reports of the 113 fatalities involving surface mobile equipment as shown in Table B-1 below. During the investigation of each fatality, the circumstances surrounding and contributing to the fatality had been identified and described. In this review, MSHA found that 63 of the 113 fatalities (55.75 percent) had identified deficiencies in training, hazard identification, or maintenance, or any combination of these three factors, that had contributed to the fatality.

Table B-1: Fatalities in 2011-2020 Involving Surface Mobile Equipment and Selected Factors Contributing to the Fatalities

#	Accident Date	Surface Mobile Equipment Involved	Contributing Factors (1=Yes, 0=No)		
			Hazard Identification or Training	Maintenance	Either of These
Total			47	30	63
1	2/11/2011	Fuel/Lube Service Truck	1	1	1
2	2/12/2011	Grader	1	0	1
3	5/14/2011	Front End Loader	0	0	0
4	9/1/2011	Wheeled Drill	1	0	1
5	10/28/2011	Haul Truck	1	0	1
6	11/2/2011	Bulldozer	0	0	0
7	12/3/2011	Bulldozer	0	0	0
8	3/17/2012	Front End Loader	0	0	0
9	4/11/2012	Excavator	1	1	1
10	5/23/2012	Excavator	0	1	1
11	5/28/2012	Front End Loader	0	0	0
12	6/21/2012	Haul Truck	1	0	1
13	7/14/2012	Water Truck	1	0	1
14	9/26/2012	Bulldozer	0	1	1
15	11/1/2012	Tracked Drill	1	0	1
16	12/14/2012	Rock Truck	0	0	0
17	1/26/2013	Bulldozer	0	1	1
18	4/4/2013	Excavator	1	0	1
19	6/13/2013	Haul Truck	0	1	1
20	7/3/2013	Front End Loader	0	0	0
21	7/10/2013	Bulldozer	0	0	0
22	7/31/2013	Haul Truck	1	1	1

Table B-1: Fatalities in 2011-2020 Involving Surface Mobile Equipment and Selected Factors Contributing to the Fatalities

#	Accident Date	Surface Mobile Equipment Involved	Contributing Factors (1=Yes, 0=No)		
			Hazard Identification or Training	Maintenance	Either of These
23	8/16/2013	Electric Shovel	0	1	1
24	9/16/2013	Haul Truck	1	0	1
25	9/19/2013	Cargo Truck	0	1	1
26	10/6/2013	Bulldozer	0	0	0
27	11/7/2013	Haul Truck	0	0	0
28	3/27/2014	Excavator	1	0	1
29	4/17/2014	Excavator	1	0	1
30	4/18/2014	Pickup Truck	0	0	0
31	4/24/2014	Bulldozer	0	0	0
32	5/1/2014	ATV	1	0	1
33	5/13/2014	Excavator	0	0	0
34	6/23/2014	Haul Truck	0	0	0
35	7/21/2014	Boat	1	1	1
36	7/23/2014	Front End Loader	1	0	1
37	8/2/2014	Haul Truck	1	1	1
38	9/15/2014	Bulldozer	0	0	0
39	9/26/2014	Forklift	0	1	1
40	10/10/2014	Bulk Tanker Truck	1	0	1
41	10/18/2014	Haul Truck	0	0	0
42	11/17/2014	Haul Truck	0	0	0
43	11/25/2014	Haul Truck	1	0	1
44	12/1/2014	Haul Truck	0	0	0
45	12/29/2014	Forklift	1	0	1
46	1/26/2015	Excavator	0	0	0
47	3/17/2015	Fuel Service Truck	0	0	0
48	3/17/2015	Haul Truck	1	0	1
49	3/23/2015	Self-Propelled Saw	0	0	0
50	5/18/2015	Fuel Truck	0	0	0
51	5/28/2015	Grader	1	1	1
52	5/28/2015	Water Truck	1	0	1
53	6/12/2015	Haul Truck	0	0	0
54	7/15/2015	Railcar	1	1	1
55	9/26/2015	Bulldozer	0	0	0
56	12/15/2015	Wrecker Truck	0	0	0
57	12/28/2015	Haul Truck	1	0	1
58	2/26/2016	Flatbed Truck	0	0	0
59	3/8/2016	Haul Truck	0	0	0
60	4/11/2016	Bulldozer	0	0	0
61	6/27/2016	Haul Truck	1	0	1
62	9/8/2016	Haul Truck	0	0	0
63	9/15/2016	Front End Loader	0	0	0

Table B-1: Fatalities in 2011-2020 Involving Surface Mobile Equipment and Selected Factors Contributing to the Fatalities

#	Accident Date	Surface Mobile Equipment Involved	Contributing Factors (1=Yes, 0=No)		
			Hazard Identification or Training	Maintenance	Either of These
64	9/21/2016	Truck-Mounted Drill	0	1	1
65	12/21/2016	Dump Truck+Trailer	0	1	1
66	2/3/2017	Tractor-Trailer	0	1	1
67	3/14/2017	Tractor-Trailer	0	0	0
68	3/24/2017	Service Truck	0	0	0
69	5/6/2017	Haul Truck	1	0	1
70	6/8/2017	Haul Truck	1	0	1
71	7/25/2017	Bulldozer	1	1	1
72	7/27/2017	Haul Truck	1	0	1
73	10/17/2017	Bulldozer	0	0	0
74	10/31/2017	Haul Truck	1	0	1
75	10/31/2017	Haul Truck	1	0	1
76	12/29/2017	Bulldozer	0	0	0
77	12/30/2017	Front End Loader	1	0	1
78	1/25/2018	Haul Truck	0	0	0
79	4/12/2018	Tractor-Trailer	0	0	0
80	6/13/2018	Haul Truck	0	0	0
81	6/15/2018	Electric Shovel	1	0	1
82	6/23/2018	Railcar	1	0	1
83	7/31/2018	Front End Loader	0	0	0
84	9/7/2018	Haul Truck	1	1	1
85	10/17/2018	Auger	1	1	1
86	10/19/2018	Haul Truck	1	1	1
87	10/25/2018	Service Truck	0	0	0
88	11/3/2018	Haul Truck	1	0	1
89	11/29/2018	Service Truck	1	1	1
90	3/7/2019	Highwall Mining Machine	1	0	1
91	5/13/2019	Crane	0	1	1
92	5/18/2019	Personnel Lift (Manbasket)	0	0	0
93	6/10/2019	Front End Loader	1	0	1
94	6/24/2019	Rigging Truck	0	0	0
95	7/17/2019	Excavator	0	1	1
96	7/30/2019	Front End Loader	0	0	0
97	8/2/2019	Fuel/Lube Service Truck	1	1	1
98	8/20/2019	Trolley Hoist	0	1	1
99	11/5/2019	Service Truck	0	0	0
100	11/16/2019	Bulldozer	0	0	0
101	1/23/2020	Tractor-Trailer	0	1	1
102	2/27/2020	Tractor-Trailer	0	0	0
103	2/27/2020	Front End Loader	0	0	0
104	6/1/2020	Tractor-Trailer	1	1	1

Table B-1: Fatalities in 2011-2020 Involving Surface Mobile Equipment and Selected Factors Contributing to the Fatalities

#	Accident Date	Surface Mobile Equipment Involved	Contributing Factors (1=Yes, 0=No)		
			Hazard Identification or Training	Maintenance	Either of These
105	6/13/2020	Dragline	0	0	0
106	8/21/2020	Tractor-Trailer	0	0	0
107	9/1/2020	Tractor-Trailer	0	1	1
108	9/16/2020	Haul Truck	0	0	0
109	10/9/2020	Truck+Hydroseeder	0	0	0
110	10/14/2020	Haul Truck	1	0	1
111	10/19/2020	Excavator	1	0	1
112	11/8/2020	Bulldozer	1	0	1
113	12/15/2020	Front End Loader	0	1	1