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Lowering Miners' Exposure to Respirable Coal Mine Dust, Including Continuous Personal Dust Monitors; Final Rule

DEPARTMENT OF LABOR

Mine Safety and Health Administration

30 CFR Parts 70, 71, 72, 75, and 90

RIN 1219–AB64

Lowering Miners' Exposure to Respirable Coal Mine Dust, Including Continuous Personal Dust Monitors

AGENCY: Mine Safety and Health Administration, Labor.

ACTION: Final rule.

SUMMARY: The Mine Safety and Health Administration (MSHA) is revising the Agency's existing standards on miners' occupational exposure to respirable coal mine dust in order to: Lower the existing exposure limits; provide for full-shift sampling; redefine the term ''normal production shift''; and add reexamination and decertification requirements for persons certified to sample for dust, and maintain and calibrate sampling devices. In addition, the rule provides for single shift compliance sampling by MSHA inspectors, establishes sampling requirements for mine operators' use of the Continuous Personal Dust Monitor (CPDM), requires operator corrective action on a single, full-shift operator sample, changes the averaging method to determine compliance on operator samples, and expands requirements for medical surveillance of coal miners.

Chronic exposure to respirable coal mine dust causes lung diseases that can lead to permanent disability and death. The final rule will greatly improve health protections for coal miners by reducing their occupational exposure to respirable coal mine dust and by lowering the risk that they will suffer material impairment of health or functional capacity over their working lives.

DATES: *Effective Date:* August 1, 2014. The incorporation by reference of certain publications listed in the rule was approved by the Director of the Federal Register as of October 12, 1999.

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SUPPLEMENTARY INFORMATION:

Table of Contents

I. Executive Summary
A. Purpose of the Regulatory Action
B. Legal Authority for Regulatory Action
C. Summary of Major Provisions
D. Major Provisions in the Proposed Rule That Are Not in the Final Rule
E. Projected Costs and Benefits
II. Introduction and Background Information
A. MSHA's Existing Respirable Dust Standards
B. 1992 Coal Mine Respirable Dust Task Group Report, 1995 NIOSH Criteria Document, and 1996 Dust Advisory Committee Report
C. 2000 and 2003 Plan Verification Proposed Rules
D. 2000 Single Sample Proposed Rule
E. Continuous Personal Dust Monitors (CPDM)
F. Regulatory History of This Final Rule
G. Government Accountability Office Activities
III. Discussion of the Final Rule
A. Health Effects
B. Quantitative Risk Assessment (QRA)
C. Feasibility
IV. Section-by-Section Analysis
V. Executive Order 12866: Regulatory Planning and Review; and Executive Order 13563: Improving Regulation and Regulatory Review
A. Population at Risk
B. Benefits
C. Compliance Costs
D. Net Benefits
VI. Regulatory Flexibility Act and Small Business Regulatory Enforcement Fairness Act
A. Definition of a Small Mine
B. Factual Basis for Certification
VII. Paperwork Reduction Act of 1995
A. Summary
B. Procedural Details
VIII. Other Regulatory Considerations
A. National Environmental Policy Act (NEPA)
B. The Unfunded Mandates Reform Act of 1995
C. The Treasury and General Government Appropriations Act of 1999: Assessment of Federal Regulations and Policies on Families
D. Executive Order 12630: Government Actions and Interference With Constitutionally Protected Property Rights
E. Executive Order 12988: Civil Justice Reform
F. Executive Order 13045: Protection of Children From Environmental Health Risks and Safety Risks
G. Executive Order 13132: Federalism
H. Executive Order 13175: Consultation and Coordination With Indian Tribal Governments
I. Executive Order 13211: Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use
J. Executive Order 13272: Proper Consideration of Small Entities in Agency Rulemaking
IX. References
X. Appendix A—Excessive Concentration Values

Availability of Information

Federal Register Publications: Access rulemaking documents electronically at *http://www.msha.gov/regsinfo.htm* or *http://www.regulations.gov.* Obtain a copy of a rulemaking document from the Office of Standards, Regulations, and Variances, MSHA, by request to 202–693–9440 (voice) or 202–693–9441 (facsimile). (These are not toll-free numbers.)

Information Collection Supporting Statement: The Information Collection Supporting Statement is available at *http://www.reginfo.gov/public/do/PRAMain* on MSHA's Web site at *http://www.msha.gov/regs/fedreg/informationcollection/informationcollection.asp* and at *http://www.regulations.gov.* A copy of the Statement is also available from MSHA by request to Sheila McConnell at *mcconnell.sheila.a@dol.gov*, by phone request to 202–693–9440, or by facsimile to 202–693–9441.

Regulatory Economic Analysis (REA): MSHA will post the REA on *http://www.regulations.gov* and on MSHA's Web site at *http://www.msha.gov/rea.htm.* A copy of the REA also can be obtained from MSHA by request to Sheila McConnell at *mcconnell.sheila.a@dol.gov*, by phone request to 202–693–9440, or by facsimile to 202–693–9441.

I. Executive Summary

A. Purpose of the Regulatory Action

The purpose of this final rule is to reduce occupational lung diseases in coal miners. Chronic exposure to respirable coal mine dust causes lung diseases including coal workers' pneumoconiosis (CWP), emphysema, silicosis, and chronic bronchitis, known collectively as ''black lung.'' These diseases are debilitating and can result in disability and premature death. Based on data from the National Institute for Occupational Safety and Health (NIOSH), new cases continue to occur among coal miners. The prevalence rate of lung disease among our nation's coal miners continues despite the fact that incurable black lung is preventable. Additionally, young miners are showing evidence of advanced and seriously debilitating lung disease from excessive dust exposure.

Over the decade 1995–2004, more than 10,000 miners died from black lung.[1] As of December 2011, according to the Department of Labor's Office of Workers' Compensation Programs, Division of Coal Mine Workers'

[1] *http://www.cdc.gov/niosh/docs/2008-143/pdfs/2008-143a-iii.pdf*, DHHS (NIOSH) Publication No. 2008–143a, Work-Related Lung Disease Surveillance Report 2007, Vol. 1, Table 2–4. Coal workers' pneumoconiosis: Number of deaths by state, U.S. residents age 15 and over, 1995–2004, p. 34, September 2008.

Compensation, the federal government has paid over $44 billion in Federal Black Lung benefits to beneficiaries (former miners, widows, dependents) since 1970 (U.S. Department of Labor, Division of Coal Mine Workers' Compensation. 2012. Black Lung Program Statistics).

The final rule is changed from the proposal. This final rule will reduce coal miners' occupational exposure to respirable coal mine dust. As a result, it will lower their risk of developing black lung disease and suffering material impairment of health or functional capacity.

B. Legal Authority for Regulatory Action

Sections 101(a)(6)(A), 103(h), and 508 of the Federal Mine Safety and Health Act of 1977 (Mine Act), provide the legal authority for this final rule. (30 U.S.C. 811(a)(6)(A), 813(h), and 957).

Section 101 of the Mine Act gives the Secretary of Labor (Secretary) the authority to promulgate mandatory health standards involving toxic materials or harmful physical agents. It requires that the Secretary set standards to assure, based on the best available evidence, that no miner will suffer material impairment of health from exposure to toxic materials or harmful physical agents over his working life. (30 U.S.C. 811(a)(6)(A)). In developing these standards, the Mine Act requires the Secretary to consider the latest available scientific data in the field, the feasibility of the standards, and experience gained under other laws. Id.

Section 103(h) of the Mine Act gives the Secretary the authority to promulgate standards involving recordkeeping. (30 U.S.C. 813(h)). Section 103(h) provides that every mine operator must establish and maintain records and make reports and provide such information as the Secretary may require. Id.

Section 508 of the Mine Act gives the Secretary the authority to issue regulations to carry out any provision of the Act. (30 U.S.C. 957).

C. Summary of Major Provisions

1. *Lowers the Existing Concentration Limits for Respirable Coal Mine Dust.* After August 1, 2016, the concentration limits for respirable coal mine dust are lowered from 2.0 milligrams of dust per cubic meter of air (mg/m^3) to 1.5 mg/m^3 at underground and surface coal mines, and from 1.0 mg/m^3 to 0.5 mg/m^3 for intake air at underground mines and for part 90 miners (coal miners who have evidence of the development of pneumoconiosis). Lowering the concentration of respirable coal mine dust in the air that miners breathe is the most effective means of preventing diseases caused by excessive exposure to such dust.

2. *Requires the Use of the Continuous Personal Dust Monitor (CPDM).* On February 1, 2016, mine operators are required to use the continuous personal dust monitor (CPDM) to monitor the exposures of underground coal miners in occupations exposed to the highest respirable coal mine dust concentrations and the exposures of part 90 miners. Use of the CPDM is optional for surface coal mines, non-production areas of underground coal mines, and for underground anthracite mines using the full box, open breast, or slant breast mining methods. The CPDM is a new sampling device that measures continuously, and in real-time, the concentration of respirable coal mine dust and provides sampling results at specific time intervals and at the end of the work shift. It is jointly approved for use in coal mines by MSHA and NIOSH under criteria set forth in Title 30, Code of Federal Regulations (30 CFR) part 74. When the CPDM is used, mine operators, miners, and MSHA will be notified of the results in a more timely manner than when the existing approved Coal Mine Dust Personal Sampler Unit (CMDPSU) is used. This will enable mine operators to take earlier action to identify areas with dust generation sources, reduce the dust levels in those areas, and prevent miners from being overexposed.

3. *Redefines the Term ''Normal Production Shift''.* The term normal production shift is redefined to require that underground mine operators take respirable dust samples in the mechanized mining unit (MMU) when production is at least 80 percent of the average production over the last 30 production shifts. The MMU is a unit of mining equipment used in the production of material. Under the existing definition, underground mine operators are required to sample when production is at least 50% of the average production reported during the operator's last sampling period (i.e., last set of five valid samples). Under the revised definition, miners will be better protected because samples will be collected during periods that are more representative of normal mining operations and dust levels to which miners are exposed.

4. *Requires Full-Shift Sampling.* The final rule requires the operator to collect respirable dust samples for the full shift that a miner works. If a miner works a 12-hour shift, respirable dust samples must be taken with an approved sampling device for the entire work shift, rather than a maximum of 8 hours as required under the existing standards. Full-shift sampling provides more representative measurements of miners' respirable dust exposures and increases their health protection.

5. *Changes the Averaging Method to Determine Compliance on Operator Samples.* Under existing standards, corrective action is required only after the average of five operator samples exceeds the respirable coal mine dust standard and a citation is issued. This permits miners to be exposed to levels of respirable coal mine dust that exceed the standard without requiring any corrective action by the operator to reduce concentrations to meet the standard. The final rule requires immediate corrective actions to lower dust concentrations when a single, full-shift operator sample meets or exceeds the excessive concentration value (ECV) for the dust standard. These corrective actions will result in reduced respirable dust concentrations in the mine atmosphere and, therefore, will provide better protection of miners from further high exposures.

6. *Provides for the Use of Single, Full-Shift Samples, by MSHA inspectors, to Determine Compliance.* MSHA inspectors will use single, full-shift samples to determine noncompliance with the respirable dust standards. MSHA has determined that the average concentration of respirable dust to which each miner in the active workings of a coal mine is exposed can be accurately measured over a single shift. MSHA is rescinding the ''1972 Joint Finding'' [2] by the Secretary of the Interior and the Secretary of Health, Education, and Welfare, on the validity of single-shift sampling. MSHA considers a single, full-shift measurement of respirable coal mine dust to ''accurately represent'' atmospheric conditions (Section 202(f) of the Mine Act) at the sampling location, if the sampling and analytical method used meet the NIOSH Accuracy Criterion. Limiting the respirable dust concentration in the active workings ensures that the respirable dust concentration inhaled by any miner is limited.

7. *Expands Medical Surveillance Requirements.* The final rule adds spirometry testing, occupational history,

[2] In 1972, acting under the Federal Coal Mine Health and Safety Act of 1969 (Coal Act), the Secretaries of the Interior and Health, Education and Welfare made a joint finding (1972 Joint Finding), under § 202(f) of the Coal Act, which concluded that a single shift measurement of respirable dust will not, after applying valid statistical techniques to such measurement, accurately represent the atmospheric conditions to which the miner is continuously exposed (37 FR 3833, February 23, 1972).

and symptom assessment to the periodic chest radiographic (x-ray) examinations required to be offered by mine operators to underground miners under NIOSH's existing standards. The additional medical surveillance requirements will alert miners to any abnormal declines in lung function, which is common evidence of Chronic Obstructive Pulmonary Disease (COPD) and not detected by chest x-rays. Notification of reduced lung function will enable miners to be proactive in protecting their health. The final rule extends the same medical surveillance requirements afforded underground miners, including chest x-ray examinations, to surface miners since they are also at risk of developing lung diseases and material impairment of health or functional capacity from exposure to respirable coal mine dust. In addition, the final rule extends part 90 miner transfer rights, which are currently provided to underground miners who have x-ray evidence of pneumoconiosis, to surface miners who have evidence of pneumoconiosis. Under 30 CFR part 90, these miners can elect to work in less dusty atmospheres to prevent the progression of disease. The medical surveillance requirements will provide improved health protection for all coal miners.

8. *Strengthens Requirements for Certified Persons.* The final rule revises requirements for certified persons who perform dust sampling and who maintain and calibrate sampling equipment. To strengthen the certification process, the final rule adds a requirement that persons must complete an MSHA course of instruction. This complements the existing requirement that, to be certified, the candidate must pass an MSHA examination to demonstrate competency in the tasks needed for respirable dust sampling procedures and in maintenance and calibration procedures. Completing the MSHA course and passing the MSHA examination will ensure that only trained persons perform these important functions. Certified persons are required under the final rule to pass the MSHA examination every three years to maintain their certification. The final rule adds procedures allowing MSHA to revoke a person's certification for failing to properly carry out the required sampling or maintenance and calibration procedures.

The final rule was strategically developed to provide a comprehensive, integrated approach to achieve MSHA's goal of reducing miners' exposure to respirable coal mine dust in a protective and feasible manner.

D. Major Provisions in the Proposed Rule That Are Not in the Final Rule

1. *Sampling Frequency.* The proposed rule would have required that CPDM sampling be conducted 7 days per week, 52 weeks per year for occupations exposed to the highest respirable coal mine dust concentrations and for part 90 miners.

2. *CPDM Performance Plan.* The proposed rule would have required operators who use CPDMs to develop and submit for approval a CPDM Performance Plan prior to using the sampling devices.

3. *Revisions to the Approved Ventilation Plan.* The proposed rule would have required operators to submit to the District Manager for approval the corrective actions to lower respirable dust concentrations.

4. *Equivalent 8-hour Concentration.* The proposal would have required the respirable coal mine dust sampled to be expressed in terms of an 8-hour equivalent concentration for shifts longer than 8 hours.

5. *Separate Intake Air for each MMU.* The proposed rule would have required a separate intake airway for each MMU.

E. Projected Costs and Benefits

- Lowers miners' exposure to respirable coal mine dust, thus reducing and preventing Black Lung.
- Significant reductions in CWP, progressive massive fibrosis (the most severe stage of CWP), severe emphysema, and deaths from non-malignant respiratory disease.
- Estimated annualized benefits: $36.9 million: (3% discount rate) and $20.0 million (7% discount rate).
- Estimated annualized costs: $24.8 million (3% discount rate) and $28.1 million (7% discount rate).

II. Introduction and Background Information

This final rule promotes the Secretary of Labor's vision of ''Promoting and Protecting Opportunity'' [3] and supports the Department of Labor's (DOL's) goal of securing safe and healthy workplaces, particularly for vulnerable workers in high-risk industries such as mining, by reducing workplace deaths and improving the health of coal miners.

This final rule is an important element in MSHA's Comprehensive Initiative to *END BLACK LUNG—ACT NOW!* Launched in December 2009, this initiative will significantly reduce disabling occupational lung disease in coal miners. It includes four components: Collaborative outreach, education and training, enhanced enforcement, and rulemaking. This final rule represents one aspect of MSHA's comprehensive and integrated approach to reduce and eliminate continued risks to miners from exposure to respirable coal mine dust. MSHA is committed to working with stakeholders to develop comprehensive outreach materials and to resolve any implementation issues. MSHA also intends to hold stakeholder seminars related to implementation of the final rule in locations accessible to the mining public.

Throughout the preamble, the terms ''respirable coal mine dust'', ''coal mine dust'', and ''respirable dust'' are used interchangeably.

This final rule combines the following rulemaking actions: (1) ''Occupational Exposure to Coal Mine Dust (Lowering Exposure);'' (2) ''Verification of Underground Coal Mine Operators' Dust Control Plans and Compliance Sampling for Respirable Dust'' (Plan Verification) (65 FR 42122, July 7, 2000, and 68 FR 10784, March 6, 2003); (3) ''Determination of Concentration of Respirable Coal Mine Dust'' (Single Sample) (65 FR 42068, July 7, 2000, and 68 FR 10940 March 6, 2003); and (4) ''Respirable Coal Mine Dust: Continuous Personal Dust Monitor (CPDM)'' (74 FR 52708, October 14, 2009). MSHA is withdrawing Plan Verification and Single Sample as separate rulemaking actions. However, the rulemaking records for the Plan Verification, Single Sample, and the CPDM rulemaking actions are incorporated into the rulemaking record for this final rule.

Several provisions in this final rule will singularly lower coal miners' exposure to respirable dust and reduce their risk of disease and disease progression. These provisions include lowering the respirable dust standards, using CPDMs for sampling, basing noncompliance determinations on MSHA inspectors' single shift sampling, full-shift sampling to account for occupational exposures greater than 8 hours per shift, changing the definition of normal production shift, changing the operator sampling program to require more sampling, requiring operator corrective action on one operator sample, and changes in the averaging method for operator samples to determine compliance. MSHA's quantitative risk assessment (QRA) in support of the final rule estimates the reduction in health risks when two provisions of the final rule are implemented—the final respirable dust standards and single shift sampling. The QRA shows that these two provisions would reduce the risks of CWP, severe

[3] Department of Labor 2014–2018 Strategic Plan Outreach, *www.dol.gov/sec/stratplan/2014outreach/.*

emphysema, and death from non-malignant respiratory disease (NMRD). The QRA projects, over a 45-year occupational lifetime, improvements in almost every underground job category and at least 6 surface categories. Large aggregated improvements are also projected for longwall tailgate operators and continuous mining machine operators (See the QRA discussion in Section III.B. of this preamble).

While the final 1.5 mg/m³ and 0.5 mg/m³ standards will reduce the risk of impairment, disease, and premature death, MSHA's QRA estimates remaining risk at the final standard. It is important to note that other provisions of this comprehensive and integrated final rule (e.g., use of CPDMs for sampling, changes in the definition of normal production shift, sampling for a full shift, changes in the sampling program, requiring operator corrective action on one operator sample, and changes in the averaging method to determine compliance on operator samples) will reduce these risks. The impacts of these other final provisions were not considered in the QRA. MSHA expects the final provisions, implemented in a comprehensive and integrated manner, will reduce the continued risks that miners face from exposure to respirable coal mine dust and would further protect them from the debilitating effects of occupational respiratory disease.

A. MSHA's Existing Respirable Dust Standards

MSHA's existing respirable dust standards, promulgated on April 8, 1980 (45 FR 23990) under Section 101 of the Mine Act, superseded Section 202(b) of the Mine Act. The standards require coal mine operators to continuously maintain the average concentration of respirable dust to which each miner is exposed during each shift at or below 2.0 milligrams per cubic meter of air (2.0 mg/m³) (30 CFR 70.100, underground coal mines; and 71.100, surface coal mines and surface areas of underground coal mines). Miners who have evidence of pneumoconiosis and are employed at underground coal mines or surface work areas of underground coal mines have the option to work in areas where average respirable dust concentrations do not exceed 1.0 mg/m³ of air (30 CFR 90.100, part 90 miners). There is no separate standard for respirable silica; rather, where the respirable coal mine dust contains more than five percent quartz, the respirable coal mine dust standard is computed by dividing the percentage of quartz into the number 10 (30 CFR 70.101 (underground coal mines), § 71.101 (surface coal mines and surface areas of underground coal mines), and § 90.101 (part 90 miners)).

Under MSHA's existing standards, mine operators are required to collect bimonthly respirable dust samples and submit them to MSHA for analysis to determine compliance with respirable dust standards (compliance samples). If compliance samples do not meet the requirements of the dust standard, MSHA issues a citation for a violation of the standard and the operator is required to take corrective action to lower the respirable dust concentration to meet the standard. Further, the operator must collect additional respirable dust samples during the time established for abatement of the hazard or violation (abatement sampling).

Underground coal mine operators collect and submit two types of samples during bimonthly sampling periods: (1) ''Designated occupation'' (DO) samples taken for the occupations exposed to the greatest concentrations of respirable dust in each mechanized mining unit (§ 70.207); and (2) ''designated area'' (DA) samples collected at locations appropriate to best measure concentrations of respirable dust associated with dust generation sources in the active workings of the mine (§ 70.208). The operator's approved ventilation and methane and dust control plan, required in existing § 75.370, must show the specific locations in the mine designated for taking the DA samples. In addition, mine operators take respirable dust samples for part 90 miners (§§ 90.207 and 90.208).

For surface work areas of underground mines and for surface mines, mine operators are required to collect bimonthly samples from ''designated work positions'' (DWPs), which are designated by the District Manager (§ 71.208).

Compliance determinations are based on the average concentration of respirable dust measured by five valid respirable dust samples taken by the operator during five consecutive normal production shifts or five normal production shifts worked on consecutive days (multiple-shift samples). Compliance determinations are also based on the average of multiple measurements taken by the MSHA inspector over a single shift (multiple, single-shift samples) or on the average of multiple measurements obtained for the same occupation on multiple days (multiple-shift samples).

Under the existing program, sampling results are often not known to mine operators, miners, and MSHA for at least a week or more after the samples are collected. Due to the delay in receiving sampling results, operators are unable to take timely corrective action to lower dust levels when there are overexposures.

B. 1992 Coal Mine Respirable Dust Task Group Report, 1995 NIOSH Criteria Document, and 1996 Dust Advisory Committee Report

In May 1991, the Secretary directed MSHA to conduct a review of the coal mine respirable dust control program and to develop recommendations on how the program could be improved. MSHA established an interagency task group (Task Group) which published their findings and recommendations in the June 1992, Review of the Program to Control Respirable Coal Mine Dust in the United States. The Task Group Report can be accessed electronically at *http://www.regulations.gov/#!documentDetail;D=MSHA-2010-0007-0211.*

On November 7, 1995, NIOSH submitted to the Secretary a criteria document recommending reduced standards for respirable coal mine dust and crystalline silica. On April 25, 1996, MSHA published a **Federal Register** notice (61 FR 18308) stating that it had decided to respond to the 1995 NIOSH Criteria Document by developing a proposed rule ''derived from the recommendations'' in the NIOSH Criteria Document. MSHA further stated that, although it would begin ''the background work necessary to develop such a rule,'' it would defer development of the rule until it received a report from the Secretary of Labor's Advisory Committee on the Elimination of Pneumoconiosis Among Coal Mine Workers (Dust Advisory Committee), which the Secretary had established on January 31, 1995, and to which MSHA had referred the NIOSH criteria document. One of the NIOSH recommendations in the Criteria Document was to use single, full-shift samples to compare miners' exposures with the NIOSH recommended exposure limit. The NIOSH Criteria Document can be accessed electronically at *http://www.cdc.gov/niosh/docs/95-106/.*

On November 14, 1996, the Dust Advisory Committee submitted its report to the Secretary. The Dust Advisory Committee Report can be accessed electronically at *http://www.msha.gov/S&HINFO/BlackLung/1996Dust%20AdvisoryReport.pdf.* The report contained 20 wide-ranging principal recommendations, subdivided into approximately 100 action items, aimed at eliminating coal miners' pneumoconiosis and silicosis. The report recommended that MSHA consider lowering the level of allowable

exposure to coal mine dust, with any reduction accompanied by a phase-in period to allow allocation of sufficient resources to the compliance effort. The report also recommended that MSHA should change the compliance sampling program to allow use of single, full-shift samples for determining compliance. On January 24, 1997, MSHA published a **Federal Register** notice (62 FR 3717) responding to the 1996 Dust Advisory Committee Report. In the response, MSHA stated its intent to conduct an in-depth evaluation of the recommendations and respond to them.

C. 2000 and 2003 Plan Verification Proposed Rules

On July 7, 2000, MSHA published the Plan Verification proposed rule (65 FR 42122, July 7, 2000). The proposal would have required underground mine operators to have a verified mine ventilation plan, with MSHA collecting samples to verify the adequacy of dust control parameters specified in the ventilation plan to maintain respirable dust standards (''verification sampling'').

In response to comments urging MSHA to withdraw the proposal, MSHA published a new proposed rule on March 6, 2003, (68 FR 10784), which would have required mine operators to have a ''verified'' mine ventilation plan and conduct verification sampling on each mechanized mining unit (MMU). Under the proposal, mine operators would have to demonstrate the adequacy of dust control parameters specified in the ventilation plan to maintain the concentration of respirable coal mine dust and quartz at or below dust standards. In addition, the mine operators' existing bimonthly respirable dust sampling program for each MMU and DA would have been eliminated and MSHA would have assumed responsibility for compliance and abatement sampling in underground coal mines.

The 2003 proposal would have also provided for the use of CPDMs once the CPDM was verified as reliable under mining conditions and commercially available.

Public hearings were held in May 2003. The closing date for the comment period for the Plan Verification proposed rule was extended indefinitely to obtain information concerning CPDMs being tested by NIOSH (68 FR 39881, July 3, 2003).

The following provisions from the 2003 Plan Verification proposal have been revised and integrated into this final rule: (1) Use of the CPDM in monitoring respirable dust exposures; (2) recording the amount of material produced by each MMU during each production shift and retaining the record; (3) sampling for respirable dust during the entire time that a miner works to account for shifts longer than 8 hours; (4) requiring that dust control parameters in the mine's ventilation plan be revised when respirable dust overexposures are indicated; and (5) threshold values that would be used to determine violations based on single sample measurements.

D. 2000 Single Sample Proposed Rule

On July 7, 2000, MSHA and NIOSH jointly published a proposed rule on Determination of Concentration of Respirable Coal Mine Dust (Single Sample) (65 FR 42068). The proposal would have rescinded the 1972 Joint Finding and established that a single, full-shift measurement of respirable coal mine dust may be used to determine the average concentration on a shift if that measurement accurately represents atmospheric conditions to which a miner is exposed during such shift.

MSHA proposed the 2000 Single Sample rule following the 11th Circuit Court of Appeals decision in *National Mining Association (NMA) et al.* v. *Secretary of Labor, et al.,* 153 F.3d 1264 (11th Cir. 1998). In this case, the Court reviewed the 1998 Final Joint Notice of Finding issued by MSHA and NIOSH. The 1998 Final Joint Finding, issued on February 3, 1998, concluded that the 1972 Joint Finding was incorrect and stated that the average respirable dust concentration to which a miner is exposed can be accurately measured over a single shift (63 FR 5664). The Court vacated the 1998 Joint Finding on procedural grounds. It found that MSHA was required by section 101(a)(6)(A) of the Mine Act to engage in rulemaking and demonstrate that a single, full-shift measurement adequately assures that no miner will suffer a material impairment of health, on the basis of the best available evidence; uses the latest available scientific data in the field; is technologically and economically feasible; and is based on experience gained under the Mine Act and other health and safety laws (153 F.3d at 1268–1269).

On March 6, 2003, MSHA and NIOSH reopened the rulemaking record to allow further comment on the Single Sample rulemaking and to solicit comment on new data and information added to the record (68 FR 10940). In May 2003, joint public hearings were held on the 2000 Single Sample proposal and the 2003 Plan Verification proposal. The comment period for the Single Sample proposal was extended indefinitely in order to obtain information on CPDMs being tested by NIOSH (68 FR 47886, August 12, 2003). The Single Sample proposal is integrated into and a part of this final rule, which permits MSHA inspectors to use single, full-shift samples to determine compliance with the respirable dust standard.

E. Continuous Personal Dust Monitor (CPDM)

On April 6, 2010 (75 FR 17512), MSHA and NIOSH published a final rule, effective June 7, 2010, revising approval requirements under 30 CFR part 74 for the existing coal mine dust personal samplers. It also established new approval requirements for the CPDM.

The CPDM is new technology that provides a direct measurement of respirable dust in the miner's work atmosphere on a real-time basis. In September 2006, NIOSH published the results of a collaborative study designed to verify the performance of the pre-commercial CPDM in laboratory and underground coal mine environments. According to the NIOSH Report of Investigations 9669, ''Laboratory and Field Performance of a Continuously Measuring Personal Respirable Dust Monitor,'' (Volkwein et al., U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health (USDHHS, CDC, NIOSH) 2006), the CPDM is accurate, precise, and durable under harsh mining conditions in providing continuous exposure information previously not available to coal miners and coal mine operators.

On October 14, 2009, MSHA published a Request for Information (RFI) on potential applications of CPDM technology to monitor and control miners' exposure to respirable coal mine dust during a work shift (74 FR 52708). The comment period closed on December 14, 2009.

On September 6, 2011, NIOSH approved a commercial CPDM as meeting the CPDM requirements of 30 CFR part 74 (USDHHS, CDC, NIOSH, 2011).

F. Regulatory History of This Final Rule

On October 19, 2010, MSHA published a proposed rule, Lowering Miners' Exposure to Respirable Coal Mine Dust, Including Continuous Personal Dust Monitors (75 FR 64412). The comment period was scheduled to close on February 28, 2011. The QRA in support of the proposal and Preliminary Regulatory Economic Analysis (PREA) were made publicly available at that time.

On October 20, 2010, MSHA held a meeting at MSHA Headquarters in Arlington, Virginia, and via conference call to brief interested stakeholders on the proposed rule.

On November 15, 2010, MSHA published a Notice scheduling six public hearings on the proposed rule in locations accessible to the mining public (75 FR 69617). In response to requests from the public, two of the hearings were rescheduled and an additional hearing was added, for a total of seven, to provide a maximum opportunity for public participation in the rulemaking (75 FR 73995). Hearings were held: December 7, 2010, in Beckley, WV; January 11, 2011, in Evansville, IN; January 13, 2011, in Birmingham, AL; January 25, 2011, in Salt Lake City, UT; February 8, 2011, in Washington, PA; February 10, 2011, in Prestonsburg, KY; and February 15, 2011, in Arlington, VA.

On January 14, 2011, MSHA extended the comment period from February 28, 2011 to May 2, 2011 (76 FR 2617). On May 4, 2011, MSHA again extended the comment period to May 31, 2011 (76 FR 25277). On May 27, 2011, MSHA extended the comment period to June 20, 2011 (76 FR 30878).

On March 8, 2011, MSHA published a **Federal Register** notice (76 FR 12648) requesting comment on information that was included in the preamble to the proposed rule and other issues that were raised during the public hearings. The notice requested comment on 25 specific issues and included two clarifications.

Public comments and supporting documentation submitted were posted on the MSHA Web site and on *www.regulations.gov*, along with transcripts and exhibits from the public hearings.

Several commenters, referring to an MSHA response to a request for documents under the Freedom of Information Act (FOIA), stated that they were denied access to documents that were critical to a thorough evaluation of the proposed rule. The request involved documents specifically related to the QRA in support of the proposed rule, and documents generally related to the rulemaking.

All documents that were critical to a thorough evaluation of the proposed and final rules are in the rulemaking record, and posted on MSHA's Web site and on *www.regulations.gov*, as noted above. These publicly available documents include Agency materials considered in the development of the proposed and final rules, public comments and supporting documentation submitted, along with transcripts and exhibits from the public hearings. If materials included in the docket are copyrighted, they are listed on *www.regulations.gov* but are not reproduced there. MSHA also posted additional historical information and data on respirable coal mine dust on its Web site at the request of the public. MSHA's complete rulemaking docket, including studies, articles, and reports reviewed by MSHA in the development of the proposed and final rules, is available in hard copy for inspection at its headquarters office. Peer reviewed documents of the QRA for the proposed rule prepared by NIOSH and the Occupational Safety and Health Administration (OSHA) at MSHA's request, as well as the QRA for the proposed rule, have been available on the Black Lung Single Source Page on MSHA's Web site since the October 19, 2010 publication of the proposed rule at *http://www.msha.gov/S&HINFO/BlackLung/Homepage2009.asp*.

G. Government Accountability Office Activities

The Consolidated Appropriations Act, 2012, required that the Government Accountability Office (GAO) review and report on the data collection, sampling methods, and analyses MSHA used to support its proposal. In August 2012, GAO issued a report, ''*Mine Safety: Reports and Key Studies Support the Scientific Conclusions Underlying the Proposed Exposure Limit for Respirable Coal Mine Dust*'', which assessed the strengths and limitations of the data and the analytical methods MSHA used to support its proposal to lower the exposure limit for respirable coal mine dust. GAO concluded that the evidence MSHA used did support its conclusion that lowering the limit as proposed would reduce miners' risk of disease.

In May 2013, GAO was requested to conduct an additional analysis on MSHA's proposed rule. In April 2014, GAO issued a report, ''*Basis for Proposed Exposure Limit on Respirable Coal Mine Dust and Possible Approaches for Lowering Dust Levels*''. GAO examined (1) the extent to which MSHA used recent CWP trend data as a basis for its proposed exposure limit, and (2) expert views on ways to lower the dust levels in coal mines, including their associated advantages, disadvantages, and cost. In the report, GAO concluded that MSHA appropriately did not use recent trend data on CWP as a basis for its proposal to lower the permissible exposure limit for respirable coal mine dust. According to GAO, these recent data from NIOSH were inappropriate for this purpose because they do not include the types of detailed information about individual miners needed to estimate the likelihood that miners would develop CWP at different exposure levels, such as historical dust exposures. With the help of the National Academies, GAO convened a group of experts knowledgeable about underground coal mining and methods for reducing coal mine dust. GAO did not make any recommendations in this report. MSHA has reviewed both GAO reports and has determined that no further action is necessary.

MSHA has also reviewed the explanatory statement by the Chairman of the House Committee on Appropriations in the 2014 Appropriations Act regarding the coal mine dust rule. Consistent with the explanatory statement, MSHA has taken into consideration all relevant information and conclusions from the GAO study when addressing compliance assistance, training, or post-implementation needs in connection with the final rule. MSHA also considered all available technologies and work practices that would allow mine operators to reduce miners' exposures to respirable coal mine dust in a manner that is not economically prohibitive for the long-term viability of the affected mines, while reducing miners' exposure to respirable (coal) mine dust. (MSHA discusses feasibility in section III.C. of this preamble and in chapter IV of the REA.) MSHA intends to develop outreach materials related to implementation of the final rule and hold stakeholder seminars in locations accessible to the mining public. MSHA also intends to develop compliance assistance materials to ensure that operators have a sufficient number of certified persons to perform sampling and maintenance and calibration of CPDMs.

III. Discussion of the Final Rule

A. Health Effects

The health effects from occupational exposure to respirable coal mine dust consist of interstitial and obstructive pulmonary diseases. Miners develop Coal Workers' Pneumoconiosis (CWP) or nonmalignant respiratory disease (NMRD). There are no specific treatments to cure CWP or NMRD. These chronic effects may progress even after miners are no longer exposed to respirable coal mine dust resulting in increased disability and death. Other complications may follow, such as pulmonary and cardiac failure, that result in total disability and premature death.

The health effects from occupational exposure to respirable coal mine dust were discussed in the preamble to MSHA's proposed rule on Plan Verification published on March 6, 2003 (68 FR 10784). The literature referenced in that document pre-dated 1999. More recent literature, from 1997 to mid-2009 with occasional references to earlier papers, was discussed in the Health Effects section of the preamble to the proposed rule for this final rule (75 FR 64412, 64458).

Reduction of coal mine dust exposure is the only effective way to prevent either CWP or NMRD. Screening and surveillance programs detect trends and clusters of disease occurrences and allow secondary preventive intervention to slow the rate of progression in miners. Data from screening and surveillance programs provide estimates of the prevalence of occupational respiratory disease among working coal miners.

At the existing respirable coal mine dust standard of 2.0 mg/m^3, cases of CWP and NMRD continue to occur. In recent years, the prevalence of CWP has increased among experienced miners, and in some cases, CWP has progressed rapidly to the more advanced form–progressive massive fibrosis (PMF). The persistence of disease requires that additional action be taken to reduce coal mine dust exposures. The final rule will reduce occupational pulmonary disease, disability, and premature mortality in coal miners.

Although not a basis or rationale for the final rule, in May 2011, CWP prevalence in a West Virginia mining population was reported in the Governor's Independent Investigation into the April 5, 2010, explosion at the Upper Big Branch (UBB) mine in southern West Virginia (p. 32). This investigation reported the prevalence of CWP as determined by autopsies in the 29 miners who died. Twenty-four of the 29 miners had sufficient lung tissue available to make a determination relating to CWP. Prevalence of CWP in these 24 miners was 71 percent (17 of 24 miners), which compares with the national prevalence rate for CWP among active underground miners of 3.2 percent, and the prevalence rate in West Virginia of 7.6 percent. The ages of the UBB miners with CWP ranged from 25 to 61 years. Of the 7 miners who were not identified as having CWP, 4 had what was characterized as ''anthracosis'' on their autopsy reports. This term is often used in lieu of the term pneumoconiosis, or may refer to a black pigment deposition without the fibrosis and other characteristics needed to make a firm diagnosis of pneumoconiosis. Three of the 24 miners had no pneumoconiosis or anthracosis noted.

Of the 17 UBB miners with CWP, 5 had less than 10 years of experience as coal miners, while 9 had more than 30 years of coal mining experience. At least 4 of the 17 worked almost exclusively at UBB. All but 1 of the 17 with CWP began working in the mines after the 2.0 mg/m^3 respirable coal mine dust standard became effective in 1973.

There was support for the proposed rule from many commenters who agreed with MSHA's conclusions in the health effects and QRA discussions in the preamble to the proposed rule. Commenters supported the proposed rule which would lower the existing dust standards, require the use of continuous personal dust monitors (CPDMs), base compliance determinations on single, full-shift samples, address extended work shifts, redefine a normal production shift, and extend medical screening and surveillance. These commenters stated that there has been an alarming increase of CWP within the past 10 years and that MSHA's existing standards have not succeeded in eliminating Black Lung.

Other commenters stated that the proposed rule is not needed. Some stated that MSHA should better enforce its existing standards rather than propose new standards. Some stated that black lung rates have been declining since 2000 when MSHA and NIOSH began using enhanced surveillance methods and that the Agency used selective data to support the proposed reduction in the standard. Others stated that MSHA should only address the health concerns in particular areas of the country, which include Virginia, West Virginia, and Kentucky. Several commenters stated that the proposal is not based on the best available evidence but, rather, is based on faulty science and medical data. One commenter suggested that MSHA, NIOSH, industry, and labor conduct a nationwide study using the CPDM to determine what dust concentrations are protective and achievable. The comments are discussed below.

In the health effects section of the proposed rule, MSHA reported results from NIOSH publications and studies that were based on grouped surveillance data. In response to commenters requesting that the underlying demographic information be made available, MSHA points out that these results are part of NIOSH's coal miner surveillance data included in the proposed rule's hazard and risk assessment analyses. NIOSH posts summary surveillance data on U.S. coal miners on its Web site at *http://www.cdc.gov/niosh/topics/surveillance/ords/*. These data are generated based on the requirements of 42 CFR part 37, Specifications for Medical Examinations of Underground Coal Miners. Because of privacy protection laws, such as the Health Insurance Portability and Accountability Act (HIPAA) of 1996, the Privacy Act of 1974, and the Freedom of Information Act, MSHA cannot provide underlying personal identifying information.

Some commenters stated that the proposed rule was based on three data sources: The NIOSH 1995 Criteria Document, a literature update by NIOSH entitled ''Current Intelligence Bulletin 64, Coal Mine Dust Exposure and Associated Health Outcomes, A Review of Information Published Since 1995'' (''NIOSH CIB 64'') (USDHHS, CDC, NIOSH (2011a)), and various NIOSH papers on its enhanced surveillance studies. MSHA did not use the NIOSH literature update in the development of the proposed rule because it was published in April 2011 and, therefore, not final when the proposed rule was published on October 19, 2010. However, the NIOSH CIB 64 provides supplementary information that supports the final rule and is referenced later in this section of the preamble. NIOSH submitted CIB 64 to MSHA during the comment period for the proposed rule.

Some commenters stated that MSHA did not produce for independent analysis the underlying data from the NIOSH Criteria Document and X-ray program. One commenter stated that this is a violation of the Office of Management and Budget (OMB) and MSHA guidelines on data quality which prevented stakeholders from being able to comment on the scientific basis of the proposed rule.

The Data Quality Act or Information Quality Act directs OMB to issue guidelines to agencies to ensure and maximize the quality, objectivity, utility, and integrity of information that agencies maintain and disseminate (Section 515 of the Treasury and General Government Appropriations Act for FY 2001 (Pub. L. 106–554)). MSHA has satisfied the requirements of OMB's 2002 data quality Guidelines, for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies (36 FR 8452, February 22, 2002). MSHA has adopted well-established quality assurance techniques to ensure the quality of information disseminated. Information

is subject to internal agency quality control and audit, and any appropriate Department of Labor level review before being disseminated to the public. MSHA's Information Quality Guidelines are available on the Agency's Web site at: *http://www.msha.gov/infoquality/mshainfoquality.htm*.

MSHA explained in the preamble to the proposed rule that the proposal was developed in part on the recommendations in the 1995 NIOSH Criteria Document. NIOSH is the agency in possession of the underlying data associated with the Criteria Document and has posted data relevant to the Criteria Document on its Web site at *http://www.cdc.gov/niosh/topics/surveillance/ords/*. In accordance with Section 101(a) of the Mine Act, NIOSH submitted the Criteria Document to the Secretary of Labor for consideration in developing standards to reduce health risks associated with miners' exposure to respirable dust.

In addition, the Health Effects section in the preamble to the proposed rule contains a comprehensive inventory and summarizes key aspects of scientific literature and studies on the health effects from occupational exposure to respirable coal mine dust. Regarding the NIOSH X-ray data, NIOSH posts summary surveillance data on U.S. coal miners on the Web site previously noted at *http://www.cdc.gov/niosh/topics/surveillance/ords/*.

One commenter stated that using data from the NIOSH surveillance program violates the data quality guidelines because NIOSH self-selects the program participants and therefore the data is biased. The commenter also stated that data from the B-reader program is imprecise, inaccurate and biased because the B-reader program gives significant false-positive readings thereby exaggerating the incidence of CWP.

The relatively low participation rates, potential self-selection biases, and a lack of correspondent exposure histories for the individual miners involved limit the use of the NIOSH surveillance data as support for the Quantitative Risk Assessments. Additional discussion is included in Section III.B., Quantitative Risk Assessment, of the preamble. NIOSH instituted the B-reader program to ensure competency and consistency in radiographic reading by evaluating the ability of readers to classify a test set of radiographs. A discussion of NIOSH's B-reader program is included in Section III.A., Health Effects, of the preamble.

In developing the proposed rule, MSHA evaluated over 150 peer-reviewed papers as part of the Agency's health effects assessment (75 FR 64460, October 19, 2010), in addition to the data from MSHA's proposed rule on Plan Verification. The literature review focused on studies of morbidity and mortality among coal miners in many countries, including the United States, South Africa, Europe, Britain, China, Australia, Turkey, and Japan. This research evaluated the relationship between respirable coal mine dust exposure and the respiratory disease it causes. The research reported on the etiology of adverse respiratory diseases, including CWP, PMF, and NMRD, such as chronic obstructive pulmonary disease (COPD) and emphysema. The fact that similar results have been found in decades of research, covering a wide variety of populations at various respirable coal mine dust exposure levels and working conditions, supports the determination that exposure to respirable coal mine dust is a significant causal factor in the development of respiratory diseases in coal miners. The conclusion of MSHA's review of this research and of NIOSH's 2011 literature update is that chronic coal mine dust exposure causes respiratory health effects including CWP, PMF, COPD, and emphysema.

Recognition that long-term respirable coal dust exposure causes irreversible respiratory health effects has been accepted by the medical community for decades. On March 26, 1969, Charles C. Johnson, Jr., Administrator, Consumer Protection and Environmental Health Service, Public Health Service, U.S. Department of Health, Education, and Welfare, testified before the General Subcommittee on Labor, and presented remarks of the Surgeon General addressing the level of medical understanding about the etiology of CWP at that time.[4] Johnson testified that CWP is a chronic chest disease caused by the accumulation of fine coal mine dust particles in the human lung that, in its advanced forms, leads to severe disability and premature death.

Johnson's testimony also pointed out that, by 1969, medical researchers in both Britain and the United States had repeatedly shown that coal miners suffer from more respiratory impairment and respiratory disability than the general population. These respiratory problems were frequently accentuated by chronic bronchitis and emphysema.

Estimates of the severity of disease risk at that time were derived from British research. This research provided the only quantitative exposure-response relationship available in 1969 and supported lowering the respirable coal mine dust standard from 3.0 mg/m^3 to 2.0 mg/m^3. Adoption of the 2.0 mg/m^3 standard was believed to be protective against the risk of disability and premature mortality that accompanies PMF. However, NIOSH has noted that as more research was completed over the next 25 years, this assumption turned out to be inaccurate (NIOSH CIB 64, 2011a).

In 1995, NIOSH published ''Criteria for a Recommended Standard—Occupational Exposure to Respirable Coal Mine Dust'', an analysis of research up through the early 1990s that further investigated the etiology of CWP and other adverse health effects associated with respirable coal mine dust exposure. NIOSH recommended that the federal coal mine dust limit be reduced to 1.0 mg/m^3. This recommendation was based on risk estimates of CWP derived from two NIOSH studies of U.S. coal miners. Predictions were derived from each study for a working lifetime of 45 years at two exposure levels: 2.0 mg/m^3 and 1.0 mg/m^3. The recommendation was also based on information that predicted excess lung function decrements following working lifetime exposures to 2.0 mg/m^3 and 1.0 mg/m^3 respirable coal mine dust. NIOSH also evaluated information from other epidemiologic studies in reaching its 1995 recommendations. NIOSH estimated, and MSHA concurs, that miners exposed to respirable coal mine dust at the existing 2.0 mg/m^3 standard are at significant risk of developing adverse health effects, such as CWP and NMRD, including COPD and emphysema.

Some commenters disagreed with NIOSH surveillance and research results as the basis for the proposed rule. These commenters stated that the prevalence of CWP and PMF in U.S. coal miners was overstated, surveillance was incomplete, and the 1.0 mg/m^3 standard was not justified. They presented various analyses of the NIOSH studies and submitted for the rulemaking record a NIOSH study that was published after the proposed rule (Suarthana et al., 2011). The Suarthana study is discussed in this Health Effects section of the preamble.

Some commenters suggested that MSHA should collect data from a representative or mandatory surveillance program and study the data in a scientifically sound manner to better understand the incidence of CWP.

MSHA believes that this program already exists in the National Coal Workers Health Surveillance Program (NCWHSP, also known as CWHSP) that is administered by NIOSH. MSHA has

[4] 91st Congress House of Representatives Report, 1st Session No. 91–563, Federal Coal Mine Health and Safety Act, October 13, 1969.

used data generated from this program in the development of both the proposed and final rules.

Occupational health surveillance tracks occupational injuries, illnesses, hazards, and exposures to improve worker safety and health and to monitor trends and progress over time. Surveillance includes both population- or group-based activities and individual or case-based activities. Worker screening and monitoring detects early disease in high-risk individuals.

The purpose of federal and state surveillance programs for chronic lung diseases, such as CWP, PMF, and NMRD, is to identify not only cases of disease, but also conditions under which the cases develop in order to improve disease control and prevention. There are three levels of prevention. Primary prevention in the case of dust-related lung disease includes reducing exposure to dust, generally through engineering controls. Secondary prevention focuses on early detection of disease and intervention in order to slow or eliminate progression. Much of the medical surveillance conducted by NIOSH is secondary prevention. Tertiary prevention involves miners seeking further medical care only after they have symptoms, progression to later stages is more likely, and the primary treatment is to manage symptoms of disease since it is too late to prevent disease.

There is a spectrum of respiratory disease development in coal miners exposed to respirable coal mine dust. Pathologic changes occur during the subclinical stage of disease development that are not detectable by either spirometry or chest x-ray (CWP 0/0). For this reason, all miners should have an initial medical examination to establish a baseline health status on which future medical surveillance can be compared to determine disease presence or progression. NIOSH and many of the research papers on which the proposed health effects assessment was based use CWP 1/0+ as the category where disease progression is evident; many of these miners may not have overt symptoms, but the chest x-ray shows signs of fibrotic changes. The use of this CWP category as a sign of the development of minimal illness dates from the 1969 Coal Act, where the Surgeon General recommended that miners be removed from dusty environments as soon as they showed ''minimal effects'' of dust exposure on chest-x-ray, i.e., pinpoint, dispersed micro-nodular lesions. Many miners may also report symptoms of developing respiratory disease, such as chronic cough, phlegm production, wheezing, and shortness of breath.

Many comments focused only on detection of clinical disease (tertiary prevention), once disease has advanced well beyond the clinical horizon when symptoms appear (CWP category 2/0+). One commenter submitted an analysis of CWP mortality in a subgroup of miners with advanced disease at the CWP 2/0+ level. While this analysis may help to understand the etiology of advancing disease, it does not identify how the disease process begins or how to prevent disease from developing. Miners with this level of disease present pulmonary symptoms and are likely to suffer from disease progression.

The focus of federal coal workers' health surveillance programs is on prevention of clinical disease, not detection of disease that has progressed well beyond the clinical horizon. The Coal Workers' X-Ray Surveillance Program (CWXSP) was established under the Federal Coal Mine Health and Safety Act of 1969, as amended by Section 203(a) of the Mine Act (30 U.S.C. 843(a)). The CWXSP Program, which is part of the National Coal Workers Health Surveillance Program (NCWHSP), began in 1970. It is administered by NIOSH. The CWXSP provides all underground coal miners with periodic, x-ray examinations, at no cost to the miner, at least every five years (42 CFR part 37).

The National Coal Study (NCS) was a long-term epidemiologic study, limited to workers in a selected group of mines with various seam heights, mining methods, coal types, and geographic locations. Many of the published peer-reviewed epidemiological studies reported in the proposed rule's health effects section grew out of the NCS. Commenters suggested that many of NIOSH's studies were incomplete due to design or other limitations and suggested that a detailed, nationwide epidemiological study be conducted based on mandatory screening before any action to lower the respirable dust standard is initiated.

MSHA does not believe that a nationwide epidemiological study, based on mandatory screening, as suggested by the commenter is needed before regulatory action is taken be reduce the respirable dust standard. Underground coal miners in the United States have been studied since before the 1969 Coal Act by the Public Health Service and State health agencies. Those studies were the basis for the current surveillance programs in this country. Numerous pre-Coal Act studies and studies since that time have characterized the respiratory system's response to various levels of respirable coal mine dust, a known fibrogenic dust. Significant levels of adverse lung diseases are continuing to develop in coal miners who have been exposed to respirable coal mine dust at the current standard.

Some commenters stated that x-rays are insensitive for detecting CWP and that surveillance programs suffer from inconsistent reading of the x-rays.

Early changes due to CWP are frequently identifiable on a high quality chest x-ray before the miner seeks medical attention due to symptoms. NIOSH instituted the B-reader program to ensure competency and consistency in radiographic reading by evaluating the ability of readers to classify a test set of radiographs. This creates and maintains a pool of qualified readers having the skills and ability to provide consistent and accurate ILO classifications. B-readers must retest every 4 years to maintain their B-reader status. A reader who fails the retest must take and pass the original approval examination before the expiration of the 4-year approval period in order to retain B-reader status. The implementation of this program in the mid-1970s, the update of the program to adjust to the ILO guidelines in 1980, and the revised ILO guidelines in 2000 and 2011 ensure B-reader consistency in reading x-rays.

In order to preserve continuity and consistency in the classifications, the images used in reproducing the 2011 ILO version of the standard radiographs are identical to those used for the 1980 set of standard radiographs, aside from one image which demonstrates pleural abnormalities. The ILO did endeavor to improve image quality in the 2000 set by using advanced computer imaging techniques. The NIOSH CWXSP requires that readers submit classifications adhering to the 2011 Revised Edition of the Guidelines for the Use of the ILO International Classification of Radiographs of Pneumoconiosis. The sets of standard images used in the 2011 and 1980 classifications are nearly identical, and thus it is the individual reader's choice which of these two sets of standard radiographs to use. However, because the quality of the 2011 standard radiographs has been enhanced by the ILO Guidelines, NIOSH recommends that readers use the 2011 standard radiographs for classifying films for NIOSH programs and studies (*http://www.cdc.gov/niosh/topics/chestradiography/breader-info.html*).

Classifying films can be variable, especially in lower disease categories, with differences of opinion between B-readers and by the same B-reader at different times (Attfield et al., 2007; Naidoo et al., 2004). To account for this

variability, the ILO classification system allows readers to determine profusion severity by indicating the most likely category and also by indicating a neighboring category that might also be valid. For example, a score of 1/2 means the disease state is classified as category 1, but could also be considered category 2. Another means of compensating for variability is to have a panel of readers interpret films by consensus rather than using a single reader. When the ILO system is used for surveillance and screening purposes, it has been demonstrated to be a valid means for identifying trends and disease clusters (Attfield et al., 2007; Naidoo et al., 2004; NIOSH, 2008). The CWXSP uses a profusion score of 1/0+ as indicative of CWP development.

Section 203(a) of the Mine Act specifically requires that operators provide periodic chest x-ray examinations to underground coal miners, and such other tests as the Secretary of Health and Human Services deems necessary to supplement the x-rays (30 U.S.C. 843(a)). In addition to pneumoconiosis apparent on x-rays, miners are at increased risk for the development of COPD. Chest x-rays alone cannot provide a measure of airflow obstruction and, therefore, often miss important lung disease. Spirometry, a simple breathing test, is an additional component of the health assessment of miners that is particularly useful. NIOSH has recommended periodic medical history and spirometry tests for both surface and underground coal miners since 1995, to facilitate preventive actions, increase miners' participation in programs for early detection of disease, and improve the derivation of representative estimates of the burden, distribution, and determinants of occupational lung disease in relation to coal mining in the United States. Final § 72.100 requires spirometry testing of both underground and surface miners.

A few commenters stated that a recent study by Suarthana et al. (2011) states that dust exposure is a poor predictor of CWP prevalence.

In response, MSHA notes that dose-response relationships between cumulative dust exposure and cases of respiratory diseases have been studied by NIOSH as part of the National Coal Study. The Suarthana study stated that: ''Epidemiological modeling of CWP prevalence and incidence undertaken on underground coal miners in the USA and elsewhere has shown that the main predictor of CWP is cumulative exposure to respirable coal mine dust.''

As stated previously, NIOSH studies the causes and consequences of coal-related respiratory disease and, in cooperation with MSHA, carries out a program for early detection of coal workers' pneumoconiosis. These activities are administered through the CWXSP.

In the early 2000s, MSHA with assistance from NIOSH piloted the Miners' Choice Program (MCP) to offer all coal miners the opportunity to participate in the CWXSP by having medical staff travel to mines or other areas to conduct medical surveillance of mining populations at no cost to the mine operator. The MCP used a mobile medical examination unit to bring the medical exams, including chest x-rays, to the miners in remote areas to provide early detection of dust-related pulmonary disease. MSHA wanted to determine the state of miner health because participation in the CWXSP decreased from the high of 100% in 1970 to 1974 to a low of 20.6% in 1990 to 1994 (Table III–2). MSHA found that participation rates increased to 25.5% in 1995 to 1999; 34.1% in 2000 to 2004; and 41.7% in 2005 to 2009. MSHA further found that as more miners were screened, the prevalence of CWP detected fluctuated. CWP was detected in 2.0% of the miners who were x-rayed from 1995 to 1999; 3.6% from 2000–2004; and 2.7% from 2005 to 2009 (Table III–1). Although commenters stated that this increase was not real, additional miner participation resulting from the enhanced surveillance identified more cases of CWP that otherwise would have gone undetected.

The Miners' Choice Program was expanded into the Enhanced Coal Workers' Health Surveillance Program (ECWHSP) in March 2006 by NIOSH to continue increasing miner participation by providing additional respiratory health evaluations to coal miners. The ECWHSP uses a mobile medical examination unit to bring the medical exams to the miners in the field to provide early detection of dust-related pulmonary disease and target additional areas for prevention. This program offers lung function testing in addition to chest x-rays as part of the medical examination and asks miners to fill out occupational and health surveys.

The National Coal Workers' Autopsy Study, which is part of the NCWHSP, provides autopsies of deceased coal miners at the request of miners' next-of-kin at no cost to the family. Autopsy results may help support a black lung benefit claim and also help scientists and medical doctors learn more about CWP. Doctors collect standardized lung specimens during autopsies to be used in ongoing scientific research as well as to provide information to the next-of-kin regarding the presence and extent of CWP in the lungs of the deceased miner. Because one basic reason for the post-mortem examination is research (both epidemiological and clinical), a minimum of essential information is collected regarding the deceased miner, including occupational history and smoking history. The data collected are used by scientists for research purposes in defining the diagnostic criteria for pneumoconiosis and in correlating pathologic changes with exposures and x-ray findings.

NIOSH reports overall prevalence of CWP 1/0+ across all MSHA districts, as well as a national prevalence (Table III–1). These numbers are based on the average number of miners employed per time period (1995–1999, 2000–2004, and 2005–2009) and the number x-rayed per time period. When more information is available from complete medical examination records, NIOSH refines the estimates as in the case with reporting CWP prevalence based on tenure, i.e., the length of time worked in coal mining (Table III–2).

During the 2005 to 2009 period, for example, over 18,500 active underground coal miners were screened as part of the CWXSP. As shown in Table III–1, this is approximately 42% of all active underground miners (NIOSH, 2011—Work-Related Lung Disease Surveillance System, CWXSP. ref. no. 2011T02–17, May 2011). Active miners from all MSHA districts participated in this screening.

Some commenters stated that the NIOSH surveillance programs are not ''well-established scientific processes for data collection'' and that black lung rates have declined since 2000.

NIOSH surveillance of CWP started in 1970 and continues today using the same case definition of CWP 1/0+ (Tables III–1 and III–2). The number of miners participating in the program has fluctuated through the years. NIOSH's active surveillance programs have reached additional miners, as shown in Table III–2; the percentage participating in the period from 2005 to 2009 was 41.7% as compared to a low of 20.6% in the period from 1990 to 1994. In addition, the number of underground coal miners in the United States has declined from over 150,000 in the 1975–1979 time period to under 45,000 in the 2005–2009 time period. The number of miners examined that provided tenure data on the health questionnaire forms was approximately 85,000 in the 1970–1974 time period to approximately 11,000 in the late 2000s.

Miners who stop working in mining are lost to follow-up. Since their health status is not known, surveillance of only

active miners may underestimate the prevalence of disease. Cohen et al. (2008) reported that disease progression continues after exposures stop, increasing lung function impairment and pneumoconiosis levels in miners once they leave employment (i.e., ex-miners and retired miners). Coal mine dust clearance from the lungs is slow and incomplete, allowing continued contact between the cytotoxic dust and lung tissues. This progression of disease after retirement from coal mining (i.e., after exposure ceased) was also observed in other countries (Cohen et al., 2008). Ex-miners displayed higher levels of respiratory disease than current miners illustrating the progression of CWP to PMF even after exposure ceased (Naidoo et al., 2005 and 2006). Miners with advanced disease are forced to retire because they can no longer perform mining tasks (Cohen et al., 2008).

Exposures, as estimated by MSHA inspector samples, have decreased since passage of the 1977 Mine Act from a mean of 0.796 mg/m^3 (with 18.7% of samples above the 2.0 mg/m^3 standard) in 1979 to 0.468 mg/m^3 (with 3.2% of samples above the 2.0 mg/m^3 standard) in 2003 at underground coal mines; and from 0.384 mg/m^3 (5.0% above the 2.0 mg/m^3 standard) in 1979 to 0.148 mg/m^3 (0.8% above the 2.0 mg/m^3 standard) in 2003 at surface coal mines (NIOSH, 2011—Work-Related Lung Disease Surveillance System, CWXSP. ref. no. 2007T02–14; *http://www2.cdc.gov/drds/WorldReportData/FigureTableDetails.asp?FigureTableID=529&GroupRefNumber=T02-14*). As exposures were reduced, the prevalence of CWP 1/0+ was also reduced, on average. Prevalence information on CWP 1/0+ among miners from the NCWHSP, reported on NIOSH's Web site, was 2.0% in the 1995–1999 time period; 3.6% in the 2000–2004 time period; and 2.7% in the 2005–2009 time period (Table III–1). When tenure is considered, however, the prevalence increased to 2.6%, 4.1%, and 4.1%, respectively (Table III–2). Table III–2 shows that disease progression continues even after exposures were reduced.

Table III-1 – CWXSP: Estimated Number of Actively Employed Workers at Underground Mines, Number of Miners Examined, and Number of Miners with CWP, 1995–2009, Including Those With and Without Tenure Information

MSHA Coal Mining District	1995–1999				2000–2004				2005–2009			
	Average Number Employed	No. X-Rayed	No. with CWP	% with CWP	Average Number Employed	No. X-Rayed	No. with CWP	% with CWP	Average Number Employed	No. X-Rayed	No. with CWP	% with CWP
District 01 (Anthracite coal mining regions in Pennsylvania)	248	26	-	-	204	63	7	11.1	119	58	6	10.3
District 02 (Bituminous coal mining regions in Pennsylvania)	5,356	1,448	15	1.0	5,261	1,777	38	2.1	4,370	1,490	32	2.1
District 03 (Maryland, Ohio, and Northern West Virginia)	6,278	1,058	18	1.7	6,467	1,507	93	6.2	5,911	1,764	38	2.2
District 04 (Southern West Virginia)	9,071	891	46	5.2	8,449	1,690	162	9.6	8,751	1,380	138	10.0
District 05 (Virginia)	4,627	908	60	6.6	4,101	1,389	130	9.4	2,982	776	70	9.0
District 06 (Eastern Kentucky)	5,324	610	38	6.2	5,408	634	42	6.6	4,707	453	60	13.2
District 07 (Central Kentucky, North Carolina, South Carolina, and Tennessee)	4,627	614	26	4.2	4,629	371	25	6.7	3,659	583	50	8.6
District 08 (Illinois, Indiana, Iowa, Michigan, Minnesota, Northern Missouri, Wisconsin)	4,627	2,046	13	0.6	4,882	3,776	37	1.0	4,549	4,891	19	0.4
District 09 (All States west of the Mississippi River, except for Minnesota, Iowa, and Northern Missouri)	3,526	1,810	14	0.8	4,018	3,127	34	1.1	4,338	3,838	36	0.9
District 10 (Western Kentucky)	2,573	688	5	0.7	2,301	1,332	18	1.4	2,534	2,354	26	1.1
District 11 (Alabama, Georgia, Florida, Mississippi, Puerto Rico, Virgin Islands)	4,043	2,731	22	0.8	3,253	1,034	16	1.5	2,626	976	17	1.7
TOTAL	**50,301**	**12,830**	**258**	**2.0**	**48,971**	**16,700**	**602**	**3.6**	**44,546**	**18,563**	**492**	**2.7**

"–" indicates fewer than five miners examined or with CWP (to protect identification of miners screened who have been diagnosed with disease because of privacy laws).

Note: The average number employed during the period, based upon quarterly reports by coal mine operators to MSHA. Because of hiring and layoffs, the total number of individuals who worked at underground mines in any period may exceed the average employment.

Source: CWP data from NIOSH's CWXSP. Coal District codes from MSHA. *http://www2a.cdc.gov/drds/WorldReportData/FigureTableDetails.asp?FigureTableID=2551&GroupRefNumber=T02-17.*

TABLE III–2—CWXSP: NUMBER AND PERCENTAGE OF EXAMINED UNDERGROUND MINERS WITH CWP (ILO CATEGORY 1/0+) BY TENURE INFORMATION PROVIDED ON MEDICAL QUESTIONNAIRE, 1970–2009

		Time Period							
		1970–1974	1975–1979	1980–1984	1985–1989	1990–1994	1995–1999	2000–2004	2005–2009*
	Average No. Employed at Underground Mines.	104,705	150,475	131,113	91,122	69,424	50,319	39,544	44,546
	Number of X-rays	105,841	99,610	45,797	19,049	14,283	12,674	16,644	18,563
	% of Miners X-rayed	101.1	66.2	34.9	20.9	20.6	25.2	42.1	41.7
	% of Miners X-rayed That Reported Tenure Information.	80.9	59.1	78.1	67.3	82.1	71.8	82.9	60.4
Tenure (years in underground mining).	Total No. of Miners Examined	85,644	58,864	35,787	12,816	11,727	9,100	13,794	11,211
	Total No. with CWP	13,288	2,887	1,083	460	424	233	570	455
	Total % with CWP	15.5	4.9	3	3.6	3.6	2.6	4.1	4.1
0–9	No. of Miners Examined	36,303	43,296	23,190	5,063	1,638	806	4,261	4,281
	No. with CWP	803	475	186	44	20	7	47	27
	% with CWP	2.21	1.1	0.8	0.9	1.2	0.9	1.1	0.6
10–14	No. of Miners Examined	6,464	5,460	7,050	4,345	2,968	642	562	311
	No. with CWP	586	328	166	111	68	7	10	**
	% with CWP	9.1	6	2.4	2.6	2.3	1.1	1.8	1
15–19	No. of Miners Examined	6,210	2,705	2,253	2,071	4,037	1,778	1,156	235
	No. with CWP	910	298	139	118	125	34	37	5
	% with CWP	14.7	11	6.2	5.7	3.1	1.9	3.2	2.1
20–24	No. of Miners Examined	8,769	2,044	993	683	2,178	3,475	3,100	958
	No. with CWP	1877	380	102	63	115	86	152	47
	% with CWP	21.4	18.6	10.3	9.2	5.3	2.5	4.9	4.9
25+	No. of Miners Examined	27,898	5,359	2,301	654	906	2,399	4,715	5,426
	No. with CWP	9,112	1,406	490	124	96	99	324	376
	% with CWP	32.7	26.2	21.3	19	10.6	4.1	6.9	6.9

* Number from Table III–1, 2005–2009 number of miners X-rayed.
** Indicates fewer than 5 miners with CWP.
Source: CWP data from NIOSH's Coal Workers' X-ray Surveillance Program (CWXSP). Ref. No. 2007F02–06, 2011T02–12.

Some commenters stated that the prevalence of disease was overstated in the proposed rule. Annual prevalence data are reported on NIOSH's Web site and summarized in Table III–3 for 1970 through 2009. Prevalence in 1970, the first year of surveillance, was 2,162 cases (30.5%). The respirable dust standard at the time was 3.0 mg/m³. As shown in Table III–3, the percent of miners show a downward trend until after 1999. In the last decade, the observed prevalence of CWP 1+ in examined miners has varied from a low of 46 cases (2.6%) in 2004 to 167 cases (5.8%) in 2006. The number of miners examined in 2005 was only 706 miners; 37 of them, or 5.2%, were diagnosed with CWP 1/0+. In comparison in 2000, 6,264 miners were examined and 242 (3.9%) were diagnosed with CWP 1/0+.

TABLE III–3—CWXSP: NUMBER AND PERCENTAGE OF EXAMINED UNDERGROUND MINERS (WHO PROVIDED TENURE INFORMATION) WITH COAL WORKERS' PNEUMOCONIOSIS (ILO CATEGORY 1/0+) YEARLY TOTALS, 1970–2009, (USING DATA FROM TABLE III–2)

Year	Total No. of Miners Examined	Total No. with CWP	Total % with CWP
1970	7,085	2,162	30.5
1971	30,703	5,154	16.8
1972	6,916	717	10.4
1973	8,001	961	12.0
1974	32,939	4,294	13.0
1970–1974	85,644	13,288	15.5
1975	8,779	482	5.5
1976	7,581	174	2.3
1977	7,870	194	2.5
1978	10,235	386	3.8
1979	24,399	1,651	6.8
1975–1979	58,864	2,887	4.9
1980	7,532	303	4.0
1981	9,201	234	2.5
1982	4,536	80	1.8
1983	4,833	133	2.8
1984	9,685	333	3.4
1980–1984	35,787	1,083	3.0
1985	3,056	69	2.3
1986	848	30	3.5
1987	2,867	92	3.2
1988	3,589	168	4.7
1989	2,456	101	4.1
1985–1989	12,816	460	3.6
1990	891	61	6.8
1991	1,036	38	3.7
1992	3,578	140	3.9
1993	3,640	95	2.6
1994	2,582	90	3.5
1990–1994	11,727	424	3.6
1995	1,920	57	3.0
1996	607	27	4.4
1997	1,625	32	2.0
1998	883	31	3.5
1999	4,065	86	2.1
1995–1999	9,100	233	2.6
2000	6,264	242	3.9
2001	2,618	104	4.0
2002	1,723	109	6.3
2003	1,423	69	4.8
2004	1,766	46	2.6
2000–2004	13,794	570	4.1
2005	706	37	5.2
2006	2,877	167	5.8
2007	2,923	82	2.8
2008	3,457	111	3.2
2009	1,248	58	4.6
2005–2009	11,211	455	4.1

Source: CWXSP—Coal Workers' X-ray Surveillance Program—Ref. No. 2011T02–12, *http://www2a.cdc.gov/drds/WorldReportData.*

Some commenters, who stated that current risks of CWP were overstated in the proposed rule, suggested that recently observed cases were due to high coal ranks and/or excessive silica exposures associated with geographically limited areas within the United States. These commenters stated that the increase in prevalence of CWP is distinctly regional and that the proposed 1.0 mg/m³ standard should not apply to regions that do not have an increase. Some of these commenters also said that CWP has been eliminated in the Midwest (i.e., Indiana, Illinois, and Western Kentucky) and pointed out that MSHA District 8 has a high participation rate in the CWXSP and the

lowest CWP rate in the country. A few commenters acknowledged that the prevalence of PMF has increased but, citing Wade et al. (2010), attributed the increase to greater silica exposure from drilling through rock. Some commenters also stated that MSHA should have examined its own silica exposure data before concluding that recently observed cases of CWP were caused by respirable coal mine dust exposures under the existing standard.

As noted in the proposed rule (75 FR 64462–64463), MSHA is aware that some cases of rapidly progressive CWP have been detected in a small percentage of miners diagnosed initially with CWP 1/0+; however, these cases are a small proportion of the larger group of miners across the U.S. who have been diagnosed with CWP 1/0+ that need to be studied to determine the reasons for the rapid progression (see Antao et al. 2005, 2006; Attfield and Petsonk, 2007).

The Wade et al. paper cited by commenters reported on a retrospective chart review of a group of 138 coal miners with PMF who were approved for benefits by the West Virginia State Occupational Pneumoconiosis Board between January 2000 and December 2009. The mean age of this group of miners was 52.6 years (40–77 years) and they had an average tenure of 30 years (7.5 to 47 years). Miners who worked as continuous mining machine operators or roof bolting machine operators had the highest occurrence of PMF (41% and 19%, respectively). The time of progression to PMF was studied in a subgroup of these miners when normal x-rays were available for comparison to x-rays showing advanced disease. In this subgroup of 43 miners, the time between the last normal chest x-ray and one showing advanced disease averaged 12.2 years (5 to 27 years). No data on quartz exposure or respirable coal mine dust was provided by Wade et al.

McCunney et al. (2009) noted in their review of epidemiology literature that coal dust has been described as ''able to mask the fibrogenic activity of quartz'' and that there are ''distinct pathological differences between simple pneumoconiosis of CWP and silicosis.'' Researchers initially thought that the active agent in respirable coal mine dust that was responsible for CWP development was quartz. However, research reported a poor correlation between radiological evidence of CWP and quartz concentration in the corresponding coal dust; there was no pattern between the quartz content of mixed dust and the probability of developing simple pneumoconiosis at quartz levels averaging 5 percent. Based on the collective weight-of-evidence of human epidemiology studies, animal investigations and *in vitro* evaluations contained in the preambles to the proposed rule (75 FR 64458, October 19, 2010) for this final rule and to the 2003 proposed rule on Verification of Underground Coal Mine Operators' Dust Control Plans and Compliance Sampling for Respirable Dust (68 FR 10837, March 6, 2003), it is apparent that quartz is not the predominant factor in the development of CWP. In fact, the results of large-scale epidemiological studies in Germany, the United Kingdom, France, and the United States indicate varying levels of risk of CWP, based on the type of coal regardless of silica content.

McCunney et al. (2009) also reported on the results of research conducted by Miller et al. (1995) in British coal miners. These miners participated in the Pneumoconiosis Field Research (PFR) program. As reported in the preamble to the proposed rule (75 FR 64462), that program, in addition to periodic chest x-rays, also collected separate industrial hygiene data that quantified typical concentrations of respirable dust and quartz for a variety of occupations within the mines. These exposure measurements were used to determine individual exposure profiles for participating miners. Miller et al. suggested that the rapid progression in radiological abnormalities, their relationship with quartz exposure estimates, and the strength of their relationship with lung function decrements resembled classical silicosis rather than CWP in a subpopulation exposed to quartz concentrations of about 10% at one specific mine. According to McCunney et al., however, recorded progressions of CWP to PMF in such cases may have resulted from misdiagnosing silicosis as CWP. McCunney et al. also reported similar findings of misdiagnosis in a case/control study of British coal miners that showed an effect of unusually high levels of quartz exposure on rapid CWP-progression.

The preamble to the proposed rule reported that NIOSH researchers determined that cases of rapidly progressive CWP are sentinel health events (75 FR 64468). Antao et al. (2005) identified a total of 886 cases of CWP among 29,521 miners examined from 1996 to 2002 in the CWXSP. CWP progression was evaluated in 783 of these miners; 277 (35.4%) were cases of rapidly progressive CWP, including 41 with PMF. The miners with rapidly progressive CWP were younger than miners without rapid progression, worked in smaller mines, and reported longer mean tenure in jobs involving work at the face (production area) of the mine. Many of these cases of rapidly progressive CWP developed in miners from eastern Kentucky and western Virginia. Eight cases showed progression of one subcategory over 5 years, 156 cases had progression equivalent to two or three subcategories over a 5-year period, and 72 cases had progression equivalent to more than three subcategories over a 5-year period.

Rounded opacities were the primary shape/size in 73% of the rapidly progressive cases compared to 50% in the non-rapidly progressive cases. Overall, the miners with rapidly progressive CWP were somewhat younger (mean age 48) than the remaining miners evaluated (mean age 51), but were similar in mean work tenure (27 to 28 years). Rapidly progressive cases were more likely to have worked in smaller mines than in larger mines. Rapidly progressive CWP cases reported longer mean tenure in jobs involving work at the face of the mine (19 years), compared to miners without rapid progression (17 years). These particular cases occurred in miners from eastern Kentucky and western Virginia (Antao et al., 2005).

Clusters of newly identified cases of advanced pneumoconiosis were surveyed in 2006 by ECWSHP teams that visited two counties in Virginia (Antao et al., 2006) and in eastern Kentucky and southwestern Virginia (Attfield and Petsonk, 2007). In March and May of 2006, a total of 328 underground coal miners employed in Lee and Wise counties in Virginia were examined. This was 31% of the estimated 1,055 underground miners in those counties. The mean age of examined miners was 47 years, and their mean tenure working in underground coal mines was 23 years. A total of 216 (66%) had worked at the coal face for more than 20 years; and 30 of the 328 miners (9%) had radiographic evidence of pneumoconiosis (i.e., category 1/0 or higher profusion of small opacities). Of these, 11 miners had advanced cases of CWP, including five with large opacities consistent with PMF and six with coalescence of small opacities on a background profusion of category 2. Among the 11 miners with advanced cases, the mean age was 51 years (range: 39–62 years), the mean tenure in underground coal mines was 31 years (range: 17–43 years), and the mean number of years working at the coal face was 29 years (range: 17–33 years). All 11 advanced cases met the radiographic criteria for rapidly progressive CWP. All reported at least one respiratory symptom (i.e., productive cough, wheeze, or shortness

of breath), the most common being shortness of breath (dyspnea). Four of the nine who underwent spirometry testing had abnormal results (Antao et al., 2006).

In a separate ECWSHP survey in 2006, pneumoconiosis rates were determined for 26 sites in seven counties in eastern Kentucky and southwestern Virginia (Attfield and Petsonk, 2007). A total of 975 (20%) of the 4,897 active underground miners in the counties participated; 37 (4%) of those tested had advanced pneumoconiosis. Medical records indicated that all 37 miners with advanced disease had worked underground for at least one interval of 10 years without a chest x-ray; 22 (59%) had worked for at least one interval of 20 years without a chest-ray, and 2 others had worked for more than 30 years without a chest x-ray. Attfield and Petsonk found that miners who worked at the coal face (not typically associated with silica dust exposure) and roof bolting machine operators (typically associated with higher silica dust exposure) with similar tenure underground (about 30 years) developed PMF at high rates. PMF was identified in 64% of the face workers and 42% of the roof bolting machine operators. Attfield and Petsonk examined disease development patterns in this population of miners since silicosis can develop faster than CWP. They found that 1 of 26 roof bolting machines operators (4%) progressed to PMF in less than 10 years, compared with 2 of 11 coal-face workers (18%).). Silica exposure was identified as only one of several factors possibly related to rapid disease progression in this population. The authors listed various potential explanations for the continued occurrence of advanced pneumoconiosis: The respirable dust standard may have been too high; failure to comply with or enforce respirable dust regulations; lack of adjusting disease prevention practices to accommodate changes in mining practices; and missed opportunities for miners to be screened for early disease. The 3 mm rounded opacities may or may not be associated with silica.

Suarthana et al. (2011) cited references by Laney et al. (2009) and Laney and Attfield (2010). These papers attempted to further illustrate what factors may be involved in the rapid progression of CWP to PMF by focusing on the presence of a specific type of x-ray findings frequently associated with silicosis (rounded pneumoconiotic opacities exceeding 3 millimeter (mm)—r-type) (Laney et al., 2009) and mine size (Laney and Attfield 2010) in U.S. coal miners who participated in the CWXSP. Laney examined NIOSH CWXSP data between 1980 to 2008 (2,868 radiographs showing ILO category 1 or greater small opacities out of a total of 90,973 available) found that r-type opacities, frequently associated with silica exposure, occurred in 201 radiographs representing 0.22% of the total number of radiographs examined. The 3 mm rounded opacities may or may not be associated with silica. It is a matter of sensitivity and specificity. It is not a silica-specific finding, but is often or frequently associated with silica exposure. Laney and Attfield examined NIOSH CWXSP data collected between 1970 and 2009 and evaluated the effect of mine size on the development of CWP and PMF. They found that miners working in small mines (fewer than 50 employees) had a significantly higher prevalence of CWP compared to miners who worked in large mines (with 50 or more employees). They reported that miners from small mines were five times more likely to have radiographic evidence of PMF (1% of miners) compared to miners from larger mines (0.2%). The Laney and Attfield (2010) study was the first to directly examine the relationship between miners' respiratory health and mine size in the U.S. They concluded that: there are distinct differences between large and small mines that potentially influence the amount and type of exposures; and the effect of small mine size on development of CWP risk was consistent across all mining states and was not confounded with coal rank or geographical region. They also found the small mine effect on CWP in other states, not just in thin seam mines that are primarily concentrated in Kentucky, Virginia, and West Virginia.

Other epidemiological studies on U.S. coal miners, discussed in the proposed rule (75 FR 64459), conclude that the rank of coal mined influences CWP rates among coal workers, suggesting that coal's carbon content is a factor in CWP risk (Huang et al., 2005, McCunney et al., 2009). According to these studies, coal from districts with lower rates of CWP (while considering similar levels of exposure to coal, both in concentration and duration) show that coal high in bioavailable iron (BAI) is associated with the highest risk of CWP. Results of *in vitro* studies with human and animal cell lines are consistent with the epidemiological data that suggest that risk of CWP is not based on quartz, but most likely due to the concentration of BAI. *In vitro* studies provide further support for the role of iron in the inflammatory process associated with CWP. (Huang et al., 2005; Zhang and Huang 2005; Zhang et al., 2002).

Huang evaluated the quality of coal, including BAI, as determined by the U.S. Geological Survey database of coal quality, across seven regions of the U.S. These data were compared to data from the first National Study of Coal Workers' Pneumoconiosis. The authors found that CWP prevalence was correlated with pyritic sulfur or total iron in the coals but not with coal rank or silica. They concluded that a significant correlation between CWP prevalence and levels of BAI exist, moderated by certain minerals in the coals that can interact and contribute to different levels of BAI and, therefore, different levels of CWP and associated COPD.

Although CWP and silicosis may have some similar clinical patterns, their etiology is different (McCunney et al., 2009; 75 FR 64458, October 19, 2010). Recent studies on U.S. coal miners illustrate this point (Antao et al., 2006; Attfield and Petsonk 2007; Laney et al., 2009, Laney and Attfield 2010, and Wade et al., 2011).

Miller et al. (1997, 2007) and Miller and MacCalman (2009) reported on the results of mortality research conducted in a group of British coal miners. These miners participated in the Pneumoconiosis Field Research (PFR) program. As reported in the preamble to the proposed rule (75 FR 64462), industrial hygiene data was collected as part of that program to quantify typical concentrations of respirable dust and respirable quartz for a variety of occupations within the mines. The data was used to determine individual exposure profiles for participating miners. The mortality of this large cohort of 17,820 coal miners was followed from 1970 through 2006 (Miller et al. 2007). The researchers presented alternative regression analyses to predict risk of mortality in relation to time-dependent estimates of individual exposures to respirable dust and respirable quartz. The researchers concluded that CWP mortality is directly related to exposure to respirable coal mine dust, which is a better single predictor of CWP risk than is respirable quartz exposure. These results are consistent with earlier findings (Hurley et al. (1982); Miller et al. (1997)) that respirable coal mine dust exposure is more closely associated with the development of pneumoconiosis than is quartz. Based on all of the available evidence, MSHA believes that respirable coal mine dust has a fibrogenic effect on the development of CWP in coal miners independent of the quartz or silica content of the coal. High silica content may accelerate the progression of CWP to PMF, the most severe form of CWP, but there is no evidence to suggest that

the presence of silica is a necessary condition for CWP, PMF, severe emphysema, or NMRD mortality.

Exposure to respirable coal mine dust from high rank coal is associated with greater risks of CWP and nonmalignant respiratory disease (NMRD) mortality. However, evidence of high risks in identified hot spots does not imply that risks in other areas are insignificant. Exposure to respirable coal mine dust from lower rank coal still places miners at significant excess risk for CWP and NMRD mortality. MSHA's Quantitative Risk Assessment (QRA) for the final rule shows that significant excess risks of CWP and NMRD mortality under the existing standard are present for miners at low rank coal mines—i.e., outside the geographic ''hot spots'' identified by some commenters. (See QRA, Tables 13, 14, 15, 17, and 18).

The CWXSP data from 2005–2009 published by Suarthana et al. show that some regions with lower rank coal, i.e., regions not identified as hot spots, also tend to have younger miners with less tenure. For example, in MSHA Districts 8, 9, and 10, tenure underground was less than 5 years for 49.1%, 47.0%, and 49.4% of the miners, respectively. Surveillance of underground coal miners in these regions indicates that CWP is occurring, though at lower rates, primarily due to the age and tenure profile of the miners. In the remaining Districts that mine bituminous coal, the median tenure was over 20 years (Table III–4).

Suarthana did not publish data from MSHA District 1, which mines anthracite, the highest ranked and most fibrogenic coal. District 1 surveillance data from NIOSH (USDHHS, CDC, NIOSH, Statistics for Underground Miners Working in MSHA District 01 (Anthracite Coal Mining Regions in Pennsylvania, 2011b) shows that during the period of 2004–2008, 67 anthracite miners participated in the ECWHSP. Age information was available for 58 miners. Mean age was 41 (range 18–69 years). Tenure information was available on 55 of these miners. The mean tenure was 17 years (range 0–45 years). Information on tenure at the face (production area) was available for 51 miners; mean years of face work was 17 years (range 1–45 years). The prevalence of CWP 1+ in 58 examined miners was 6 cases (or 10%). Commenters did not include anthracite coal mines in MSHA District 1 in their discussions of regional hot spots or suggest that silica was responsible for CWP at anthracite coal mines. Nevertheless, at exposure levels experienced over a 45-year occupational lifetime under the existing standard, anthracite coal mines present significant excess risks of CWP and NMRD mortality. (See QRA, Tables 13, 14, 15, 17, and 18). In the case of NMRD mortality, risks for anthracite coal miners are estimated to be far greater than for miners in the same occupations at high rank bituminous coal mines (QRA, Tables 17 and 18).

Overall, NIOSH surveillance data indicate that pneumoconiosis at the CWP 1/0+ level is occurring in underground coal miners across each MSHA Coal District in the United States; not just in the ''hot spot'' areas of southern West Virginia, eastern Kentucky, and western Virginia highlighted by some commenters.

Table III–4 shows that almost 50 percent of CWXSP participants in Districts 8, 9, and 10 have tenure of less than five years; and, yet, miners in those districts continue to develop CWP 1/0+ at 0.6% (16 cases), 1.2% (28 cases), and 2.3% (27 cases) respectively. As shown in Table III–1, miners continue to develop CWP in all MSHA Districts.

The commenters who questioned the validity of the reduction in the existing 2.0 mg/m^3 standard focused on the dose-response relationship and asserted that data generated from pre-1970 were out-of-date and should not be used for risk assessment purposes. MSHA's QRAs for the proposed and final rules assessed risk at current exposure levels. Data shown in Tables III–1 and III–2 indicate that CWP is continuing to develop, especially in miners with more underground tenure, as stated in MSHA's QRA. Almost all of these miners have worked only during the period while the existing 2.0 mg/m^3 standard has been in effect. While average exposures have been reduced, current exposure conditions place miners at significant risk of incurring material impairment of health or functional capacity over their working lives.

Other commenters suggested that MSHA selectively chose CWP data to include in the health effects assessment. They suggested that CWP prevalence is not increasing. In response, MSHA notes the data show that there was a reduction in prevalence of CWP in the 1990s until continued surveillance indicated that many cases of CWP were missed or newly developed (Attfield et al., 2009). Also, the prevalence of CWP increased with age and tenure. (See Tables III–1, III–2, III–3, and III–4.)

TABLE III–4—COAL WORKERS' X-RAY SURVEILLANCE PROGRAM (CWXSP)—UNDERGROUND COAL MINING SURVEY SUMMARIES OF OBSERVED PREVALENCE OF CWP—2005–2009 [1] [2]

Parameters	MSHA District									
	2	3	4	5	6	7	8	9	10	11
Median Dust (in mg/m³)	0.79 (0.54–1.05)	0.96 (0.46–1.20)	0.80 (0.31–3.08)	0.55 (0.18–2.34)	0.75 (0.36–1.17)	0.69 (0.28–1.12)	1.14 (0.73–1.70)	0.98 (0.30–1.30)	1.14 (0.76–1.21)	0.99 (0.52–1.12)
Number of Miners	911	1,504	1,280	689	423	522	2,713	2,351	1,190	825
Age of Miners Examined:										
≤19	1	10	0	0	0	6	43	73	28	3
20–29	84	148	106	29	29	67	682	686	339	64
30–39	129	207	216	79	70	103	613	529	346	91
40–49	142	218	282	242	174	192	564	524	222	175
50–59	471	785	607	316	132	143	729	464	240	424
≥60	84	136	69	23	18	11	82	75	15	68
Median Tenure (range)	25 (0–44)	22 (0–50)	25 (0–44)	27 (0–42)	24 (0–44)	20 (0–42)	5 (0–45)	5 (0–42)	5 (0–40)	24 (0–50)
Tenure %:										
0–4 years	20.1	20.6	11.0	7.8	8.5	14.0	49.1	47.0	49.4	25.5
5–10 years	11.5	12.9	12.1	6.5	10.9	11.5	14.1	14.6	16.2	6.6
11–20 years	11.5	14.0	18.9	14.7	19.4	24.7	12.9	14.8	14.1	10.6
21–30 years	28.2	25.3	26.7	44.0	40.9	33.3	17.6	18.0	13.4	40.1
41–40 years	28.3	26.5	30.6	26.6	19.6	16.3	6.2	5.4	6.9	17.0
> 40 years	0.3	0.7	0.7	0.4	0.7	0.2	0.1	0.1	0.0	0.4
Observed Prevalence of X-ray Findings:										
CWP 1/0+	22 (2.4%)	39 (2.6%)	125 (9.8%)	62 (9.0%)	58 (13.7%)	49 (9.4%)	16 (0.6%)	28 (1.2%)	27 (2.3%)	20 (2.4%)
Age of Cases:										
≤19	0	0				0	0	0	0	0
20–29	1	1	0	0	0	0	2	1	2	0
30–39	0	0	1	1	0	1	2	5	2	0
40–49	3	8	23	25	28	19	1	8	10	4
50–59	14	23	89	30	29	28	10	13	12	10
≥60	4	7	12	6	1	1	1	1	1	6

[1] Inspector-measured coal mine dust concentration data at mine level 1970–2008.

[2] Observed prevalence is reported; Suarthana et al. estimated predicted CWP prevalence by using the 1992 Attfield and Morring (1992b) model. Attfield and Morring used mean job-specific dust levels used in the 1992 estimates, not mean mine specific dust levels. The paper reported median dust levels.

Source: Suarthana et al., 2011.

NIOSH reports prevalence in 5-year intervals for miners who voluntarily participate in the CWXSP. The numbers of miners who volunteer for medical surveillance vary over time (Table III–2) and the degree of detailed information provided also varies over time. Participation rates are dependent, in part, on availability of screening resources. NIOSH screens as many miners as possible through both the CWXSP (regular screening program) and the ECWHSP (enhanced screening program). Over time, the percentage of actively employed miners who volunteered for medical surveillance varied from 26% for the 1995–1999 time period to 34% for the 2000–2004 time period to 42% for the 2005–2009 time period, across all MSHA Districts (Table III–1). The requirements in final § 72.100 will increase participation rates. Final § 72.100 requires that each operator provide to each miner, including each surface coal miner, who begins work at a coal mine for the first time, an initial examination consisting of chest x-rays, spirometry, symptom assessment, and occupational history, and the opportunity to have the medical examinations at least every 5 years thereafter. MSHA expects that participation rates will increase due to the inclusion of surface miners in the screening/surveillance program. Other commenters suggested that more studies need to be completed before a revised standard can be developed since MSHA did not demonstrate that cases of CWP can be prevented under the proposed standard.

The QRA to the proposed rule demonstrated that cases of CWP, along with emphysema, silicosis, and chronic bronchitis, known collectively as ''black lung,'' could be prevented under the proposed respirable dust standards. The QRA relied on MSHA inspector and operator sampling data collected during the 5-year period 2004–2008 and predominantly relied on 4 epidemiologic studies from 1995, 2007, 2008, and 2009. These studies relied on coal mine dust samples and data collected from 1968 to 1988. The researchers, who conducted the studies that MSHA relied on for the proposed rule, took steps to mitigate biases in the data used to estimate the health effects of miners' exposure to respirable coal dust. The relationship between exposure to respirable coal mine dust and disease prevalence is essentially unchanged since the studies that MSHA relied on were conducted. In addition, MSHA upwardly adjusted operator samples and excluded abatement samples taken by MSHA to mitigate biases in the MSHA data. The QRA showed that exposures under the existing respirable coal mine dust standards are associated with cases of CWP, chronic obstructive pulmonary disease (COPD) including severe emphysema, and death due to non-malignant respiratory disease (NMRD). All of these outcomes constitute material impairments to a miner's health or functional capacity.

The QRA also analyzed and quantified the excess risk of miners incurring CWP or COPD, or dying due to NMRD, after 45 years of full-shift occupational exposure at levels currently observed in various exposure categories. Miners having different occupations and working at different locations face significantly different levels of respirable coal mine dust exposure. In every exposure category, including clusters of occupational environments showing the lowest average dust concentrations, current exposure conditions place miners at significant risk of incurring each of the material impairments considered.

Finally, the QRA projected the risk of material impairments after the proposed respirable dust standards were applied to each shift. Several provisions in this final rule will singularly lower coal miners' exposure to respirable dust and reduce their risks of disease and disease progression. These provisions include lowering the respirable dust standard, full-shift sampling to account for occupational exposures greater than 8 hours per shift, changing the definition of normal production shift, use of CPDMs for sampling, basing noncompliance determinations on MSHA inspectors' single shift sampling, revising the sampling program, requiring operator corrective action on a single full-shift operator sample, and changing the averaging method to determine compliance on operator samples. MSHA's QRA estimates the reduction in health risks when two provisions of the final rule are implemented—the final respirable dust standard and single shift sampling. The QRA shows that these two final provisions would reduce the risks of CWP, severe emphysema, and death from non-malignant respiratory disease (NMRD). For instance, the QRA for the final rule projects, over a 45-year occupational lifetime, significant improvements in almost every underground job category and at least 6 surface categories. Large aggregated improvements are also projected for longwall tailgate operators and continuous mining machine operators.

While the final 1.5 mg/m^3 standard will reduce the risk of impairment, disease, and premature death, estimates from MSHA's revised QRA reveals remaining risk at the final standard. However, MSHA believes that other provisions of the final rule will diminish these risks. The impacts of these other final provisions were not considered in the QRA. Cumulatively, MSHA expects that the final provisions will reduce the continued risks that miners face from exposure to respirable coal mine dust and would further protect them from the debilitating effects of occupational respiratory disease.

It has been over 40 years since the 1969 Coal Act was enacted. Exposures to respirable coal mine dust have been reduced with resultant reduction in disease prevalence. Table III–2 shows that: In the time period from 2005 to 2009 miners with over 25 years of tenure in underground coal mining have a CWP 1/0+ prevalence of 6.9%; and miners with only 0–9 years of tenure have CWP 1/0+ prevalence of 0.6% for that same time period. These miners are younger and have less cumulative exposure to respirable coal mine dust. The average prevalence of CWP 1/0+ for the period 2005 to 2009 was 4.1%.

The overall prevalence of CWP 1/0+ in all miners was 2.7% (See Table III–1) for the 2005–2009 time period. However, NIOSH data show that CWP 1/0+ is still occurring at significant levels in the active mining population. With continued surveillance over time, the number of CWP 1/0+ cases detected annually fluctuates; however, significant risk of material impairment of coal miners' health still remains, as noted in the QRA for this final rule.

Smoking in miners was mentioned by some commenters as a causative factor for observed lung disease in miners.

Exposure to coal mine dust is an independent factor in the development of CWP. Smoking is a risk factor for the development of lung disease, including cancer, COPD, and emphysema. Smoking and exposure to respirable dust have an additive effect on the development of COPD in miners. However, as shown in the Health Effects section of the preamble to the proposed rule, significant levels of NMRD, such as COPD and emphysema, occur in nonsmoking miners caused by their exposure to respirable coal mine dust.

In the first round of the CWHSP, 54.4% of underground coal miners were smokers, 25.5% were former smokers, and 20.1% were never smokers (Beeckman, et al., 2001; Beeckman, et al., 2002). Estimates of the current prevalence of smoking in coal miners (by MSHA District) are shown in Table III–5. This data set was reported as part

of the ECWHSP data on NIOSH's Web site. Smoking status among surveyed coal miners is currently estimated to be 22% smokers, 27% former smokers, and 51% never smoked. Again, since respirable coal dust exposure and smoking have an additive effect on the occurrence of COPD in smoking miners, MSHA believes the reduction in respirable dust levels in mining due to implementation of the final rule, coupled with the reduction in smoking in the mining population, also would have a beneficial effect on reducing the occurrence of NMRD in this population over time. (See Section IV, Health Effects, in the preamble to the proposed rule (75 FR 64458), Green et al., 1998a, and Kuempel et al., 2009b.)

TABLE III–5—SMOKING PREVALENCE AMONG COAL MINERS PARTICIPATING IN THE ECWHSP, 2006–2010

MSHA district	Number of miners	Smoking status		
		Never (%)	Former (%)	Current (%)
1	58	22 (38)	8 (14)	28 (48)
2	664	356 (54)	200 (30)	108 (18)
3	1,019	531 (52)	264 (26)	224 (22)
4	1,059	573 (54)	250 (24)	236 (22)
5	629	314 (50)	170 (27)	145 (23)
6	374	182 (49)	79 (21)	113 (30)
7	443	205 (46)	109 (25)	128 (29)
8	667	312 (47)	205 (31)	150 (22)
9	879	462 (53)	262 (30)	155 (18)
10	135	78 (58)	39 (29)	18 (13)
11	565	299 (53)	158 (28)	108 (19)
Total	6,492	3,334 (51)	1,744 (27)	1,413 (22)

Source: USDHHS, CDC, NIOSH, CWHSP, Statistics for Underground Miners, Districts 1 to 11, 02/13/2011.

MSHA's existing standard permits overexposures above the respirable coal mine dust standard due to averaging samples. Some commenters expressed concern that the proposed single sample provision would increase the number of citations that a mine operator receives, but would not affect a miner's long-term exposure and the subsequent development of chronic health effects.

The single sample provision in this final rule is changed from the proposal and only applies to MSHA inspector samples. MSHA does not anticipate that this final provision will, over the long term, increase the number of operator citations. A single sample that exceeds the standard would not cause or significantly contribute to disease. However, cumulative overexposures—masked when used as part of an average based on multiple samples—could cause or significantly contribute to development or progression of diseases, with each overexposure being an important factor contributing to disease. Compared to the current method of dust sampling, single full-shift samples will reduce a miner's cumulative exposure to respirable coal mine dust and the risk of developing occupational respiratory disease. For these reasons, single full-shift samples above the standard must be controlled so that miners' cumulative exposure is not increased beyond the level that will induce disease.

Final § 72.800 provides that the Secretary will use a single, full-shift measurement of respirable coal mine dust to determine the average concentration on a shift since that measurement accurately represents atmospheric conditions to which a miner is exposed during such shift. Additional discussion on single full-shift sampling is located elsewhere in this preamble under § 72.800.

Some commenters questioned the relationship between respirable coal mine dust exposure and development of NMRD, such as COPD and chronic bronchitis. Epidemiological studies that were discussed in the Health Effects section of the preamble to the proposed rule (75 FR 64460) found that coal miners from the United States, Great Britain, Australia, France, Asia, and South Africa developed decreased lung function that was proportional to the miners' cumulative respirable coal mine dust exposure. Exposure to higher respirable coal mine dust levels over a working lifetime resulted in more miners experiencing a significant loss of lung function. These studies illustrate a strong dose-dependent relationship between respirable coal mine dust exposure and subsequent development of obstructive lung diseases, such as lung function impairment, chronic bronchitis, and emphysema (75 FR 64465). The decline in lung function is not linear; studies indicate that there may be some recovery following a year or two of exposure. But, the recovery can be temporary and is affected by continued exposure. As the number of years working in mining grows, the adverse effect on lung function does as well.

Chronic exposure to respirable coal mine dust causes chronic bronchitis, as was found in 35% of a mining population in the United States. This disease is different from that caused by tobacco smoke. Coal mine dust-related bronchitis is associated with deposits of fibrous tissue, mineral pigment, and inflammatory cells in the walls of membranous and respiratory bronchioles and alveolar ducts. This condition is referred to as mineral dust airways disease. Emphysema is caused both by smoking and coal mine dust exposure. Severity of disease has been related to dust content of the lungs and cumulative lifetime coal mine dust exposure. Kuempel et al. (1997b) showed that significant decrements in lung function occur by the age of 65 years in long-term nonsmoking miners exposed to an average respirable coal mine dust concentration of 0.5 mg/m^3.

One commenter stated that for proper evaluation of the health effects studies, more information is needed; such as miner jobs, number of job changes, time spent on specific jobs, number and size of mines, and employment in different mines.

Many of the studies reported in the proposed rule had this type of detail in the data collected from certain mining populations, although only summary data were reported in the published papers. This type of detail was available in the industrial hygiene (IH) surveys conducted by British researchers as part of the Pneumoconiosis Field Research (PFR) program established in the early

1950s and explained in the proposed rule (75 FR 64462). Concurrent with the health surveys, a separate IH assessment was conducted as part of the PFR program that quantified typical concentrations of respirable dust and quartz for a variety of occupations within the mines. These exposure measurements were linked to data from payroll systems on the times worked by each miner in the same occupations. This IH assessment produced individual and period-specific estimates of exposure to respirable dust and quartz (MacCalman and Miller, 2009; Attfield and Kuempel, 2003; Scarisbrick and Quinlan, 2002).

In addition, the U.S. National Coal Study (NCS) is a long-term epidemiologic study, limited to miners in a selected group of mines with various seam heights, mining methods, coal types, and geographic locations. Many of the published peer-reviewed epidemiological studies reported in the proposed rule's health effects section are based on data from the NCS. In those studies, estimates of cumulative dust exposures were given. Examples of these studies include Henneberger and Attfield (1997) and Kuempel et al. (1997b). These papers were reviewed in the development of the proposed rule (75 FR 64460).

Similarly, some commenters identified seam height or mine size as potential factors that were not modeled in the regression analyses but could potentially contribute to the observed frequency of adverse health effects. To date, there are some epidemiological studies that have directly explored the association of coal seam height or mine size and CWP, PMF, non-malignant respiratory diseases, emphysema, or FEV_1 declines. However, no epidemiological coal miner studies have modeled respirable coal mine dust and non-malignant respiratory diseases while examining the confounding effect of coal seam height. The available studies are described below.

Peters et al. (2001) studied the influence of coal seam height on lost-time injury and fatality rates at small underground bituminous coal mines. Nonetheless, Peters did not examine the association of coal seam height and NMRDs or FEV_1 declines among coal miners.

Suarthana et al. (2011) stated that low seam height likely contributed to excess CWP cases. It was also noted that thin seam mining poses difficulties because the rock surrounding the coal seam often has to be cut to permit equipment to be employed effectively (also see Pollock et al., 2010). Suarthana et al. (2011) noted that the average coal seam height was lower in central Appalachia than in other regions (median seam height 60 (range 26–138) inches versus 79 (range 31–168 inches; $p<0.001$). Data on seam height were obtained from the MSHA Standardized Information System (MSIS) for the time period of 2005–2009. Suarthana concluded that the observed prevalence of CWP substantially exceeded predicted levels in central Appalachia. Therefore, coal seam height was reported as a likely factor contributing to the observed elevated CWP rates. However, Suarthana stated that further study is needed to characterize the factors responsible for elevated CWP rates. Overall, no direct association between CWP and coal seam height was observed.

Cowie et al. (2006) found FEV_1 deficits in 1,267 (18%) British coal miners. Cumulative respirable dust exposure ranged up to 726 gh/m^3 (gram hours per cubic meter) with a mean of 136 gh/m^3; on average an exposure to cumulative respirable dust of 100 gh/m^3 was associated with a reduction in FEV_1 of 0.0631. In addition, an increase of 50 gh/m^3 was associated with an increase of about 2% in the proportion of men with small deficits in FEV_1 (-0.367 deficit); 1.5% to 2% for medium deficits (-0.627) depending on age; and a similar pattern was observed for large deficits (-0.993), but with smaller increases. Cowie stated that these results may be due to differences in seam height, mechanical breathing efficiencies, or the workload associated with limb size or body mass. Yet, the association of FEV_1 deficits among coal workers and seam height was not explored.

In terms of FEV_1 declines, Wang et al. (1999) investigated the association between occupational exposure to dust and clinically important FEV_1 declines in a group of 310 underground coal miners (cases) and their matched mining referents with stable lung function. This study defined a seam height <50 inches as a low seam mine, and compared the total years worked in low seam mines between two groups 1) cases (310 underground coal miners) and 2) matched partners (referents); cases and referents averaged 7.2 and 5.4 total years worked ($p=0.21$), respectively. However, the authors did not investigate the association between clinically important FEV_1 declines and mine seam height and mine size. Overall, logistic regression models conducted in this analysis did not explore the relationship between clinically important declines in FEV_1 and seam height.

Laney et al. (2010) acknowledged that their study is the first to directly examine miner respiratory health and mine size. Laney also highlighted that the prevalence of CWP and PMF increased between the 1900s and the 2000s for mines of all sizes. The prevalence of CWP is 6.5% in the 1970s, 2.5% in the 1980s, 2.1% in the 1990s and 3.2% in the 2000s. The prevalence of PMF was higher in larger mines (50+ miners) in the 1970s and 1980s; whereas, the prevalence was higher in smaller mines (<50 miners) in the 1990s and 2000s.

Laney and Attfield (2010) examined NIOSH CWXSP data collected between 1970 and 2009 and evaluated the effect of mine size on the development of CWP and PMF. They found that miners working in small mines (fewer than 50 employees) had a significantly higher prevalence of CWP compared to miners who worked in large mines (with 50 or more employees). They reported that miners from small mines were five times more likely to have radiographic evidence of PMF (1% of miners) compared to miners from larger mines (0.2%).

Suarthana et al. (2011) found that mine size (e.g., number of employees in a mine) may be associated with higher CWP prevalence levels. The researchers used the Attfield and Morring (1992b) exposure response model versus the original Attfield and Morring (1992a) model that used mean job-specific dust levels. The researchers stated that they did not have the dust level information specific to all jobs; instead, the researchers estimated dust exposure using the mean mine-specific dust level based on MSHA compliance data. The median measured dust concentration and range are reported at the mine level. However, the QRA for the proposed rule estimated CWP risk based on mean job-specific dust levels. The authors excluded underground coal miners from MSHA district 1 due to the small number of participants (n=55) and difference in coal type (anthracite) compared to the other districts in the analysis (bituminous). In addition, the authors state that further study is needed to characterize the factors responsible for elevated CWP rates; the results point to a need for greater vigilance in controlling coal mine dust, especially that which arises from rock cutting.

One commenter said that MSHA failed to consider in the proposed rule other factors that NIOSH discussed in its 2011 Current Intelligence Bulletin 64, such as free radicals, particle occlusion, and bioavailable iron.

MSHA did not use the 2011 NIOSH literature update in the development of the proposed rule because it was not final when the rule was published on October 19, 2010. However, the Health Effects section in the preamble to the proposed rule included a section called Hazard Identification (75 FR 64458) that discussed these factors and how they affect the toxicity of coal particles.

One commenter stated that MSHA analyzed only part of the NIOSH data. This commenter, however, did not provide detail about what data were missing.

The preamble to the proposed rule stated that it summarized the health effects from occupational exposure to respirable coal mine dust. This summary included a literature review on this same subject published in its proposed rule on Plan Verification, which was published on March 6, 2003 (68 FR 10784). The literature referenced in that document pre-dated 1999. The October 19, 2010, proposed rule updated the health effects information that was published in 2003 and discussed the more recent literature dating from 1997 to mid-2009 (75 FR 64458). MSHA reviewed extensive literature not only published by NIOSH but also published by researchers in other countries, such as France, Britain, Taiwan, Netherlands, Germany, China, and South Africa.

One commenter stated that during the 2009 spot inspections, MSHA personnel routinely observed improper sampling procedures for dust collection, improper handling of sampling devices, and improper maintenance and calibration of approved sampling devices. This commenter stated that improper procedures must be corrected before lowering the respirable dust standards.

In response, MSHA points out that the QRA to the proposed rule was based on both MSHA inspector samples and operator samples during 2008 and 2009. MSHA's enforcement experience is that most mine operators attempt to be in compliance with the existing respirable dust standards during MSHA inspector sampling. However, even if proper sampling procedures, proper handling of sampling devices, and proper maintenance and calibration of approved sampling devices had been used, this Health Effects section and the QRA to the proposed rule establish that at the existing standard of 2.0 mg/m^3, cases of CWP and COPD continue to occur.

A commenter stated that MSHA does not really know how much dust that miners are exposed to and therefore needs to conduct a study using the CPDM to determine the exposure before reducing the exposure level.

Dose-response relationships have been determined by using the approved sampling device (gravimetric or CMDPSU) over the last 35 years. NIOSH and MSHA will continue to study the effects of respirable coal mine dust; however, the relationship between exposure and effect is well established. The final rule will lower miner exposure to respirable coal mine dust thus resulting in less respiratory disease in the miner population.

B. Quantitative Risk Assessment (QRA)

Below is a summary of the quantitative risk assessment (QRA) in support of the final rule. The QRA for the final rule revises the QRA in support of the proposed rule. The QRA for the proposed rule (US Department of Labor, Quantitative Risk Assessment in Support of Proposed Respirable Coal Mine Dust Rule, September 2010) addressed the proposed respirable coal mine dust standard of 1.0 mg/m^3, and 0.5 mg/m^3 for intake air and for part 90 miners. The QRA for the final rule addresses the final 1.5 mg/m^3 respirable coal mine dust standard as well as the 0.5 mg/m^3 standard for intake air and part 90 miners. In response to public comments, it also includes an uncertainty analysis.

The QRA for the proposed rule was peer reviewed by independent scientific experts at NIOSH and OSHA. The full text of that QRA and the peer reviewers' reports can be accessed electronically at *http://www.msha.gov/regs/QRA/CoalDust2010.pdf* and *www.regulations.gov*. MSHA posted all comments on the QRA for the proposed rule at *http://www.msha.gov/REGS/Comments/2010-25249/CoalMineDust.asp* and on *www.regulations.gov*. The full text of the QRA for the final rule can be accessed electronically at *http://www.msha.gov/regsqra.asp* and *www.regulations.gov*.

The QRA for the final rule, like the QRA for the proposal, addresses three questions: ''(1) whether potential health effects associated with current exposure conditions constitute material impairments to a miner's health or functional capacity; (2) whether current exposure conditions place miners at a significant risk of incurring any of these material impairments; and (3) whether the final rule will substantially reduce those risks.''

After summarizing respirable coal mine dust measurements for miners in various occupational categories, Part 1 of the QRA for the final rule shows that exposures at existing levels are associated with CWP, COPD including severe emphysema, and death due to NMRD. All of these outcomes constitute material impairments to a miner's health or functional capacity.

Part 2 of the QRA for the final rule analyzes and quantifies the excess risk of miners incurring CWP or COPD, or dying due to NMRD, after 45 years of full-shift occupational exposure at levels currently observed in various exposure categories. Miners having different occupations and working at different locations face significantly different levels of respirable coal mine dust exposure. In every exposure category, including clusters of occupational environments showing the lowest average dust concentrations, current exposure conditions place miners at a significant risk of incurring each of the material impairments considered.

Part 3 of the QRA for the final rule projects the risk of material impairments after the final respirable coal mine dust standards are applied to each shift. It estimates the reduction in health risks when two provisions of the final rule are implemented—the final respirable dust standard and single shift sampling. The QRA shows that these two provisions would reduce the risks of CWP, severe emphysema, and death from NMRD. Additionally, MSHA believes that other provisions of the final rule (e.g., full-shift sampling, changing the definition of normal production shift, use of CPDMs for sampling, revising the sampling program, and requiring operator corrective action based on a single full-shift operator sample will further diminish these risks.

The final rule is projected to have a greater impact on reducing risk for underground miners than for surface miners. Although the final rule will benefit coal mine workers who are exposed to average respirable dust concentrations both above and below the final 1.5 mg/m^3 and 0.5 mg/m^3 standards, it is projected to have its greatest impact on workers who currently experience frequent exposures to dust concentrations above the final standards. Underground work locations exceed the final respirable dust standards on many more shifts than surface locations and also tend to experience higher average dust concentrations.

The final rule is expected to reduce the risks of CWP, severe emphysema, and NMRD mortality attributable to respirable coal mine dust exposures. Table 28 of the QRA for the final rule contains the projected reduction in these risks for each occupational category. For progressive massive

fibrosis (PMF), the most severe stage of CWP considered, reductions of up to 56 excess cases per thousand are projected for underground workers at age 73, depending on occupation. For severe emphysema at age 73, the projected improvements for underground workers range up to a reduction of 34 cases per thousand depending on occupation. Again for underground workers, the reduction in excess cases of death due to NMRD by age 85 is projected to range up to 6 per thousand, depending on occupation. For surface workers, reductions exceeding 1 case per thousand exposed miners are projected for PMF and severe emphysema in several occupational categories. Excess risks per thousand part 90 miners are projected to decline by 19 cases of PMF at age 73, 14 or 22 cases of severe emphysema at age 73 (depending on race), and 4 cases of NMRD mortality by age 85.

Part 4 of the QRA for the final rule contains an analysis of uncertainties in the projected reductions in risk. This includes both a quantitative analysis of sensitivity to the assumptions and methods used and a qualitative discussion of the maximum range of credible estimates for projected reductions in respirable coal mine dust exposures. MSHA's best estimates were found to lie near the middle of the range produced by alternative assumptions.

In all of its calculations, the QRA assumes that miners are occupationally exposed to respirable coal mine dust for a total of 86,400 hours over a 45-year occupational lifetime (e.g., either 48 weeks per year at 40 hours per week, 32 weeks per year at 60 hours per week, or any other work pattern that amounts to an average of 1,920 exposure hours per year). Current health risks are greater than those shown in the QRA for miners working more than 1,920 hours per year.

In addition, the final rule also tightens the requirement for normal coal production necessary for a valid dust sample, requires the use of CPDMs, revises the dust sampling program, and requires operator corrective action on a single, full-shift operator sample. These provisions are expected to further reduce respirable dust exposures, thereby resulting in improvements greater than those shown in the QRA. For a discussion of the benefits of the final rule, see Chapter V of the REA.

Public comments on the QRA for the proposed rule addressed five issues: (1) Hazard identification, (2) exposure-response models and possible threshold effects, (3) reliance on mean and cumulative exposures, (4) method of projecting exposures and risk reductions under successful implementation of final rule, and (5) uncertainty in the QRA's results.

1. Hazard Identification

Some commenters stated that the QRA for the proposed rule did not contain a hazard identification section, consisting of toxicological, epidemiological, or clinical evidence addressing whether the existing standard of 2.0 mg/m^3 causes incremental harm to miners' health.

MSHA provided a comprehensive evaluation of the critical scientific evidence supporting a causal connection between respirable coal mine dust exposures at the current level and adverse health effects in Section IV, Health Effects, of the preamble to the proposed rule, and in Section 1(d) of the QRA for the proposal which pertained to health effects and material impairment under current exposure conditions.

MSHA agrees with the commenters that the hazard identification step should reflect current biological understanding of the inflammatory mode of action for lung diseases induced by inhalation of coal mine dust. Section IV.B.4 of the preamble to the proposed rule discussed a variety of biological mechanisms including inflammation.

A few commenters stated that the QRA relied on spurious associations among historical trends to establish a causal relationship between respirable coal mine dust exposures and adverse health effects. Associations among historical trends played no role in the QRAs for the proposed or final rules. None of the three published regression analyses on which the QRAs rely regress one time trend against another. Instead, they quantify the relationship between varying levels of accumulated respirable coal mine dust exposure and the relative frequency of CWP (CWP1+, CWP2+, and PMF), severe emphysema, and premature death due to NMRD.[5] The subjects, i.e., data points, of these regression analyses are not rates of disease corresponding to aggregated exposure levels in particular years. Rather, the data points of the regression models are individual miners who were more or less simultaneously exposed to different levels of respirable coal mine dust. Thus, those miners who were exposed to low cumulative exposures serve as an internal control group compared to miners who were exposed to higher cumulative exposures.

Since the pertinent studies included miners whose lifetime cumulative exposures fell well below the existing standards, these studies provide MSHA with a basis for determining whether exposure levels under the existing respirable coal dust standards cause incremental harm to miners' health. This topic was addressed in sections 1(d) and 2 of the QRA for the proposal. The conclusion, subject to assumptions described in Section 2(f) of the QRA, is that current exposure conditions which, as shown in Tables 6 and 12 of the QRA for the proposal, are generally below the existing 2.0 mg/m^3 and 1.0 mg/m^3 standards, place miners at a significant risk of incurring each of the material impairments considered. MSHA reaches the same conclusion in the QRA to the final rule.

A few commenters stated that MSHA improperly relied on estimates of current disease prevalence from the NCWHSP, which was initiated in 1970 and is administered by NIOSH. These commenters stated that the NCWHSP surveillance data is biased due to issues related to the accuracy and precision in the diagnosis of CWP and PMF, low miner participation rates, limited exposure data, and other design and analysis limitations, e.g., participant self-selection.

MSHA did not rely on the NCWHSP surveillance data in its QRAs for either the proposed or final rules. The relatively low participation rates, potential self-selection biases, and a lack of correspondent exposure histories for the individual miners involved limit the use of the surveillance data as support for the QRAs. The QRAs primarily relied on three epidemiologic studies: Attfield and Seixas (1995); Kuempel et al. (2009a); and Attfield and Kuempel (2008). These three studies are consistent with the commenters' statement that estimates of current disease prevalence should characterize historical exposures of individual miners and incorporate cumulative exposure metrics in the analyses to check for a pattern of increasing disease risk with increased dust exposure level.

However, NCWHSP surveillance data are useful in establishing that significant health hazards persist under existing respirable coal dust exposure conditions. Although the utility of these data for quantitative risk assessment is limited, they do show there is an unacceptably high incidence of respirable coal mine dust-related disease among miners whose exposure came entirely after adoption of the existing respirable coal dust standards. (See Section III.A., Health Effects, in this preamble.)

Sections 1(d) and 2 of the QRAs for the proposed and final rules use the

[5] See Appendices I, J, and K of the QRAs for the proposed and final rules.

National Study of Coal Workers' Pneumoconiosis (otherwise known as NCS) data to address the question of whether a lifetime of occupational respirable coal mine dust exposure at the existing standard presents a significantly increased risk of adverse health effects (also see Goodwin and Attfield (1998) and Brower and Attfield (1998)). Unlike the surveillance data, the NCS data contain information on both the health and the respirable coal mine dust exposure of individual miners.

Dust exposure estimates are calculated by summing the products of time worked in each job within an individual miner's work history with dust concentration data from the exposure matrix derived by Seixas et al. (1991). Brower and Attfield (1998) found that the self-reported occupational history information on standardized questionnaires in the NCS collected from U.S. underground coal miners is reliable and that the amount of bias introduced by recalling past employment history is minimal. The NCS is further described in Section III.A of this preamble.

Some commenters discussed possible radiological misclassification in the NCS data.[6] However, these commenters did not dispute the appropriateness of using this type of study to establish a dose-response relationship that can be used effectively in a quantitative risk assessment.

Some commenters challenged the QRA's findings of significant health risks from exposure at the existing 2.0 mg/m³ standard over an occupational lifetime. MSHA addresses issues raised by these commenters in the following subsections: (a) CWP, including PMF; (b) severe emphysema; and (c) mortality due to NMRD.

a. CWP, including PMF

Some commenters acknowledged that the exposure-response analyses of respirable coal mine dust and CWP2+ show strong associations for high rank coal, with increased prevalence below the existing standard. However, these commenters maintained that there are no apparent increases in CWP2+ for low rank coals at exposures below the existing 2.0 mg/m³ standard. According to the commenters, the prevalence of CWP2+ and PMF predicted by the exposure-response models for miners experiencing an occupational lifetime of exposure to respirable coal dust at 2.0 mg/m³ from low or medium rank coal is less than the ''background'' rate, or prevalence, of positive radiographic findings among workers with no occupational exposure to respirable coal mine dust.

The commenters assumed, in reaching their conclusion, that the background prevalence, which had been shown to be approximately five percent for CWP1+ among 60-year-old non-exposed workers, was also five percent for CWP2+ and PMF. MSHA stated during one of the public hearings on the proposed rule that it is not appropriate to compare predictions of CWP2+ prevalence to the background prevalence for CWP1+.

The 1995 Attfield/Seixas study provides a formula, shown in Appendix I of the QRAs for the proposed and final rules, that enables estimation of the background prevalences for CWP1+, CWP2+, and PMF. Based on this formula, Table III–6 below shows the estimated background prevalences specific to CWP1+, CWP2+, and PMF, along with the corresponding prevalences predicted for miners exposed to respirable coal mine dust concentrations averaging 2.0 mg/m³ for an occupational lifetime of 45 years. The predicted prevalences of CWP1+, CWP2+, and PMF for miners exposed to respirable coal mine dust from low/medium rank coal are all far greater than the corresponding background prevalence. For miners exposed to high rank coal, the difference is even greater.

All of the estimated excess risks shown in both QRAs for exposed miners are denoted as ''excess'' risks precisely because the background prevalence has been subtracted from the predicted prevalence among exposed miners. Therefore, the calculation of excess risk always yields zero when exposure equals zero (i.e., no known occupational exposure); and, for exposed miners, excess risk is the increase in predicted prevalence from background. For example, at age 73, the center graph in Figure 10 of the QRAs for the proposed and final rules shows an excess risk of 156 cases of CWP2+ per thousand miners exposed for 45 years to respirable coal mine dust from low/medium rank coal at an average concentration of 2.0 mg/m³. The same result is obtained from Table III–6 below by subtracting the background prevalence of 6.2 percent (62 cases per thousand) from the prevalence of 21.8 percent (218 cases per thousand) shown for exposed miners (i.e., 21.8%-6.2%=15.6%: 156 cases per thousand miners, compare with Figure 10 in both QRAs).

TABLE III–6—EXPECTED PREVALENCE (PERCENTAGE) OF RADIOGRAPHIC FINDINGS INDICATING CWP AND PMF, BASED ON ATTFIELD/SEIXAS LOGISTIC REGRESSION MODEL

Age	Background (zero exposure)			45-year exposure at 2.0 mg/m³ top entry is for low/medium rank coal bottom entry is for high rank coal		
	CWP 1+	CWP 2+	PMF	CWP 1+	CWP 2+	PMF
60	5.3	1.1	0.7	17.8	4.7	2.2
	.....	.....	.....	32.7	14.7	9.3
65	7.6	2.2	1.3	24.1	8.7	4.2
	.....	.....	.....	41.7	25.2	16.9
73	13.3	6.2	3.9	37.1	21.8	11.6
	.....	.....	.....	57.0	49.6	37.8

Moreover, systematic error or bias due to systematic misinterpretation of radiographic data would be equally present in the results for both exposed and unexposed miners. Therefore, the effect, if it exists, of such misinterpretations should be canceled when background prevalence is subtracted from predicted prevalence to form the estimates of excess risk provided in the QRAs for the proposed and final rules. Some commenters

[6] Uncertainty due to radiological misclassification is addressed separately in Section 2, Exposure-Response Models and Possible Threshold Effects, (b) Bias due to Errors in Diagnosis and (c) Bias due to Errors in Exposure Estimates. See Wagner et al., 1992.

emphasized potential biases of this type but failed to mention that comparing the frequency of positive radiographic findings for exposed miners with the appropriate background rates serves to control for such biases.

b. Severe Emphysema

Some commenters stated that the weight of the epidemiological evidence fails to support any clinically significant deficits in forced expiratory volume (FEV_1) or any increased occurrence of chronic obstructive pulmonary disease (COPD) at cumulative respirable coal mine dust exposures equivalent to an occupational lifetime at the existing standard. [See the proposed rule discussion on emphysema; Green et al., 1998a; Kuempel et al., 2009a and 1997b]. However, the only metric used to support this assertion was the average loss in FEV_1 attributable to respirable coal mine dust exposure, across the entire population of exposed miners. Section 1(d)(ii) of the QRAs for the proposed and final rules points out that averaging FEV_1 loss across a population can mask the effects of exposure on susceptible sub-populations. Averaging fails to reveal the risk of FEV_1 reductions that exceed the average by a clinically significant amount.[7] Dust exposure at a given level may affect susceptible individuals to a far greater extent than what is suggested by the average effect. This type of masking is avoided when, as in NIOSH's 1995 Criteria Document, findings are expressed in terms of the prevalence of clinically significant outcomes.

For example, the average reduction in FEV_1 predicted by the Soutar/Hurley (1986) estimate is less than 140 ml after 45 years of occupational exposure to respirable coal mine dust at 2.0 mg/m^3. However, this average reveals little or nothing about the effects on individual miners. If the exposure effects were clinically significant in as little as one percent of all cases (10 cases per thousand), then this would constitute a significant increase in risk associated with exposure. An average reduction in FEV_1 of 140 ml or less does not preclude the possibility that the reduction exceeds 300 ml or even 1,000 ml in a substantial portion of the exposed population. Instead of solely focusing on the average loss in pulmonary function associated with respirable coal mine dust exposure, MSHA also considers the rate at which clinically significant lung function deficits have occurred. Table III–7 (reproduced from Table 7–3 of the NIOSH Criteria Document) provides estimates of the excess risk, i.e., the number of miners expected to develop a clinically significant deficit in FEV_1 per thousand exposed miners after an occupational lifetime of exposure to various concentrations of respirable coal mine dust.[8] Although the commenters correctly counted the Attfield and Hodous (1992) study that showed no clinically significant average reduction in FEV_1, Table III–7 shows that the average reduction is not the only outcome of interest. As shown in Table III–7, the Attfield and Hodous (1992) study also shows clinically significant reductions in FEV_1 in a substantial number of cases per thousand exposed miners. Specifically, for miners at age 65 occupationally exposed to a mean respirable coal mine dust concentration of 2.0 mg/m^3 over a 45-year working lifetime, the estimated excess risk of $FEV_1 < 65\%$ of the predicted normal value is 9 per 1,000 for never smokers in the western region and 12 per 1,000 for the eastern region.[9]

[7] The term ''clinical significance'' is defined as a difference in effect size considered by experts to be important in clinical or policy decisions, regardless of the level of statistical significance (Last, John M., ed. 2001. *A Dictionary of Epidemiology,* Fourth Edition. New York: Oxford University Press, Inc.

[8] The values shown in Table III–7 represent excess risks because they are adjusted to discount background rates of clinically significant deficits in FEV_1 for unexposed workers at age 65.

[9] Table III–7 is based on two studies: Attfield and Hodous (1992) and Seixas et al. (1993). The commenters indicated that the first study is a sound study methodologically—except for the exposure estimates that are biased to increase the exposure-response slope of the study group of pre-1970 miners exposed to high and unregulated respirable coal mine dust levels. MSHA discusses the comments on bias in the exposure estimates in Section III.B.2.c of this preamble.

Table III-7. — Excess (exposure-attributable) prevalence of clinically significant decreased lung function* among U.S. coal miners at age 65 following exposure to respirable coal mine dust over a 45-year working lifetime.

Study and region	Lung function decrement	Smoking status	Cases/1,000 at various mean dust concentrations		
			0.5 mg/m^3	1.0 mg/m^3	2.0 mg/m^3
Attfield and Hodous [1992]:†					
East	<80% FEV_1	Never smoked	10	21	44
		Smoker	12	24	51
West	<80% FEV_1	Never smoked	9	19	40
		Smoker	11	23	48
East	<65% FEV_1	Never smoked	2	5	12
		Smoker	4	8	19
West	<65% FEV_1	Never smoked	2	4	9
		Smoker	3	7	15
Seixas et al. [1993]‡	<80% FEV_1	Never smoked	60	134	315
		Smoker	68	149	338
	<65% FEV_1	Never smoked	18	45	139
		Smoker	27	67	188

*Decreased lung function is defined as FEV_1 <80% of predicted normal values. Clinically important deficits are FEV_1 <80% (which equals approximately the LLN, or the 5th percentile) and FEV_1 <65% (which has been associated with exertional dyspnea).

†Attfield and Hodous [1992] define the following coal ranks and regions:

East: anthracite (eastern Pennsylvania), and bituminous (central Pennsylvania, northern Appalachia [Ohio, northern West Virginia, western Pennsylvania], southern Appalachia [southern West Virginia, eastern Kentucky, western Virginia], Midwest [Illinois, western Kentucky], South [Alabama]).

West: Colorado and Utah.

‡Coal rank was not provided in Seixas et al. [1993]. However, miners were included from bituminous coal ranks and regions across the United States, as described in Attfield and Seixas [1995]:

1. High-rank bituminous (89%-90% carbon): central Pennsylvania and southeastern West Virginia
2. Medium/low-rank bituminous (80%-87% carbon): medium-rank—western Pennsylvania, northern and southwestern West Virginia, eastern Ohio, eastern Kentucky, western Virginia, and Alabama; low-rank—western Kentucky, Illinois, Utah, and Colorado.

Source: Reproduced from Table 7–3 of the NIOSH Criteria Document.

Similarly, the QRAs for the proposed and final rules focus on excess risk, rather than mean response, to show that respirable coal mine dust exposures for an occupational lifetime at the existing standard can significantly increase the risk of FEV_1 reductions associated with severe emphysema. Based on the exposure-response model described in Kuempel et al. (2009a), Figure 14 in both QRAs shows that among never-smoking white coal miners, the excess risk at 2.0 mg/m³ ranges from approximately 12 percent (117 cases per 1,000) at age 65 to approximately 16 percent (162 cases per 1,000) at age 80. These percentages represent the estimated probability that a miner exposed to an average respirable coal mine dust concentration of 2.0 mg/m³ over a 45-year occupational lifetime will develop severe emphysema attributable to that exposure.

The QRAs for the proposed and final rules use the pulmonary response model described in Kuempel et al. (2009a) as the basis not only for the estimates discussed previously, but also for the calculation of all current and projected excess risks of severe emphysema attributable to respirable coal mine dust exposures.[10]

Some commenters criticized the Kuempel et al. (2009a) study and the related study, Kuempel et al. (2009b) which relied on the same study population of 722 autopsied miners and non-miners. These commenters stated that the Kuempel et al. studies had little to no relevance to the existing or proposed dust standards because the exposures of the autopsied miners studied were pre-1970 and likely to have been much higher than current exposures. The commenters did not provide evidence to support their criticism of the Kuempel et al. (2009a and 2009b) studies.

Table 1 of the Kuempel et al. 2009b study and section 1(d)(ii) of the QRAs for the proposed and final rules show that the study group in question consisted of 616 deceased coal miners and 106 deceased non-miners (who presumably had no respirable coal mine dust exposure but functioned as internal controls in the statistical analysis).[11] Among the coal miners, the mean cumulative respirable coal mine dust exposure was 103 mg-yr/m³, with a standard deviation (σ) of 40.6 mg-yr/m³.

Since miners in the study had an average tenure of 34.3 years, they were exposed to an average respirable coal mine dust concentration of 3.0 mg/m³ (i.e., 103 mg-yr/m³/34.3 yr) over their occupational lifetimes, with $\sigma = 1.184$. Assuming an approximately lognormal distribution,[12] this would suggest that approximately 58% of these miners experienced average respirable coal mine dust concentrations less than 3.0 mg/m³ and 19% of them averaged less than 2.0 mg/m³.

The QRAs for the proposed and final rules are designed to evaluate risks expected for exposures accumulated over a 45-year occupational lifetime. Therefore, it is also relevant to examine the distribution of respirable coal mine dust concentrations that would, after a 45-year occupational lifetime, give rise to the same exposure totals as those experienced by miners in the Kuempel et al. 2009b study. This result in an average respirable coal mine dust concentration of 2.3 mg/m³, with $\sigma = 0.902$ mg/m³. In this case, again assuming an approximately lognormal exposure distribution,[13] approximately 82% of the miners would experience average respirable coal mine dust concentrations less than 3.0 mg/m³, 43% would average less than 2.0 mg/m³, and 18% would average less than 1.5 mg/m³.

Consequently, considering either the 34.3-year average tenure of miners in the study group (Kuempel et al., 2009b), or the 45-year occupational lifetime MSHA uses to evaluate occupational risks, it appears that the Kuempel et al., 2009a, 2009b reports are relevant to exposure conditions under the existing respirable coal mine dust standard.[14] Table 8 of the QRAs for the proposed and final rules show that MSHA's enforcement of the existing respirable dust standard has not eliminated work locations exhibiting average respirable coal mine dust concentrations greater than 1.5 mg/m³ or even 2.0 mg/m³. At the very least, these studies are highly relevant to risks at such work locations.

The commenters, in referring to the Kuempel et al. (2009a and 2009b) study population, identified self-reporting of smoking histories as a potential source of bias and rejected a suggestion by the studies' authors that the timing of self-reported data collection on smoking added to the studies' strengths. According to the studies' authors, data collection had occurred in the 1960s and 1970s, when smoking was not a contentious issue and Federal compensation programs for smoking-related illnesses had not yet been introduced. The commenters, however, contended that the authors' mention of possible smoking exposure misclassification ''tends to negate'' their claim that non-contentious smoking histories comprised a strength of the study. The commenters further argued that the studies' finding that dust exposure had a greater effect than smoking was unconvincing and that both of these factors were questionable for the study cohort because smoking histories were self-reported and ''when compensation matters are involved, smoking histories are likely to be unreliable.'' Commenters further stated that occupational dust exposure can have an effect on the development of emphysema and COPD, but the general literature still considers ''ordinary'' levels of occupational pollution to be minor compared to cigarette smoking and aging.

First, in response to commenters, as suggested by the studies' authors, MSHA points out that the reliability of the miners' smoking histories is unlikely to have been compromised by compensation programs in that the programs did not exist at the time of the studies. Kuempel et al. (2009a and 2009b) mention misclassification of smoking history only in a list of ''potential limitations'' and make no suggestion that this has anything to do with compensation incentives. Second, as demonstrated in the preceding discussion, respirable coal mine dust exposures for the autopsied miners were not ''far in excess of today's standard'', 2.0 mg/m³, as the commenters state. Third, respirable coal mine dust exposure estimates were not biased to overestimate high exposures and underestimate low exposures. (See discussion in the subsequent preamble section on bias due to errors in exposure estimates, Section III.B.2.c.). Finally, the commenters interpreted the finding that each mg-year/m³ of respirable coal mine dust exposure is, on average, similar in effect to each ''pack-year'' of cigarette

[10] See QRA for the proposed rule, Tables 16, 24, and Appendix J.

[11] The commenters stated that the study population in Kuempel et al., 2009a ''is comprised of 116 individuals with spirometry drawn from the same 722 autopsied miners and non-miners just discussed [in connection with Kuempel et al., 2009b].'' In response to commenters, although 116 subjects with FEV_1 data were used to define cutoff points for clinically significant emphysema severity, the logistic regression models relating respirable coal mine dust exposure to the probability of meeting these cutoff points used all 342 members of the study population with complete data. (See Kuempel et al., 2009a, Tables 1 and 2).

[12] If X is Lognormally distributed with mean = 3.0 and standard deviation = 1.184, then $Log_e(X)$ is Normally distributed with mean = 1.026 and standard deviation = 0.380.

[13] If X is Lognormally distributed with mean = 2.3 and standard deviation = 0.902, then $Log_e(X)$ is Normally distributed with mean = 0.756 and standard deviation = 0.380.

[14] Since these studies used the same methods for estimating pre-1970 exposures as the NCWHSP studies, the comments on possible biases in these exposure estimates also apply here. Comments on bias in the exposure estimates are addressed in the Section III.B.2.c.

smoking as somehow undermining the studies' credibility.[15] The commenters did not provide any references to support their view that the general literature still considers adverse health effects of ordinary levels of occupational pollution to be minor relative to those from cigarette smoking; nor did they provide evidence that this generalization applies specifically to respirable coal mine dust and emphysema.[16]

With respect to the data used in Kuempel et al. (2009a) to relate clinically significant cutoff points of emphysema severity to respirable coal mine dust exposures, the commenters stated, without any supporting evidence, that miners were coached to distort pulmonary measurements.

In addition, commenters stated that there was a significant trend between the emphysema index and FEV_1, but much of the variability was unexplained. The FEV_1 data (available for a small subset of the autopsied subjects) were used in this study only to establish appropriate cutoff points for clinically significant values of the emphysema severity index; the unexplained variability seen while establishing these cutpoints has no direct bearing on the logistic regressions that relate respirable coal mine dust exposures to the probability of exhibiting clinically significant emphysema severity.

The average cumulative dust exposure was reported to be 87 mg-year/m^3 among the autopsied miners used in the logistic regressions.[17] [18] This is notably less than the 103.0 mg-year/m^3 average reported for miners in the study population as a whole. Assuming the same coefficient of variation in exposures as reported for all miners in the study population (approximately 39%), it follows that autopsied miners included in the logistic regressions experienced exposures equivalent to a respirable coal mine dust concentration of 1.93 mg/m^3 averaged over a 45-year occupational lifetime, with $\sigma = 0.762$ mg/m^3.[19] Once again assuming an approximately lognormal exposure distribution,[20] this means that approximately 62% of these miners would have experienced average respirable coal mine dust concentrations less than 2.0 mg/m^3 and 32% of them would have averaged less than 1.5 mg/m^3. This calculation contradicts the commenters' claim that the study is applicable only to the pre-1970 era, when ''miners were exposed to respirable dust far in excess of today's standard.''

The commenters generally disagreed with MSHA's reliance on the Kuempel et al. (2009a) findings by focusing on the possibility of errors in the FEV_1 measurements and cumulative exposure estimates. Despite MSHA's heavy reliance on these studies in the QRA, the commenters did not include them in their evaluation of the weight of evidence. However, potential biases due to exposure and/or FEV_1 misclassification cannot explain all of the results.

Table 4 of Kuempel et al. (2009b) shows that a strong correlation (R^2 = 0.44) was observed between the amount of coal dust found in the lungs of deceased miners and the degree of emphysema severity determined at autopsy. This result, which depends on neither exposure estimates nor FEV_1 measurements, is statistically significant at a confidence level greater than 99.99 percent ($p < .0001$), after accounting for cigarette smoking, age at death, and race. The average emphysema severity index observed among never-smoking miners (302, or 30.2 percent of the lung affected, Kuempel et al., Table 2 (2009b)) exceeded the cutoff point (285) corresponding to a 20-percent reduction in FEV_1 from the predicted normal value. Therefore, this study provides strong evidence that respirable coal mine dust exposures under current conditions can cause clinically significant pulmonary effects. This evidence is confirmed and strengthened by evidence presented in Miller et al. (2007) and Attfield and Kuempel (2008) that the risk of mortality due to COPD increases significantly with increasing respirable coal mine dust exposure.

c. Mortality Due to NMRD

Some commenters acknowledged a strong exposure-response relationship between respirable coal mine dust exposure and mortality from nonmalignant respiratory diseases (NMRD) but claimed that the associations appear to be confined to high rank coal dust. According to these commenters, respirable coal mine dust exposure ''is strongly associated with significant excess NMRD mortality among anthracite coal miners,'' but this association ''is not found among miners of lower rank coals (bituminous and sub-bituminous).'' More specifically, the commenters stated that ''there appears to be no increased mortality risk of CWP associated with coal mined in eastern Appalachia, western Appalachia, and the Midwest.'' [21] To support this

[15] With regard to the probability of developing clinically relevant emphysema (i.e., emphysema associated with FEV_1 less than either 80% or 65% of predicted normal values, ''the contribution of cumulative dust exposure was greater than that of cigarette smoking at the cohort mean values, *although not significantly so* . . . [emphasis added]'' In the cohort used for the logistic regression analysis supporting this part of the analysis, mean cumulative respirable coal mine dust exposure was 87 mg-year/m^3 among miners and mean cigarette smoking was 42 pack-years. (Kuempel et al., 2009a).

[16] The relative magnitude of estimated coefficients of the emphysema severity index regression model for smoking history and respirable coal mine dust exposure should not be interpreted as representing the relative potencies of cigarette smoke and respirable coal mine dust as toxic agents. See Appendix J, Table 66 of the QRAs for the proposed and final rules. The estimated smoking history coefficient is 0.0099 (packs/day *X* years) and the estimated respirable coal mine dust coefficient is 0.010 (mg/m^3 *X* years). The magnitude of each coefficient depends on the choice of units used to represent exposure to the respective agent. For example, if the unit used to represent respirable coal mine dust exposure had been µg-year/m^3 instead of mg-year/m^3, then the estimated coefficient for respirable coal mine dust would have been approximately 1/1,000 of that for smoking. Furthermore, a ''pack-year'' does not represent the same duration of exposure as an occupational mg-year/m^3. A pack-year represents an average consumption of one pack of cigarettes per day for a year. Each pack normally contains 20 cigarettes. If it took an average of five minutes to consume each cigarette, then a pack-year would represent 36,500 minutes of exposure to cigarette smoke. In contrast, assuming 1,920 occupational exposure hours per year, each mg-year/m^3 represents 115,200 minutes of exposure to respirable coal mine dust (i.e., 1,920 hrs of exposure per yr *X* (60 minutes/1 hr) = 115,200 minutes of exposure per yr).

[17] With regard to the probability of developing clinically relevant emphysema (i.e., emphysema associated with FEV_1 less than either 80% or 65% of predicted normal values), ''the contribution of cumulative dust exposure was greater than that of cigarette smoking at the cohort mean values, *although not significantly so*. . . .'' In the cohort used for the logistic regression analysis supporting this part of the analysis, mean cumulative respirable coal mine dust exposure was 87 mg-year/m^3 among miners and the mean cigarette smoking was 42 pack-years (Kuempel et al. (2009a).

[18] Neither the standard deviation of cumulative exposure nor information on tenure in mining was reported for this subset of the study population.

[19] The coefficient of variation is the ratio of the standard deviation to the mean. The coefficient of variation is independent of the unit in which the measurement is taken, i.e., dimensionless. The coefficient of variation for the coal mine population in the logistic regression model is assumed to be the same as that for the entire miner study population in the Kuempel et al. (2009a) study.

[20] The log-normal distribution is a continuous probability distribution of a random variable whose logarithm is normally distributed. The distribution of respirable coal mine dust is not normally distributed; therefore, respirable coal mine dust was assigned a random continuous probability distribution termed the lognormal distribution represented by Log_e (respirable coal mine dust). The transformation was conducted to run parametric statistics models (i.e., model respirable coal mine dust with an analysis of variance (ANOVA), analysis of covariance (ANCOVA), and regression models). If X is Lognormally distributed with mean = 1.9 and standard deviation = 0.762, then $Log_e(X)$ is Normally distributed with mean = 0.585 and standard deviation = 0.380.

[21] The same commenters also claimed that ''Numbers were too small for a mortality analysis

Continued

conclusion, the commenters cited the results in Tables IX and X of Attfield and Kuempel (2008). These commenters also noted that the conclusion is based on only one mortality study, Attfield and Kuempel (2008), and proposed that NIOSH should test this observation by analyzing exposure-response trends by coal rank.

The study cohort in Attfield and Kuempel (2008) included a total of 8,899 miners from five coal mining regions across the U.S. There were 498 miners from the Anthracite region, 1,353 from the East Appalachia region, 4,886 from the West Appalachia region, 1,210 from the Midwest region, and 952 from the West region. Contrary to the commenters' interpretation, Tables IX and X of Attfield and Kuempel (2008) show a statistically significant increase in NMRD mortality associated with increasing respirable coal mine dust exposure in each of these five coal mining regions. The commenters' mischaracterization of the findings presented in Attfield and Kuempel (2008) appear to have resulted from two misinterpretations.

First, the relative risks shown in Table IX of Attfield and Kuempel (2008) for four of the five coal mining regions examined are expressed relative to the risks found for the fifth region (i.e., the West). Therefore, the fact that, except for Anthracite, the relative risks do not differ significantly from 1.0 means that only in the Anthracite region is the observed effect different from the effect observed in the West.[22] Although the effects observed in East Appalachia, West Appalachia, and the Mid-west do not differ significantly from those observed in the West, this does not imply that any of the observed effects are insignificant. Specifically, the ''four-fold increased risk of anthracite,'' shown in Table IX (op. cit.) as having a relative risk of 4.41, means that (all other factors being equal), the risk of NMRD mortality in the Anthracite region is probably four to five times what it is in the West (95% CI: 3.08–5.92). Since the analysis used to construct Table IX does not show any statistically significant difference between the West and any other region, except Anthracite, it shows *only* that NMRD risk in the Anthracite region is probably four to five times what it is in the other regions as a group. This says nothing about what the risk actually is in any of the regions, let alone the risk attributable to cumulative dust exposure.

Similarly, the regional coefficients shown for NMRD in Table X of Attfield and Kuempel (2008) pertain to NMRD mortality risks relative to the West region—this time based on a statistical analysis that treats cumulative dust exposure as a continuous variable. It is this analysis that is used to evaluate current and projected risk in the QRAs for the proposed and final rules.[23] For example, all other factors being equal, the relative risk (RR) in the ''Mid-west'' region is best estimated to be

$RR = e^{-0.2870} = 0.75$

There is considerable uncertainty in this particular estimate, so all that can be said with high confidence is that NMRD mortality risk in the Mid-west probably lies somewhere between 51 percent below and 12 percent above that in the West (95% CI: 0.49–1.12). However, just as NMRD mortality risk in the West depends on age, smoking history, and cumulative respirable coal mine dust exposure, so does NMRD mortality risk in the Mid-west. According to the analysis used to construct Table X, NMRD mortality risk is far greater in the Anthracite region than in any of the other four regions,[24] but that does not mean there is no risk in the other regions or that the other regions exhibit no relationship between NMRD mortality and cumulative respirable coal mine dust exposure.

Second, contrary to the commenters' interpretation, both Tables IX and X of Attfield and Kuempel (2008) show statistically significant increases in NMRD mortality with increasing respirable coal mine dust exposure for the region associated with lowest rank coal: The West. The estimated exposure-response relationship is modified in the other regions—amplified, relative to the West, in the East Appalachia and Anthracite regions and attenuated, relative to the West, in the West Appalachia and Mid-west regions. The following explication is based on Table X, since that is what is used in the QRAs for the proposed and final rules, but the same principles apply to interpreting Table IX.

Since the West region comprises the baseline in the relative risk model, no regional coefficient is applied for respirable coal mine dust exposures in the West. Therefore, using Table X, the relative risk of NMRD mortality, after a 45-year occupational lifetime of exposure to (low-rank) western respirable coal mine dust at a concentration averaging 2.0 mg/m^3, is estimated to be:

$RR = e^{-0.00709\,(45 \times 2.0)} = 1.89$

This means that the risk of NMRD mortality is estimated to be 89 percent greater for a miner who has been exposed to 90 mg-year/m^3 of respirable coal mine dust than for an unexposed miner of the same age, region, and smoking history. At a 45-year occupational lifetime average respirable coal mine dust concentration of 1.5 mg/m^3, the estimated relative risk is:

$RR = e^{0.00709(45\times1.5)} = 1.61$

Therefore, for respirable coal mine dust exposures in the West-region (where the coal is low-rank), increasing the lifetime average from 1.5 mg/m^3 to 2.0 mg/m^3 increases the estimated relative risk by 28 percentage points (i.e., (1.89–1.61)*100). According to Attfield and Kuempel (2008), the coefficient giving rise to this increase (0.00709) is statistically significant at a confidence level exceeding 99 percent. Therefore, contrary to the commenters' assertions, the Attfield-Kuempel analysis shows an increased risk of NMRD mortality associated with increasing respirable coal mine dust exposures in the region with lowest rank coal. Multiplying these relative risks by 0.75 (the regional factor for Mid-west coal) attenuates but does not eliminate, the estimated exposure-response relationship.

For exposures to the higher rank respirable coal mine dust in East Appalachia, the corresponding relative risks are:

$RR = e^{0.2187 + 0.00709(45\times2.0)} = 2.36$

at 2.0 mg/m^3 and

$RR = e^{0.2187 + 0.00709(45\times1.5)} = 2.01$

at 1.5 mg/m^3.

Therefore, increasing the cumulative exposure from 67.5 mg-year/m^3 to 90 mg-year/m^3 increases the estimated relative risk by an estimated 35 percentage points (i.e., (2.36–

of Western coal, which is the lowest ranked coal and presumably the lowest risk if the coal rank hypothesis is correct.'' This is incorrect. The study cohort described in Attfield and Kuempel (2008) included 952 miners from the West region, and the study found significant risk of NMRD mortality for miners exposed to respirable coal mine dust in that region. As will be explained below, NMRD mortality in the West region was used as a baseline for the relative risk of NMRD mortality in the other four regions.

[22] For regions other than Anthracite, the 95% CI in Table IX encompasses the number one (''1.0'') and is therefore not statistically significant—i.e., the study authors are not 95% confident that the effects in East Appalachia, West Appalachia, and the Mid-west region are different from that in the comparison region (the West).

[23] Appendix K of the QRAs for the proposed and final rules shows that for each regional coefficient (α), $RR = e^{\alpha}$, where $RR = e$ is the base of the natural logarithms. For the West region, $\alpha = 0$, so the baseline relative risk is $RR = e^{0} = 1$.

[24] Regional coefficients of the proportional hazards model are reported by Attfield and Kuempel (2008) in Table X as Anthracite (1.4844), East Appalachia (0.2187), West Appalachia (−0.3477), and Mid-west (−0.2870), relative to the West region. Therefore, applying the formula in Footnote 23, the relative risks are respectively estimated to be 4.41, 1.24, 0.71, and 0.75.

2.01)*100).[25] This shows that the estimated exposure-response relationship is steeper (positive slope) in East Appalachia than in the West, as reflected by the positive regional coefficient. For the Anthracite region, where coal has the highest rank, the estimated coefficient is substantially larger (Table X: 1.4844), so the slope of the estimated exposure-response relationship is far steeper than in East Appalachia or any of the other regions. Therefore, the commenters' interpretation that the Attfield-Kuempel 2008 study suggests that there is no increased risk associated with the lower-than-anthracite ranks of coal is not correct.[26]

In the QRA for the proposed rule, all work locations are classified as ''Low/Medium Rank,'' ''High Rank Bituminous,'' or ''Anthracite'' by a procedure described in Footnote 40 of that QRA. Appendix K of the QRA states that work locations included in the Anthracite and High Rank Bituminous categories are assigned coal rank coefficients of 1.4844 and 0.2187 (Table X), respectively. All other work locations are assigned a coefficient of zero. The resulting relative risk estimates for NMRD mortality under current exposure conditions are shown, by occupation, in Table 68 of the QRAs for the proposed and final rules. The fact that the underlying Attfield-Kuempel exposure-response model shows relative risk as increasing with increasing exposure levels—even for low/medium rank coal—can be seen by comparing relative risks in the QRAs' Table 68 to the corresponding exposure levels in the QRAs' Table 12.

As shown above and in Appendix K of the QRAs for the proposed and final rules, the Attfield-Kuempel exposure-response analysis does exactly what some of the commenters said is needed: Using geographic location as a proxy, it stratifies the analysis of NMRD mortality risk by coal rank. Though it may be prone to misinterpretation, that analysis identifies statistically significant and substantial NMRD mortality hazards not only for anthracite, but also for regions identified with high rank bituminous and lower rank coal.

2. Exposure-Response Models and Possible Threshold Effects

For each of the three adverse health conditions covered by the QRAs for the proposed and final rules (CWP, severe emphysema, and NMRD mortality), a previously published exposure-response model was used to quantify the excess risk associated with specified respirable coal mine dust exposures averaged over a 45-year occupational lifetime. Appendices I, J, and K in both QRAs describe the three models and explain, mathematically, how the models were applied to calculate risks. Some commenters objected to the use of these models for a variety of reasons. These objections will be addressed in the following subsections: (a) Attribution of Risk, (b) Bias due to Errors in Diagnosis, (c) Bias due to Errors in Exposure Estimates, (d) Threshold Effects, and (e) Model Consistency and Coherence.

a. Attribution of Risk

A commenter stated that regression equations do not necessarily express causal relationships and objected to the characterization in the QRA for the proposed rule of its underlying formulas as exposure-response relationships.

Although the misuse or misinterpretation of regression analysis can lead to groundless imputations of causal relations, regression analysis can properly be used to quantify a causal relationship that is known or believed to exist. As shown in the Health Effects section of the preambles to the proposed rule and in this final rule, there is ample toxicological and epidemiologic evidence to support a causal relationship between respirable coal mine dust exposures and the adverse health outcomes that have been identified. MSHA believes regression analysis was properly used and interpreted in the published studies on which the QRAs for the proposed and final rules rely. MSHA also believes that the resulting regression models express useful estimates of causal exposure-response relationships. In addition, while some commenters questioned the strength or shape of the exposure-response relationships, one commenter challenged the premise of a causal connection between respirable coal mine dust exposure and adverse health effects. The commenter provided a simple hypothetical regression analysis example. The example illustrates both (1) the danger of misidentifying a causal relationship by misinterpreting a regression result and (2) why MSHA believes the regression models used to quantify excess risk in the QRAs for the proposed and final rules express exposure-response relationships rather than spurious, non-causal associations.

In the commenter's example, the underlying basis of causal relationships is represented by two equations:

$$\text{Risk} = \text{Age} - \text{Exposure}$$

and

$$\text{Exposure} = 0.5 \times \text{Age}$$

The first equation specifies that in the hypothetical universe of this example, aging causes risk to increase, while exposure is protective and causes risk to decrease. The second equation expresses a causal relationship between age and exposure: Each year of aging causes an increase of 0.5 exposure units.[27] Combining these two equations, risk can be expressed as either,

$$\text{Risk} = \text{Age} - (0.5 \times \text{Age}) = 0.5 \times \text{Age}$$

or, as the commenter chose to do for the sake of example,

$$\text{Risk} = (2 \times \text{Exposure}) - \text{Exposure} = \text{Exposure}$$

Now, if a researcher were to compile data on risk and exposure in this hypothetical universe, and then perform a regression analysis on these data (ignoring age), the result would be, as indicated by the commenter, a spurious (i.e., non-causal but mathematically correct) relationship of the form

$$\text{Risk} = 1 \times \text{Exposure}$$

where ''1'' is derived from the analysis as the estimated regression coefficient. Because of this, and the fact that the QRA relies on regression models, the commenter concluded that MSHA's projected changes in risk are meaningless.

The commenter, however, did not present a full analysis in the example. If the researcher suspected that Age (but not exposure) was causally connected to Risk, then this would presumably motivate the researcher to compile data on Age and perform the regression analysis on that variable. The result would properly express the causal exposure-response relationship:

$$\text{Risk} = 0.5 \times \text{Age}$$

In this case, the regression analysis would yield ''0.5'' as the estimated coefficient of Age, thereby correctly determining the slope of the causal exposure-response relationship. A researcher might also perform an exploratory, multiple regression analysis using all of the available data, including both Age and Exposure as candidate predictor variables. In this event, calculation of the regression coefficients would be computationally intractable if the data contained

[25] The mg-year/m^3, 45-yr occupational lifetime average, is calculated from the mg/m^3 dust concentration. Where 67.5 mg-year/m^3 = 1.5 mg/m^3 × 45 yr occupational lifetime average and 90 mg-year/m^3 = 2.0 mg/m^3 × 45 yr occupational lifetime average.

[26] The commenters also stated that the exposure estimates used by Attfield and Kuempel (2008) are biased in such a way as to ''increase the exposure response slope.'' This comment is discussed in Section III.B.2.c.

[27] Aging might be said to *cause* exposure if exposure accumulates unavoidably as time passes. Exposure to cosmic radiation is a possible example.

absolutely no measurement errors.[28] If, more realistically, the data did contain measurement errors, then the regression analysis would yield a relationship with estimated coefficients of the following form:

$$\text{Risk} = a_1 \times \text{Age} + a_2 \times \text{Exposure}$$

where the regression estimates, a_1 and a_2, would generally be close to +1 and −1, respectively, but could differ from these values by amounts dependent on the error structure. So, rather than showing that regression invariably produces spurious relationships, the commenter's example illustrates the importance of taking all relevant variables into account. When properly executed on the relevant data, regression analysis provides a valid means of estimating the parameters of causal exposure-response relationships.

MSHA believes that the exposure-response models on which the QRAs for the proposed and final rules rely were derived from regression analyses properly executed on the relevant data. The causal connections with respirable coal mine dust exposure are supported by evidence from independent studies,[29] and the effects of age and other correlates (such as coal rank and smoking history when available) were simultaneously estimated. All three studies (Kuempel et al., 2009a, 2009b; Attfield and Kuempel, 2008) found both age and cumulative respirable coal mine dust exposure to be statistically significant factors in predicting the probability of adverse health effects. Other factors (such as smoking history, coal rank, and race) were incorporated into the exposure-response models when they were found to be statistically significant.

The commenter disagreed with MSHA about the utility of the specific regression models on which the QRA for the proposed rule relied, and the relative importance of possibly relevant factors that were not included—either because the factors were not deemed relevant by the studies' authors or because the necessary data were unavailable. The commenter proposed that socioeconomic and demographic factors that may affect exposure or risk (such as age, seniority, education, income, and access to medical care) be included in the models and used in the calculation of partial attributable risks. The commenter suggested that neglecting such variables could lead to spuriously high estimates of health risks due to exposure.

As indicated above, age was accounted for in all of the models used in the QRAs for the proposed and final rule). Some socioeconomic factors may have been represented, to an unknown extent, by coal mining region in the CWP and NMRD mortality studies and by race in the emphysema study. Risks in the CWP and emphysema studies were attributed to exposure based on internal comparisons with miners in the same cohort experiencing relatively little or no exposure. Variation in respirable coal mine dust exposure among miners within mining regions is unlikely to be related to socioeconomic differences. Therefore, socioeconomic differences among miners within regions are unlikely to explain the risk attributed to exposure (i.e., the difference between risk expected with and without the exposure, after adjustment for age and coal mining region or race). MSHA recognizes that the regression models may have been improved by explicit consideration of various socioeconomic factors. However, no such studies have been published, and the commenter provided no evidence that including such variables would have a significant impact on the estimated effects of respirable coal mine dust exposure.

Similarly, other commenters identified a number of factors that were not modeled in the regression analyses but could potentially contribute to the observed frequency of adverse health effects. These included silica content of the respirable coal mine dust, coal rank, mine size, and seam height.

Coal rank was not considered in the emphysema study, but it was represented by a surrogate mdash;coal mining region—in the CWP and NMRD mortality studies. Mine size may, to some degree, be correlated with socioeconomic characteristics, but the only evidence of its relevance pertains to its correlation with exposure levels: As shown in their comment, exposures tend to be greater at smaller mines. Therefore, accurate exposure estimates should include the contribution of mine size to health risks.[30] Similarly, seam height may be related to socioeconomic characteristics, but the only known effect it has on respiratory health arises through its impact on silica content of the respirable coal mine dust: As pointed out in their comment, thin seams require mining a higher proportion of stone than thick seams. This leaves silica content of respirable coal mine dust as a potentially important variable that was not included in the regression models used in the QRA.

MSHA agrees that including silica exposures as a covariate would have improved the credibility of these models. There are no alternative studies on U.S. exposures that do so. However, Miller et al. (2007), using data from British coal mines, conducted two separate analyses on mortality due to CWP and mortality due to COPD, both of which simultaneously examined silica exposures and respirable coal mine dust exposures as candidate predictor variables. Both of these analyses showed a stronger association with respirable coal mine dust than with quartz, and including both variables in the models, resulted in approximately the same regression coefficient for respirable coal mine dust exposure as when silica exposure was excluded.[31] Furthermore, the models containing both silica and respirable coal mine dust exposures resulted in estimated regression coefficients for silica exposure that were not statistically significant. In contrast, the estimated coefficients for respirable coal mine dust exposure were statistically significant at a high confidence level (>99.9 percent) regardless of whether silica exposure was included. These analyses were used in the QRAs for the proposed and final rules to confirm the significance of respirable coal mine dust exposures below the existing standard. (See Figures 12 and 15 in both QRAs.)

Although the possible confounding effects of tobacco smoking were addressed in all of the studies used in the QRAs for the proposed and final rules, one commenter objected to the use of ''smoking patterns that held decades ago'' in formulating exposure-response relations applicable to current or projected conditions. This commenter stated that because of curvature in the joint exposure-response relationship for severe emphysema (described in Appendix J of the QRA), part of the risk of severe emphysema attributed to respirable dust exposure

[28] This is because it would not be possible to invert the so-called X′X matrix, given the unvarying interdependence of *Age* and *Exposure.*

[29] See the Health Effects Section of the preamble to the proposed rule.

[30] Potential biases in the exposure estimates are addressed in Section III.B.2.c below.

[31] Though remaining *approximately* the same, the estimated regression coefficients for respirable coal mine dust exposure actually *increased* slightly when silica exposure was included in the model. For CWP mortality, the regression coefficient for respirable coal mine dust exposure was 0.0058 when quartz exposure was excluded and 0.0060 when quartz exposure was included (Miller et al. (2007), Table 5.9). For COPD mortality, the coefficient for respirable coal mine dust exposure was 0.0016 when quartz exposure was excluded and 0.0019 when quartz exposure was included. (Miller et al. (2007), Table 5.18). Exposure units for both respirable coal mine dust and silica were g-hr/m^3. Predicted effects are on the natural logarithm of relative risk.

depended on smoking patterns that no longer exist.

MSHA addressed this issue in both QRAs by basing its estimates of excess risks of severe emphysema attributed to respirable coal mine dust exposure only on the results obtained for never-smokers.[32] This was done partly to avoid the amplification effect of smoking noted by the commenter. Likewise, the estimated excess risks of CWP and NMRD mortality attributed to respirable coal mine dust exposure are independent of smoking effects.

The commenter also used the relatively large regional background effect estimated by one of the models to suggest that a causal interpretation of the QRA's regression models is not justified. One of the exposure-response models used in the QRAs for the proposed and final rules, namely the Attfield-Kuempel NMRD mortality model, does assign a ''background'' relative risk of 4.4 to miners in the Anthracite region (Attfield and Kuempel (2008), Table IX).

As stated in the QRA for the proposed rule, Appendix K (p. 135), ''This suggests that the regional effects [as estimated using the model] are primarily due to geographic factors other than coal rank.'' However, it does not undercut a causal interpretation of the model's result for respirable coal mine dust exposure. Study demographics affirm that only 5.6 percent of the study group resided in the Anthracite region (Table III–7). Furthermore, a causal interpretation is supported by the results for NMRD mortality vs. respirable coal mine dust exposures found by Miller et al. (2007, Table 5.10), in which the regional and/or coal rank issue did not arise. Attfield and Kuempel (2008) recognized that in their analysis, ''variations in lifestyle, health care, and non-coalmine exposures across geographical regions are . . . confounded with coal rank. . . .'' Nevertheless they concluded that ''the findings confirm and enlarge upon previous results showing that exposure to coal mine dust leads to increased mortality, even in the absence of smoking.'' After consideration of the commenters' views, MSHA continues to agree with these conclusions from Miller et al. (2007) and Attfield and Kuempel (2008).

b. Bias due to Errors in Diagnosis

Other commenters stated that inaccuracies in diagnosing CWP and PMF by means of chest X-rays during the fourth Round of the NCWHSP invalidate the exposure-response relationships used in the QRA for the proposed rule. These commenters also stated that the adjusted summary prevalence for the percentage of combined opacities in the original readings for Round 4 using ILO 1980 was 2.3% for category 1+ and 0.3% for category 2+ and that the re-readings using ILO 1980 were 22.5% and 0.91% for categories 1+ and 2+, respectively. From this, they inferred that the results from re-reading the NCWHSP x-rays were no more reliable or valid than the original readings and therefore do not represent prevalence of disease.

Accuracy of the Round 4 X-ray readings pertains only to the exposure-response relationships used for CWP and not for severe emphysema or NMRD mortality. Furthermore, imprecision in the readings would not bias the logistic regression results for CWP used in the QRAs for the proposed and final rules, since the readers were unaware of respirable coal mine dust exposures for the miners whose X-rays they were reading. Therefore, errors in the readings due to imprecision would have been uncorrelated with exposure and so should not have appreciably affected the regression estimates. In addition, imprecision of the readings was reduced by using the median category assigned by three specially selected B-readers. Potential bias was mitigated by specifically selecting the three readers to be ''representative of B-readers in general (i.e., avoiding extremes of interpretation)'' (Attfield and Seixas, 1995). The commenters present no evidence of any bias in these readings.

MSHA believes that disagreement between results from the original readings of Round 4 x-rays and the re-readings does not imply that the re-readings were ''no more reliable or valid than the original readings. . . .'' The team of three B-readers who performed the re-readings were selected because they were highly experienced (having read at least 500 films during Round 4) and, based on a preliminary reading trial, were the least likely to give extreme interpretations among readers meeting the other selection criteria. More importantly, the opacity prevalences shown by the commenters are for ''combined opacities,'' a category that includes both rounded and irregular opacities. Unlike small rounded opacities, small irregular opacities are not generally associated with simple CWP; and for small rounded opacities, much closer agreement was reported between the original readings and the re-readings. For CWP1+, prevalence was 1.3% in the original Round 4 readings and 2.1% in the re-readings of the same Round 4 X-ray films (Goodwin and Attfield, 1998).

Furthermore, Attfield and Seixas (1995) reported good agreement in the prevalences of CWP1+ found by the three readers used in their analysis of the Round 4 data: 7%, 7%, and 9%. They also reported that ''this similarity persisted when the data were tabulated by deciles of estimated dust exposure. . . .''

As reported in Attfield et al. (1997), a randomly selected subset of 2,380 x-rays from Round 1 of the NCWHSP were re-read by three readers who were selected to be representative of reader participants in the surveillance program. The median determinations of these re-readings were used to re-estimate exposure-response relationships for comparison with the corresponding results reported in Attfield and Morring (1992a). Although the intercepts (i.e., the predictions of background risk at no respirable coal mine dust exposure) were significantly different, ''the logistic [regression] coefficients from the two studies for cumulative exposure were almost identical (0.008 for the original study and 0.010 for the re-readings)'' (Attfield et al., 1997, p. 343). Consequently, estimates of excess risk attributable to respirable coal mine dust exposure (obtained by subtracting the intercept from the risk predicted at a specified exposure level according to the same analysis) would be similar regardless of whether the original readings or the re-readings were used.[33]

c. Bias Due to Errors in Exposure Estimates

Biases in respirable coal mine dust exposure estimates could enter into the analyses in the QRAs for the proposed and final rules in a variety of ways. Bias may enter either into the exposure estimates used in the epidemiologic studies on which both QRAs rely or into the QRAs' estimates of current exposures. Since the QRAs' projections of exposures under the proposed and final rules are formed by modifying the estimates of current exposures, biases in current exposure estimates would also affect the projections.

The estimates of current exposures in the QRAs for the proposed and final rules are formulated primarily from MSHA inspector samples, but they are supplemented by operator samples for

[32] See the QRA for the proposed rule, pp. 53, 74, 131–132, captions to Tables 15, 24, and footnote to Table 28.

[33] Because of the upward curvature in the logistic regression model, estimated excess risk would be slightly higher using the analysis yielding a higher intercept than if the two analyses yielded identical regression coefficients for respirable coal mine dust exposure.

work locations where fewer than two (i.e., only one or zero) valid inspector sample is available for the base year, 2008. The current exposures estimates are also adjusted upwards for certain work locations where there is some evidence that relatively high respirable coal mine dust levels have been temporarily reduced in the presence of an MSHA inspector.[34] The procedure used to form the adjusted, supplemented (AS) estimates, and the rationale behind it, are described in the QRA for the proposed rule on pages 24–25 and in Appendix F. The effect of these adjustments on exposure estimates is discussed on page 26 of the QRA for the proposed rule and summarized in Figures 8 and 9 of the QRAs for the proposed and final rules, which compare the AS estimates against the generally lower unadjusted estimates drawn entirely from inspector samples. As explained in the QRA for the proposed rule Footnotes 26 and 28, and supported by the statistical analysis in Appendix E(c) of the QRAs for the proposed and final rules, MSHA believes that the adjustments do not introduce bias into the AS exposure estimates, but rather compensate for pre-existing downward biases in both the inspector and operator sampling data.

Some commenters disagreed with MSHA's AS estimates stating that the QRA's adjustment process systematically overestimates exposures, even when the original exposure estimates are unbiased.'' According to this commenter, the AS procedure ignores or denies ''the obvious possibility that the operator samples may sometimes be too high''.

It is not MSHA's objective in using the AS estimation procedure to derive unbiased estimates for individual work locations. Instead, the objective is to improve the accuracy of the estimated mean for a group of related work locations (e.g., all continuous mining machine operators or all continuous mining machine operators at high rank bituminous coal mines). MSHA agrees that the adjustments may result in overestimates of exposure at individual work locations, but it is only the mean exposure, estimated across an entire group, that is included in the risk calculations in the QRAs for the proposed and final rules.

Based on evidence cited in the QRAs, MSHA believes that mean exposure levels, across groups of work locations, are underestimated by both the inspector and the operator sampling data. The commenter did not address this evidence and suggested instead that the adjustments were made ''unjustifiably . . . to correct for possible occasional underestimation of true exposures . . . but without performing any symmetrical adjustments to correct for equally possible occasional overestimation of true exposures.'' MSHA does not agree that respirable coal mine dust samples, whether they are collected by inspectors or by operators, are equally likely to overestimate or underestimate mean exposure levels. Instead, MSHA believes that the unadjusted means are biased downward precisely because respirable coal mine dust concentrations on sampled shifts are more likely to be below the mean than to exceed it. This was a principal motivating factor behind development of the continuous personal dust monitor.

Moreover, MSHA made corrections for occasional overestimation of exposures. For example, the QRAs for the proposed and final rules exclude repeated inspector samples at work locations exhibiting high Day-1 measurements and adopt a weighting procedure designed to avoid biasing the estimates toward work locations targeted for more frequent dust inspections because of their relatively high respirable coal mine dust measurements. These adjustments resulted in reducing estimates of respirable coal mine dust concentrations more than the AS procedure increased them.

In addition to evidence of underestimation cited in the QRAs, Boden (1986) noted that mine- and job-specific distributions of respirable coal mine dust concentrations compiled from operator compliance samples in 1970 to 1977 contained greater than expected numbers of low measurements compared to fitted lognormal distributions. Attfield and Morring (1992a) reported the same general tendency. These findings are further support of the QRAs' use of the AS estimation procedure.

MSHA agrees with the commenter that there may be work locations where inspector samples are perfectly representative, statistically, of normal conditions. However, MSHA believes that making a relatively small upward adjustment for roughly half of any such work locations hardly compensates for other work locations at which inspector samples and operator samples are both biased downward. Figures 8 and 9 in the QRAs for the proposed and final rules show that the impact of these adjustments on estimated means is not excessive compared to the downward biases that have been reported. As stated in Footnote 28 of the QRA for the proposed rule,

> MSHA recognizes that the AS estimates may be biased relative to mean exposure levels . . . on those shifts sampled by MSHA inspectors . . .. However, the objective is to obtain the best possible estimate of mean exposure across all shifts within groups of related work locations, and not just those shifts that are sampled by an MSHA inspector. Accordingly, MSHA believes that its use of operator data in the AS estimation procedure as applied to specific work locations serves to reduce rather than increase the potential for overall bias.

Systematically increasing exposure estimates is not the same thing as systematically over-estimating exposures. These increases may well be insufficient to fully compensate for the downward bias in respirable coal mine dust samples as a representation of respirable coal mine dust concentrations.

Commenters stated that another limitation of the AS estimation procedure was that there was no symmetrical counter-adjustment in the estimated effects of exposure used in the QRA's exposure-response models. The commenter stated that when exposure estimates are adjusted upward, then potency estimates should be symmetrically counter-adjusted downward to avoid biasing risk estimates upward.

The commenters assumed that a downward bias in exposure measurements was not accounted for in estimating the exposure-response relationships. As described in Seixas et al. (1991), respirable coal mine dust concentration measurements obtained at the mining face were, for the NCWHSP, adjusted upward by 13 percent to compensate for a downward bias judged to exist in the operator sampling data used.[35] These adjusted exposure values

[34] Some commenters mistakenly stated that MSHA did not adjust the AS estimates when the inspector samples are higher. However, whenever only one valid MSHA sample was available for a work location, operator samples were used in addition to the MSHA sample, regardless of whether the MSHA measurement was higher or lower than the operator average. As to other aspects of the AS estimates, these commenters recognized that MSHA's ''approach was motivated by the concern that dust levels are temporarily lowered when MSHA inspectors are present . . . '' but stated that ''when the operator data are higher than the inspector data, MSHA has no real evidence that this is because of extra control efforts during the inspector sampling.'' MSHA's objective in using the AS estimates is to estimate conditions on all shifts, not just shifts that were sampled by MSHA or operators or both. Since evidence of bias exists in both the inspector and the operator samples (see the QRAs for the proposed and final rules, pp. 24–25 and Appendix E), the AS estimation procedure was deliberately designed to compensate for bias in samples from both sources.

[35] Other adjustments described in Seixas et al. (1991) were designed to compensate for specific

were then applied to both the pre- and post-1970 exposures used in the development of cumulative exposure estimates for all of the exposure-response relationships on which the QRA for the proposed rule relies.

In response, MSHA notes that since respirable coal mine dust concentrations measured at the face are generally far higher than those measured at other work locations, they dominate in determining regression estimates of the exposure effects. Hence, the 13-percent upward adjustment in exposures resulted in a corresponding reduction of estimated potency, just as the commenter suggested. This 13-percent adjustment correlates well with the overall impact of applying the AS estimation procedure (see Figures 8 and 9 in the QRAs for the proposed and final rules).

After cautioning that errors in estimated exposures could (theoretically) bias the QRA's estimates of risks attributable to the exposures, the commenters suggested that ''an unknown fraction (up to 100%) of the risk attributed to differences in exposures may in reality be due to unmodeled errors in exposure estimates and covariates . . . .''

MSHA recognizes that any unknown fraction may be as high as 100 percent or as low as zero percent. However, the commenters did not submit any calculations showing how large or widespread the measurement errors would need to be to account for a significant portion of the differences in prevalence of adverse health effects observed for study subjects having categorically different estimated exposures. Nor did the commenters provide any evidence that any errors in the estimated exposures used to establish the exposure-response models in the QRA for the proposed rule were of a type that would increase, rather than occlude, the estimated effects of respirable coal mine dust exposure.[36]

Other commenters stated that there was a specific systematic error in estimates of pre-1970 exposures that tend to exaggerate the effects of respirable coal mine dust exposure in the Kuempel pulmonary response model for severe emphysema, the Attfield-Kuempel NMRD mortality model, and (to a lesser extent) the Attfield-Seixas CWP models.

In response to commenters' concern, MSHA notes that the epidemiologic studies that produced these models relied on estimates of pre-1970 exposure levels for specific jobs. These estimates were formed by combining exposure measurements collected in 1968–1969 by the U.S. Bureau of Mines (BOM) with measurements collected by mine operators in 1970–1972. The U.S. BOM dataset contained data for certain jobs at the mining face but little or no data for most other underground jobs and no data at all for any surface jobs. Therefore, in order to compile lifetime cumulative exposures for each miner included in the epidemiologic studies, job-specific mean respirable coal mine dust concentrations observed in the 1970–1972 operator data were multiplied by a factor of 2.3. This factor ''was obtained averaging ratios of job-specific BOM dust means to 1970–1972 MSHA concentrations for every occupation where there were sufficient U.S. BOM data (n > 10 samples)'' (Attfield and Morring, 1992a). All exposures for miners after 1972 were estimated using the job-specific means calculated each year from the operator data.

According to these commenters, the estimates of each miner's pre-1970 exposures are biased relative to the U.S. BOM data and elevate the slope of the exposure-response curve and reduce thresholds of effect, thereby spuriously overestimating risk. Since they were based on an average ratio rather than job-specific ratios, pre-1970 exposures were generally underestimated in high-exposure jobs and overestimated in low-exposure jobs. According to the commenters, this resulted in underestimating total cumulative exposure for the most highly exposed miners and overestimating total cumulative exposure for the least exposed miners, thereby giving rise to a ''spuriously steeper slope'' in the estimated exposure-response relationships derived from these data.

The use of the mean ratio to estimate job-specific occupational exposure averages prior to 1970 was justified by Attfield and Morring (1992a) by four factors. First, a large part of the job-to-job variation in the ratio of pre-1970 BOM exposure data to 1970–1971 mine operator exposure data is probably of random origin, especially for jobs with relatively few BOM samples. Based on standard errors for the ratios' numerators, 95% confidence intervals included the value 2.3 (i.e., the mean ratio used in the back-extrapolation) for 13 of the 25 ratios for the jobs shown in Table I of Attfield and Morring (1992a).

Second, for some of the remaining jobs, the mean of 2.3 was believed to be more valid than the actual, observed, job-specific ratios. For example, BOM data show pre-1970 dust levels were less than or equal to levels shown by the 1970 and 1971 data for the supply man and utility man jobs. In the opinion of Attfield and Morring, this did not seem reasonable.

Third, the necessity of pooling individual MSHA jobs into the broader Lainhart categories for matching with the work histories resulted in reduced variation of dust levels across Lainhart job groups compared to individual MSHA jobs. This brought the job-specific ratios based on Lainhart categories (which Attfield and Morring considered to be of more practical relevance than the individual MSHA jobs cited by the commenters) closer to the mean of 2.3 used in the exposure derivation.

The last of the four factors proposed by Attfield and Morring concerns the results of attempting to derive exposure estimates based on variable ratios. The actual BOM job means were used directly to estimate the exposures, with MSHA data being used only to fill in the gaps. The resulting exposure estimates had a mean and standard deviation of 100 and 79 g-hr/m^3, respectively, and were highly correlated with those developed by using the common ratio (Pearson correlation = 0.95). Use of these data in exposure-response analyses did not realize any advantages. In another attempt, a set of pre-1970 dust exposure estimates was generated by using variable ratios derived from a nonlinear regression model. The resulting exposure estimates did not correlate better with medical indexes in analyses of exposure-response.

MSHA agrees with Attfield and Morring that the first three factors support their use of the common average ratio. However, their fourth factor may support the position taken by commenters that use of this constant ratio artificially inflates the slope of the exposure-response regression line. This would be the case if the criterion for ''realizing any advantages'' and correlating ''better'' is simply that the estimated slope is steeper (and therefore more evident) than the slope obtained using the constant ratio. It is not clear from Attfield and Morring (1992a) what the criterion actually is.

biases introduced, at the time of the NCWHSP, by MSHA's analytical and data processing procedures for determining respirable coal mine dust concentrations from gravimetric samples. These biases have long since been eliminated, as documented in the **Federal Register** notice MSHA published jointly with DHHS on July 7, 2000 (65 FR 42068). Therefore, corresponding adjustments are not necessary for the 2004–2008 data used in the QRAs.

[36] Errors due to imprecision of the sampling device (cyclone, pump, and weight gain determination) are *not* of a type that would increase estimated effects of respirable coal mine dust exposure. Since they are independent of the underlying exposures, having more errors of this type merely raises the threshold on how steep the response must be for the relationship to be detectable.

MSHA believes that both the commenters and Attfield and Morring (1992a) overlooked an important factor mitigating any bias introduced into cumulative exposure estimates by use of the common ratio: Namely, that miners generally did not continue to work in a single occupation for their entire lifetimes. In another context, Attfield and Morring (1992a) state: ''. . . few miners spent all of their working life in the dustiest jobs, hence heavy exposures received while performing those jobs were usually diluted by the exposures caused by work in less dusty jobs'' (op cit, p. 252). Likewise, some of a miner's occupations would have a below-average ratio while others would have an above-average ratio. Therefore, job-related exposure biases introduced into the exposure history of an individual miner would tend to compensate for one another; and estimates of overall cumulative exposure would be expected to approach the correct value as the number of individual jobs held increased. For this reason, along with those provided by Attfield and Morring, MSHA believes that bias due to use of a common ratio for back-extrapolation had only a minor impact, if any, on the estimated exposure-response relationships.

Some commenters also stated that the Attfield and Kuempel (2008) NMRD mortality study had another bias, related to incomplete work history data, that could potentially bias exposure-response associations by under-estimating exposure and over-estimating risk.

After acknowledging that ''up to 23 years of exposure may have been omitted from a miner's exposure,'' Attfield and Kuempel (2008) addressed potential impact of exposure misclassification on their results. According to Attfield and Kuempel, any such impact was mitigated by several factors. First, dust exposure levels in U.S. mines were mandated to be much lower after 1969; data indicates that levels had dropped by 1975 to less than one-third to one-quarter of pre-1969 levels, with most of the drop happening in the period 1970–1972 [Attfield and Morring, 1992b]. A miner's post-1970 exposure would generally have contributed a relatively small percentage of total exposure. Second, the workforce had an average age of 44.5 at the start of follow-up, meaning that many in the study cohort would be likely to retire early in the follow-up period, again limiting the potential for misclassification. Third, although younger miners have the most potential for misclassification in their exposures since their tenure during follow-up may have been as long, or longer than, their pre-follow-up tenure, very few NMRD deaths occurred in younger miners. Only 6% of the total NMRD deaths occurred in miners younger than 45 years of age at start of follow-up, while 19% occurred in miners younger than age 50. The impact of exposure misclassification during follow-up was assessed by restricting the analysis to miners aged 50 years or older at start of follow-up. Use of the proportional hazards model on NMRD on this subgroup gave rise to a relative risk of 1.006 per mg-year/m^3 ($p<0.0001$), which is similar, but slightly smaller than that for all workers (relative risk=1.007). According to Attfield and Kuempel, these findings do not absolve the results from the effects of exposure misclassification, but the findings do indicate that any effect is limited and ''much less than might be suggested by first appearances.''

Although Attfield and Kuempel characterize the issue as one of ''exposure misclassification,'' this is somewhat misleading, since the missing exposures are systematically set to the lowest possible value (zero) rather than to various values randomly drawn from the distribution of exposure levels. Consequently, the effect is not ''possible attenuation of the exposure-response relationship,'' as Attfield and Kuempel suggest, but, to the contrary, an inflation of the relative risk associated with each unit of exposure, as suggested by these commenters. The three mitigating factors cited by Attfield and Kuempel reduce the effect of this bias, but they do not completely eliminate it.

Only part of the impact of excluding exposures experienced after 1970 is revealed by restricting analysis to workers aged 50 or greater at the start of follow-up, as described by Attfield and Kuempel above. Although these workers were older than the average age of the cohort, it can reasonably be presumed that many of them still accumulated significant exposures after 1970. Therefore, the restricted analysis does not show the full impact of the bias. Nevertheless, even the partial impact is greater than Attfield and Kuempel suggest by comparing the relative risks estimated for a single mg-yr/m^3 of exposure. Over a 45-year occupational lifetime, exposure to low rank (West region) respirable coal mine dust at an average concentration of 2.0 mg/m^3 produces an estimated relative risk = $e^{90\times0.00709}$ = 1.89 based on the full analysis and relative risk = $e^{90\times\mathrm{Log}_e(1.006)}$ = 1.71 based on the partial analysis.[37] This discrepancy of over 10 percent demonstrates a substantial overestimate of the risk attributable to respirable coal mine dust exposure. Eliminating the bias entirely would almost certainly reduce the estimated relative risk even further.[38]

MSHA agrees that setting all exposures experienced after 1970 to zero has inflated the Attfield-Kuempel estimates of NMRD mortality risk attributable to respirable coal mine dust exposure. However, based on the discussion above, MSHA sees no evidence that this bias is entirely or even mostly responsible for the observed relationship between respirable coal mine dust exposure and NMRD mortality risk. Still, the bias may help explain why the Attfield-Kuempel relative risk estimates are so much greater than corresponding estimates based on the research reported by Miller et al. (2007), as shown in Figure 15 for COPD mortality in the QRAs for the proposed and final rules. Accordingly, MSHA is reducing the coefficient of respirable coal mine dust exposure used to estimate NMRD mortality relative risk (hazard ratios) by one-third. This brings the coefficient down to a value of 0.0048, which is halfway between the original Attfield-Kuempel estimate of 0.00709 and the Miller estimate of 0.0025.[39]

d. Threshold Effect

One commenter suggested that the majority of cases of respirable coal mine dust-related disease observed in miners is due to high multiples of average exposures (perhaps 5 to 10 times). The commenter stated that miners in this upper end of the exposure distribution contribute disproportionately, and perhaps exclusively to the number of observed cases. Since current average respirable coal mine dust concentrations exceed 0.5 mg/m^3 for nearly all underground face occupations (see Figure 7 in the QRAs for the proposed and final rules), the commenter considered concentrations of 2.5 mg/m^3 or less (i.e., anything less than a five-fold multiple of the average) to be generally benign. However, the

[37] The average respirable coal mine dust concentration of 90 mg-yr/m^3 is calculated by multiplying 2.0 mg/m^3 by 45 yr occupational life.

[38] All of the discussion and calculations in this paragraph pertain to estimated NMRD mortality risks.

[39] The Attfield-Kuempel estimate is shown in Table X of Attfield and Kuempel (2008) and Appendix K of the QRA for the proposed rule. The Miller estimate was derived by multiplying 0.0013 (i.e., the coefficient of respirable coal mine dust exposure shown in Model NMRD/05 of Miller et al. (2007) by 1,920 hr/yr and dividing by 1,000 mg/m^3.

commenter cited no toxicological or epidemiological evidence to support this hypothesis with respect to respirable coal mine dust exposures.

The commenter suggests that only respirable coal mine dust concentrations above a threshold level can cause adverse respiratory health effects, and that exposure-response relationships for respiratory diseases must model a threshold effect. The commenter was correct in noting the QRA's exclusive reliance on threshold-free risk models. However, the commenter cited no alternative, empirically-derived threshold models applicable to risks specifically due to respirable coal mine dust exposures, and provided no evidence to support the premise that respirable coal mine dust is toxic only when exposures exceed a threshold level.[40] Although the QRA did not discuss the evidence for or against thresholds, the applicability of threshold models to respirable coal mine dust exposures has been investigated in the published literature.

The possibility of an exposure threshold for CWP response was investigated and rejected in Attfield et al. (1997). In the explanation from the Attfield article below, TLV represents a possible threshold limit value.

> Determination of the existence of a threshold effect, through use of the transformation
>
> $CE - (CE - TLV) \cdot H(CE - TLV)$,
>
> Where CE is cumulative exposures and $H(CE - TLV) = 0$ if $CE < TLV$, and 1 otherwise, was examined using the χ^2 value for the coefficient for transformed exposure variable.
>
> Figure 1 shows a plot of this statistic for three outcomes: category 1+, category 2+ and PMF for a range of TLV from 0.0 to 2.0 $mg \cdot m^{-3}$. It is clear from this figure that there was little convincing indication of a threshold. For category 1+ and PMF, χ^2 peaked close to 0 $mg \cdot m^{-3}$, while for category 2+ the peak was near to 1.0 $mg \cdot m^{-3}$ but the curve was virtually flat, suggesting great uncertainty in the location of any threshold. Use of the log-likelihood value in place of χ^2 suggested even less evidence for a threshold. In other analyses . . ., rather than a threshold, there was evidence of a non-zero baseline of response at zero dust exposure.

Figure III–1 is reproduced from Figure 1 of Attfield et al. (1997) and shows why the authors concluded that the evidence failed to support a threshold effect (no threshold effect existed at or above 1.0 mg/m^3).

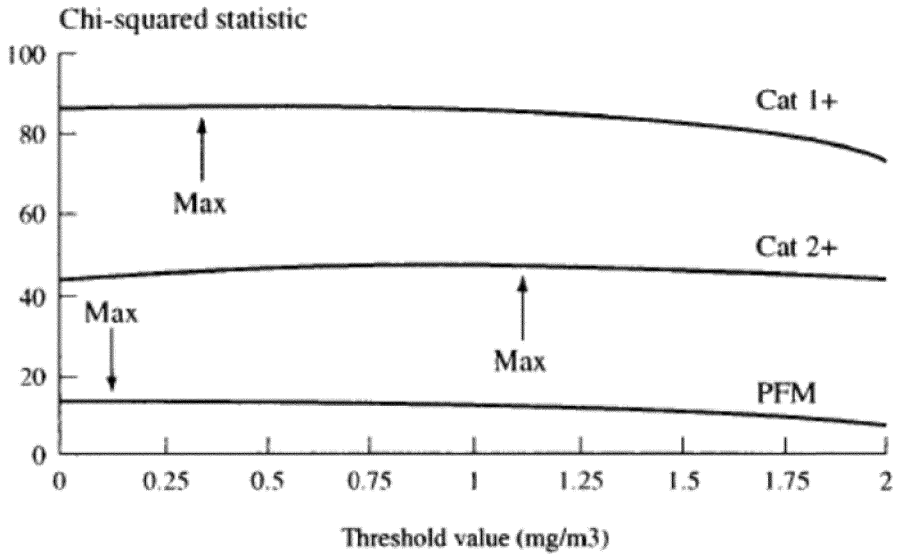

Figure III–1—Examination of threshold. Plot of χ2 statistics against candidate threshold limit values for category 1 +, category 2+ and PMF, reproduced from Figure 1 of Attfield et al. (1997). PMF was mislabeled as "PFM" in the original Figure

Bailer et al. (1997) examined several alternative models, including threshold models, for describing exposure-response relationships between respirable coal mine dust and FEV_1 deficits among miners who participated in Round 1 of the NCWHSP. For FEV_1 less than 80% of the predicted normal value, a threshold was suggested at a cumulative exposure of 22.0 mg-yr/m^3.[41] This corresponds to exposure at an average respirable coal mine dust concentration of 0.5 mg/m^3 over a 45-year occupational lifetime.[42]

Based on its review of the available evidence included in the QRAs for the proposed and final rules and the Health Effects section of the preamble to the proposed rule, MSHA has determined that the best available epidemiological evidence fails to support a threshold model for either CWP or clinically significant pulmonary effects due to respirable coal mine dust exposures. The evidence indicates that if an exposure threshold does exist, it is likely to occur at respirable coal mine dust concentrations below not only the existing standard, but also the final standard, assuming a 45-year lifetime of occupational exposure. Due to the nonlinear nature of the models, much of the reason for stratifying the exposures by occupation and work location was to account for higher exposures in certain job categories.

Regardless, the mean respirable coal dust concentration for each coal mining occupation in the QRAs for the proposed and final rules is documented in accordance to the MSHA's job coding based on single distinct occupation. Attfield and Morring (1992a) determined that the average tenure

[40] The research cited by the commenter does not apply specifically to respirable coal mine dust exposures.

[41] The 95-percent confidence interval reported for this estimate was 0 to 55 mg-yr/m^3, so the evidence for a threshold was not statistically significant at a 95-percent confidence level.

[42] The average respirable coal mine dust concentration of 0.5 mg/m^3 is calculated by multiplying 22 mg-yr/m^3 by 45 yr occupational life.

worked for the Lainhart job coding scheme was different for each occupation group. Therefore, the occupational category decomposition for respirable coal dust is needed in the QRA, as was done in both QRAs.

e. Model Consistency and Coherence

One commenter also stated that the Attfield-Kuempel exposure-response model for NMRD mortality used in the QRA for the proposed rule exhibited inconsistencies that do not pass basic consistency checks for yielding valid risk predictions. As an example, this commenter cited the Attfield-Kuempel model for NMRD mortality risk, which, even with cumulative exposure set to zero, produces relative risk estimates of 4.4 and 1.2 for miners regionally associated with anthracite and high rank bituminous coal, respectively. The commenter did not describe or enumerate the ''basic consistency checks'' considered necessary for validating risk predictions or identify any other examples of purported inconsistencies in any exposure-response models used in the QRA.

As discussed in Section III.B.2.c. of this preamble, the commenters did not recognize that the model does not attribute a relative risk of 4.4 to coal in the absence of any exposure. Instead, as explained in the QRA for the proposed rule, Appendix K, the model estimates a relative risk of 4.4 ''for miners regionally associated with anthracite . . .'' and ''[t]his suggests that the regional effects are primarily due to geographic factors other than coal rank . . . .'' (QRA, Appendix K, p. 135). The relative risk estimate of 4.4 represents background risk in the Anthracite region, which is not associated by the model with coal. The same background risk is present in both the estimate of risk under current exposure conditions and the reduced risk projected to remain under the final rule. Therefore, background risk associated with the Anthracite region is canceled out when projected risk is subtracted from existing risk to estimate the final rule's impact.

MSHA does not regard the relative risk estimated for exposure in the Anthracite region as an inconsistency. As emphasized above, the Attfield-Kuempel model yields a background relative risk or intercept of 4.4 for occupationally unexposed miners in the Anthracite region. The effect of anthracite exposure is modeled by the slope of the exposure-response curve, rather than its intercept. The model predicts (a) that the background rate of NMRD mortality in the anthracite region is 4.4 times what it is in the West region; and (b) that the slope of the exposure-response relationship is also greater (by a factor of 4.4) for anthracite exposures than for exposures to western coal.[43]

Furthermore, MSHA believes that it is appropriate to attribute improvements in predicted risk (obtained by subtraction within coal mining regions) with reductions in the exposures expected under the final rule. The commenter listed several factors, unrelated to respirable coal mine dust exposure, that could account for the predicted improvements, including model specification errors, unmodeled interactions among variables, omitted covariates and confounders, etc. However, these possibilities do not arise from inconsistencies in the particular exposure-response models used in the QRA. Such factors may contribute to the uncertainty of any epidemiological analysis. The fact that the commenter ''could'' account for the predicted improvements does not contradict MSHA's view that the predicted improvements are rationally attributable to reductions in respirable coal mine dust exposure.

Despite their shortcomings, the exposure-response models used in the QRA comprise the best available means of quantifying risks attributable to respirable coal mine dust exposures. Therefore they satisfy both the requirements of § 101(a)(6)(A) of the Mine Act requiring the Secretary to set health standards ''on the basis of the best available evidence'' and the Office of Management and Budget's (OMB) 2002 data quality guidelines, Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies (36 FR 8452, February 22, 2002). None of the commenters cited alternative quantitative models that they thought MSHA should use instead.

2. Reliance on Mean and Cumulative Exposures

Some commenters, in accounting for possible threshold effects, objected to the reliance in the QRA for the proposed rule on mean respirable coal mine dust concentrations at work locations and lifetime cumulative respirable coal mine dust exposures. In addition, the commenters disagreed with the QRA's application of exposure-response models to mean exposures within groups of occupationally, geographically, and environmentally related work locations.[44] The commenters explained that there are two related problems with the QRA's exposure metric: (1) Its use of cumulative exposures (ignoring peaks, and the fact that a higher concentration for a shorter time may cause diseases even though the same cumulative exposure spread over more years would not); and (2) its focus on mean exposures, ignoring the variance of exposure and the occurrence of exceptionally high (far above the mean) cumulative exposures.

The commenters' concern about relying on average exposures depends partly on the premise of threshold effects noted in Section III.B.2.d. of this preamble. If this premise were true, then attributing risks to average respirable coal mine dust concentrations and cumulative exposures could both mask threshold effects and assign risks to a broader population than warranted. The existing epidemiological data, however, do not appear to support the premise of significant threshold effects. Furthermore, as mentioned in the QRA, no exposure-response models have been published that would enable MSHA to account for peak respirable coal mine dust exposures when quantifying health risks.

The commenters are also concerned that masking can occur when different exposures are averaged together. MSHA agrees, and the QRA for the proposed rule states this in the justification for stratifying its analysis:

> Applying an exposure-response model to an occupational average exposure level fails to account for risks in more specific environments where the exposure is above the occupational average. (QRA, p. 41.)
>
> . . . Therefore . . . exposure response models for CWP, severe emphysema, and NMRD mortality are applied to dust concentration averages for clusters of work locations whose dust conditions pose similar risks. (QRA, p. 42.)

Work locations with respirable coal mine dust conditions posing similar risks are identified in the QRA not only by occupation, but also by the recurrence of exposure measurements exceeding 1.0 mg/m^3 and 2.0 mg/m^3

[43] At a specified mean respirable coal mine dust exposure concentration, μ mg/m^3, experienced over a 45-year occupational lifetime in the Anthracite region, the slope (i.e., rate of change) of the Attfield-Kuempel exposure-response model for relative risk of NMRD mortality is:

$$45\beta \times \exp(\alpha + 45\beta\mu) = \exp(\alpha) \times 45\beta \times \exp(45\beta\mu)$$

where $\beta = 0.00709$, $\alpha = 1.4844$ for the Anthracite region, and $\alpha = 0$ for the West region. Therefore, for any specified value of μ, the slope for anthracite exposures is exp (1.4844) = 4.4 times the slope for West region exposures. Note that for reasons explained in Section III.B.2.c, MSHA is reducing the Attfield-Kuempel estimate of β by a factor of one-third, from 0.00709 down to 0.0048.

[44] In the present context, ''environmentally related'' refers to work locations in the same overexposure recurrency class as defined in the QRA. ''Geographically related'' refers to work locations assigned to the same coal rank category.

(''recurrency class'') and by the rank of coal at the work location. Accordingly, the QRA's analysis is stratified into 306 cells, shown in the Tables 12 and 20 in the QRA. Although this complicates presentation of the QRA's results, it was done precisely to avoid distorting risk estimates by averaging essentially different exposures. The QRA provides separate analyses for strata ranging between work locations showing average exposure to low rank respirable coal mine dust at 0.11 mg/m^3 and work locations showing average exposure to high rank respirable coal mine dust at 2.94 mg/m^3. (See Table 12 in the QRAs for the proposed and final rules.)

These same commenters stressed the importance of quantifying not just the mean exposure concentration before and after a rule is implemented, but how the frequency distribution of exposures will change. To illustrate, a hypothetical example was provided to show that a rule that decreases mean exposure can increase risk. A key feature of this example was that the rule reduces the mean exposure concentration, through rigorous dust control measures that result in lower exposures for most workers, but in higher exposures for workers in locations where implementation or compliance fail.

The commenters presented no discussion of where, how, or why the proposed rule would cause exposures for any miners to increase, and MSHA sees no reason why failures of implementation or compliance would do so. Furthermore, the projections in the QRA for the proposed rule of respirable coal mine dust concentrations under the proposed and final rules do exactly what the commenter advocates as being important: The frequency distribution of exposures, before and after implementation of the rule, is projected before estimating any risks. The QRA does this by projecting the expected impact of the rule separately onto each of the individual respirable coal mine dust measurements used to characterize the exposure distribution for each work location (See the QRA for the proposed rule, Appendix H(c), p.128). Mean projected exposure concentrations are calculated, for each work location and then for the whole cluster of similar work locations comprising each stratum of the analysis, only after the frequency distribution of respirable coal mine dust concentrations on a shift has been projected.

MSHA did not rely on mean exposures, and as further justification for stratifying its analysis, the QRA for the proposed rule points out that when exposure-response relationships are curved upwards (as in the QRA), ''evaluating risk at the average exposure level will always underestimate average risk.''

The commenters also stated that MSHA's QRA did not quantify relatively high (disease-relevant) exposures, nor model how they would change if the proposed rule is finalized.

As indicated above, the QRA for the proposed rule separately evaluates current and projected risks in 306 different exposure strata, including five in which average exposure exceeds the existing standard (QRA, Table 12). In addition, the QRA for the proposal quantifies the prevalence of individual excursions (QRA, Tables 6 and 9 and Figures 5 and 6) and explicitly projects the impact of reducing these excursions to the final standard (QRA, p. 64 and Footnote 55). MSHA agrees that further research on the effects of excursions would be beneficial, but there have been no studies providing exposure-response models sensitive to measures of exposure excursion frequency and intensity. MSHA believes that by modeling the elimination of all shift exposures above the final standard in its projections of risk under the final rule, the QRA for the final rule has accounted for excursions to the greatest extent possible.

3. Projected Exposures and Risk Reductions

MSHA believes that it is not only important to quantify the mean exposure concentration before and after a final rule is implemented, but also how the frequency distribution of exposures will change. This is why the QRAs for the proposed and final rules address each work location separately in their projections of exposures, estimating the job-specific effect on relatively low exposures separately from the effect on exposures that currently exceed the standard. Some commenters used a very different method of predicting how exposures would have changed under the proposed rule. According to their method, respirable coal mine dust concentrations under the proposed rule would follow the same distributional form as current exposures, but with the mean shifted lower by an amount sufficient enough to force nearly all of the high concentrations down below the proposed standard. To reduce dust concentrations sufficiently while maintaining the same distributional form, a substantially greater reduction in the mean is required than what the QRA for the proposed rule projects.

The QRA for the proposed and final rules formulate projections by reducing current exposures by various amounts, depending where they are relative to the applicable standard, and then calculating the resulting mean for each stratum in the analysis. Since the QRA assumes (conservatively) that respirable coal mine dust concentrations on relatively dusty shifts will be reduced only as far as necessary to achieve compliance, the distribution of projected concentrations generally bears little resemblance to the current distribution of concentrations. It is anticipated that the continuous personal dust monitor will eventually enable mine operators to maximize production while keeping dust concentrations at or below the permissible standard on every shift. The projected change in exposure distributions is schematically illustrated by Figure III–2.

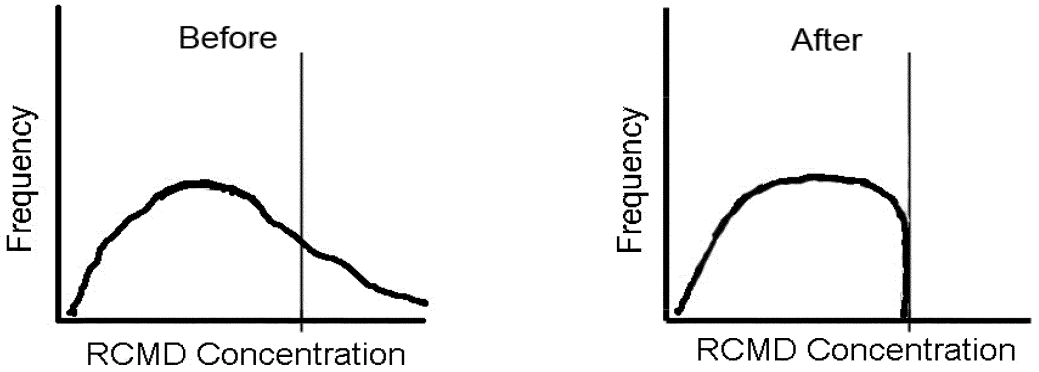

Figure III–2—Schematic diagram of change in distribution of respirable coal mine dust concentrations (RCMD) at an individual work Location as projected by QRA for the proposed rule. Vertical line represents the final respirable coal mine dust concentration standard

In contrast, other commenters' method constructs its projections by computing the mean of a theoretical distribution in which individual respirable coal mine dust concentrations would rarely exceed the final standard. This calculation is based on the premise that in achieving compliance with the final standard on every shift, the distribution of concentrations would compress but retain the same general shape as before. Their method assumes that the shape of the respirable coal mine dust distribution (i.e., the relative variance) remains unchanged. The type of change predicted by the commenters is shown in Figure III–3.

The underlying difference between these two approaches is that the commenters state that MSHA's analysis in the QRA for the proposal of the required respirable coal mine dust reductions needed to meet the proposed respirable coal dust standard is not adequate because it substantially underestimates the necessary reductions. Under the final rule, operators will only need to make reductions on shifts on which the 1.5 mg/m^3 standard is exceeded. Additional reductions may occur and were included in the QRA's projections to the extent suggested by empirical evidence (Table 19 and Appendix H(b) of the QRAs for the proposed and final rules), but neither the proposed and final rules require these reductions. The theoretical model used by the commenters would require larger reductions to satisfy the theoretical constraint of a constant relative variance.

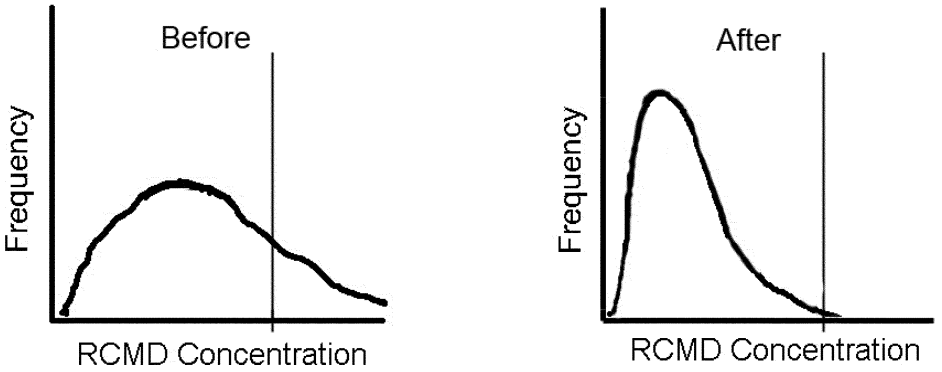

Figure III–3—Schematic diagram of projected change in distribution of respirable coal mine dust (RCMD) concentrations according to the commenters approach. Vertical line represents final respirable coal mine dust concentration standard

These commenters expressed concern about the difficulty of reproducing MSHA's analysis of the inspector sampling data cited in the QRA for the proposed rule (U.S. Department of Labor, MSHA (2010). Quantitative Risk Assessment, Dust Data Files, InspSamp.txt). Before discussing the evidence the commenters present in support of their theoretical model, it is helpful to clarify a source of some confusion. The commenters are correct when they state that a total of 146,917 valid, Day-1 inspector samples [45] were used by MSHA in the QRA, as shown in Tables 1 and 3 of the QRA for the proposal. These commenters noted that this subset of 146,917 was obtained from the total of 181,767 non-voided samples by excluding (a) 14,016 samples collected within 21 days after ''Day 1'' of an MSHA dust inspection, (b) 10,927 Day-1 samples not associated with an occupation, and (c) 9,906 Day-1 intake air samples. One additional sample (d) was excluded ''because the dust concentration measurement appears to have resulted from a coding error.'' These subtotals (a, b, c, and d) are all shown in Appendix B of the QRAs for the proposed and final rules and fully account for the 34,850 valid samples excluded from the analysis

[45] A ''Day-1'' inspector sample is an MSHA inspector sample that was collected more than 21 days after the initial day of a prior MSHA inspection in the same production area of a specified mine.

Samples are deemed to have been obtained in the ''same production area'' of a specified mine when the samples are coded with the same mine ID and the same 2nd and 3rd digits of MSHA's 4-digit entity code. For example, entity codes 0010 and 9011 represent the same production area within a specified mine.

(181,767 − 34,850 = 146,917). The apparent source of confusion was that the summary formula provided at the bottom of page 93 in the QRA for the proposed rule did not include the 9,906 excluded intake air samples.[46] This has been corrected in Appendix B of the QRA for the final rule.

These commenters also were concerned with the QRA's stated reasons for excluding the 2004–2007 inspector samples from its estimates of current and projected exposure levels. After noting the temporal changes in samples per work location shown by Table 5 in the QRA for the proposed rule, and substantial right-skewing of the respirable coal mine dust concentration data, they stated that a downward trend in the average [respirable coal mine dust] level per work location is expected due to increasing sampling error associated with decreasing sample size for the right-skewed data, absent any real change in respirable coal mine dust distributions over that period.[47] Furthermore, the commenters expressed concern with MSHA's finding of a downward trend in inspectors' measurements because their assessment of a temporal trend by job category in the MSHA inspector Day-1 sample data shows no meaningful temporal trend in any category or for the aggregated data. According to the commenters, some trends reached nominal statistical significance, but they explained virtually zero percent of the variance of the natural-log-transformed respirable coal mine dust data.

For both underground and surface measurements, MSHA's analyses (summarized in Appendix D(c), Tables 39 and 41, in both QRAs for the proposed and final rules) show a statistically significant downward time-trend in respirable coal mine dust concentrations obtained from inspector samples, at confidence levels exceeding 99.9 percent. Unlike the non-peer reviewed analysis submitted by these commenters, MSHA's peer-reviewed analyses account for specific mines, specific work locations within mines, and applicable standards. Although, in MSHA's analysis, the percentage of variance explained by the time-trend (represented by ''sampling date'' in the ANCOVA tables) is small compared to that explained by occupational differences, it is larger than the amount explained by mine-to-mine differences or differences between production areas within the same mine, and even the applicable standard. It may be that in the commenters' analysis, temporal effects were partially masked by aggregating across work locations and ignoring differences and/or changes in the applicable standard in effect at specific work locations. As mentioned on page 102 of the QRA for the proposed rule, the ANCOVA method used adjusts for variability in the number of samples obtained in each year at each location. Furthermore, lack of statistical symmetry in the data (and associated heterogeneity of sampling errors) is addressed by application of the maximum-likelihood Box-Cox transformation[48] (Box and Cox, (1964)). The commenters' objections to MSHA's analyses are not supported by the available data.

These commenters performed an analysis of the Log-transformed inspector data and reported that when each Mine ID and work location-specific set of untransformed data was normalized (divided) by its corresponding applicable dust standard, the resulting log-transformed data sets aggregated by job category were, in each, either approximately normally distributed (for 9 of 33 job categories), or otherwise approximately distributed as a mixture of two normal distributions for the remaining job categories.

From this analysis, the commenters concluded that mixed lognormal distributions provided a more accurate and simpler basis for performing statistical analysis with the coal mine dust data set. However, they presented no evidence that the logarithmic transformations they used were ''more accurate'' than the Box-Cox transformations used by MSHA in the QRA for the proposed rule (which include the logarithmic transformation as a special case). It is simpler to analyze the data (and explain results) when all mines and work locations within mines are combined into an undifferentiated pool. However, the finding in the QRA for the proposed rule[49] that ''. . . work locations exhibit a wide variety of distributional forms . . . that cannot adequately be approximated by a lognormal model'' did not refer to the combined data. These commenters presented no evidence suggesting that it was more accurate to combine data from all work locations associated with the same occupation than to differentiate among work locations at different mines or mine areas. Tables 39 and 41 of the QRA for the proposal show that these differences are statistically significant, so not including them would not yield more accurate results.

Approximate log-normality across work locations was never questioned or disputed in the QRA for the proposed rule. For purposes of estimating the impact of the final rule on expected risk, the important questions are whether the distributions should be assumed lognormal within work locations and, far more important, whether they would retain, within work locations, the same coefficient of variation and distributional form under the final rule regardless of their distribution. MSHA expects the final rule to have its greatest impact on work locations currently exhibiting the highest dust concentrations, with relatively little impact on work locations already in compliance with the final standard on every shift.

According to the commenters, full compliance with the rule as proposed would have required a 92% reduction in the mean respirable coal mine dust concentration for longwall tailgate operators, from 1.39 mg/m^3 (their estimate of the current mean) to 0.11 mg/m^3 (their estimate of the mean level required to meet the proposed 1.0 mg/

[46] These commenters also requested clarification of the 4-digit entity code provided in the sampling data files. Leading zeros and blanks should be treated as equivalent when interpreting the first two characters. As stated in Footnote 12 on pages 5 and 14 respectively of the QRAs for the proposed and final rules, samples collected at the same work location within a mine or processing facility are identified by sharing the same 2nd and 3rd characters of the entity code, along with the same mine ID and job classification code.

[47] These commenters also questioned MSHA's use of a study predating the 2004–2008 data, and of miners' anecdotal evidence, to justify the assumption of downward bias in MSHA's respirable coal mine dust measurements. MSHA acknowledges that it is inherently difficult, if not impossible, to fully quantify bias due to selective reductions of dust levels in the presence of an MSHA inspector. However, MSHA finds the anecdotal evidence for such bias, confirmed over many years of miners' testimony at public hearings, to be persuasive. The 1993 study represented an attempt to quantify some part of this bias, and no similar study of later sampling data is available. It was cited in the QRA for the proposed rule, along with the anecdotal evidence, only to support MSHA's assessment that such bias exists. Neither it, nor the anecdotal evidence, was used in any attempt to quantify the extent of the bias (U.S. Dept. of Labor, MSHA, 1993, Report of the Statistical Task Team of the Coal Mine Respirable Dust Task Group).

[48] This enables valid analysis of data exhibiting a much wider array of error structures than what these commenters assume, and permits the logarithmic transformation (appropriate when standard deviation is proportional to the mean concentration measurement) as a special case. In the analysis of surface data (QRA for the proposal, Table 41), the transformation (Box-Cox λ=0) is identical to the logarithmic transformation favored by these commenters. In the analysis of underground data (QRA, Table 39), the transformation (Box-Cox λ=0.1) is close to logarithmic but reflective of data that is slightly less skewed than the Lognormal assumption would predict.

[49] Appendix G(b), p. 125.

m^3 standard with a 99% compliance rate). This calculation relies on the following unfounded assumptions that MSHA responds to below.

(i) That variability in dust concentrations for a specified occupation, pooled across all mines and mine sections, is similar to the variability at the individual work locations where exposure occurs and the final standard would actually be implemented.

The values of σ_1 and σ_2 shown in the commenter's calculations represent the pooled variability in respirable coal mine dust concentrations across all work locations for each occupation. Thus, the measure of variability these commenters use in their analysis combines (1) the average variability observed within work locations and (2) the variability in the mean levels observed between work locations of the same occupational type. This inflates the estimates of variability within work locations—where the mandated reductions would actually have to occur. Furthermore, individual work locations may have widely differing degrees of variability in respirable coal mine dust concentrations. Therefore, pooled estimates of variability within work locations (even if properly calculated so as to eliminate the effects of variability between work locations) could merely be averages of significantly divergent exposure patterns at individual work locations. The calculations that the commenters present in their comments apply only to work locations where variability in respirable coal mine dust concentrations is approximately equal to variability observed across the entire population of work locations associated with longwall tailgate operators.

(ii) That within occupational categories, the shift-to-shift dust concentration at each work location is lognormally distributed.

Although the assumption of universally lognormal exposure distributions is widespread and perhaps entrenched in the occupational hygiene literature, it is not always supported by coal mine dust concentration measurements at individual work locations. (See Appendix G(b), QRA for the proposed rule.) Multimodal, or even unimodal right-skewed distributions, are not necessarily well-approximated by a lognormal model. Although these commenters correctly suggest that multimodal distributions can often be adequately represented as mixtures of lognormal distributions, they present no evidence that such distributions provide good, predictive models for the distribution of respirable coal mine dust concentrations within work locations. The fact that pooled exposures are lognormally distributed does not imply that exposures at individual work locations are lognormally distributed.

(iii) That the distributional form (i.e., shape) of each occupational exposure distribution, as represented by the lognormal parameters shown in their comments, would not change after successful implementation of the final rule.

As illustrated by Figure III–3, it is this assumption of shape-retention that is primarily responsible for the extreme reductions in mean exposure that these commenters conclude are necessary for compliance with the proposed rule. The commenters did not present empirical evidence directly supporting this assumption, but they did offer the following justification after MSHA questioned the assumption at a public hearing: (1) Empirical evidence for each job category was shown to be consistent with contributing log-normal components; (2) evidence was based on an analysis of dust concentration measurements that had already been ''normalized'' as a result of dividing them by compliance level specific to each job location and job category; and (3) the underlying pre-normalized data aggregated across each job category also exhibit mixed log-normal distributions. According to the commenters, this demonstrates that compliance resulted in job-specific multiplicative shifts of the type assumed in their subsequent analysis. They also argued that if more complex types of shifts had arisen due to compliance, such as those projected in the QRA, then the pre-normalized data would not be expected to exhibit the degree of consistency with mixed log-normal distributions that is summarized in the comments.

Although all three of the commenters' premises summarized above are true, they do not support the commenters' conclusion that the effect of applying job-type-specific control measures to comply with new regulations will be to induce a leftward (downward) multiplicative shift in the mixed log-normal distribution that the commenters estimated to be consistent with empirical data for that job category. Furthermore, the commenters' three premises apply only to the distributions of respirable coal mine dust concentration measurements aggregated across all work locations of a given occupational type. Their analysis models a static distribution for each occupational aggregate and does not address the response to compliance with more stringent standards. Despite the ''normalization'' procedure described, the commenters' analysis provides no information on how individual work locations have responded to reductions in their exposure limits. For most work locations, the applicable standard did not even change appreciably during the data period. The fact that these aggregated distributions are consistent with mixed lognormal assumptions demonstrates nothing about how individual work locations will respond to the reduced standard.

4. Uncertainty Analysis

As indicated above, a difference in assumptions as to how respirable dust exposures would have changed under the proposed rule led some commenters to project exposures for longwall tailgate operators that are quantifiably different from those projected by MSHA. Although MSHA believes that Figure III–2 provides a much better picture than Figure III–3 of how dust concentrations in individual work locations will change under either the proposed or final rule, MSHA fully acknowledges that its predictions of future exposure distributions are not certain. This uncertainty was expressed in the QRA for the proposal by a statement of the major assumptions involved in MSHA's projections (QRA, p. 80). However, MSHA has no empirical data basis for quantifying the degree of uncertainty attached to these assumptions. This illustrates a more general point: Although it may be possible to quantify and compare the results of competing models, it may not be possible (in the absence of appropriate experimental data) to provide a valid quantitative assessment of uncertainty in regard to competing assumptions.

Several commenters stated that the QRA for the proposal lacked sufficient discussion of the uncertainty surrounding its estimates of current and projected exposures and health risks, and of the reductions in risk expected to result from implementation of the proposed rule.

Although the QRA for the proposed rule contained qualitative discussions of its major assumptions and their implications with respect to both current and projected risks (pp. 58–59 and p. 80, respectively), it did not present much quantitative information on statistical uncertainties related to the estimates it used. In part, this was because such quantification often overlooks far greater and more important uncertainties in the underlying assumptions. Nevertheless, in response to comments, the QRA for the final rule provides additional information on uncertainty of the estimates wherever possible. In

addition, the QRA for the final rule contains a comprehensive uncertainty analysis for MSHA's estimates of current and projected exposures (QRA for the final rule, Section 4).

MSHA agrees with some commenters that a purely quantitative approach has the potential to underestimate uncertainty due to its lack of incorporation of model uncertainty. Therefore, although MSHA believes that the QRAs for the proposed and final rules have employed the best available models for estimating existing and future health risks, MSHA's presentation of quantitative uncertainty measures should be tempered by the realization that such measures depend heavily on acceptance of the underlying assumptions of the models used in the both QRAs.

One commenter stated that the two mortality studies cited in the QRA for the proposal (Miller et al., 2007; and Attfield and Kuempel, 2008, Figure 15) yield what appear to be quite different estimates of relative risk for COPD mortality attributable to respirable coal mine dust exposure. However, the commenter did not mention the main point of the QRA's discussion of the difference between these estimates on page 40: ''. . . even the lower estimate shows a significant increase in COPD mortality attributable to the dust exposure.'' More importantly, the difference in relative risk reported from the two studies (Miller et al., 2007; Attfield and Kuempel, 2008) is not statistically significant. Table III–8 contains 90-percent confidence intervals for the relative risks at mean concentrations of 1.0, 1.5, and 2.0 mg/m^3. The lack of any statistically significant difference is shown by the extensive overlap between corresponding intervals. Therefore, contrary to the commenter's suggestion, the difference in estimated relative risks may well reflect normal sampling variability rather than a fundamental disagreement between models.

In addition, Table III–8 presents 90-percent confidence intervals for relative risks of COPD mortality based on MSHA's revision of the Attfield-Kuempel estimate, which is intended to mitigate bias due to underestimation of exposure, as explained in the last paragraph of Section III.B.2.c.[50]

TABLE III–8—90-PERCENT CONFIDENCE INTERVALS FOR RELATIVE RISK (RR) OF COPD MORTALITY ATTRIBUTABLE TO RESPIRABLE COAL MINE DUST EXPOSURE AVERAGED OVER 45-YEAR OCCUPATIONAL LIFETIME, ACCORDING TO THREE DIFFERENT EXPOSURE-RESPONSE MODELS

Mean respirable coal mine dust conc. mg/m^3	Miller et al. (2007) model COPD/17	Attfield/ Kuempel (2008)	Attfield/ Kuempel revised by MSHA
1.0	1.10–1.20	1.12–1.61	1.13–1.36
1.5	1.16–1.31	1.18–2.03	1.20–1.58
2.0	1.22–1.43	1.25–2.58	1.28–1.84

The commenter also suggested that mortality data obtained after implementation of the Mine Act contradict predictions from the exposure-response models on which the QRA relies. Citing Bang et al. (1999) and Mazurek et al. (2009), the commenter stated that mean respirable coal mine dust concentrations have been reduced in the past, yet health risks have increased in some age categories. According to the commenter, this conflicts with the predictions of the QRA's risk modeling, and shows that the model predictions are not certain, and may be incorrect. For reasons explained below, MSHA believes the commenter misinterpreted the results of both studies. Bang et al. (1999) computed annual age-specific mortality rates for three age groups (15–44, 45–64, and 65 or older), and for the aggregate, among decedents for whom CWP, asbestosis, or silicosis was identified as either an underlying or contributing cause of death. The overall age-adjusted CWP-related mortality rate declined steadily over the 1985–1996 study period, ''from 8.32 per million in 1985 to 3.20 per million in 1996.'' CWP-related mortality rates also declined significantly within the 45–64 and ≥ 65 age groups, but not in the 15–44 age group. The authors concluded that ''the reduction of CWP mortality could be related to enforcement of and compliance with dust-control measures adopted in 1969.'' With respect to the lack of a statistically significant downward trend in the 15–44 age group, the authors noted not only that ''this observation may have resulted in part from lack of power due to smaller annual numbers of deaths at younger ages;'' but also that—

The continued occurrence of pneumoconiosis deaths in young adults may reflect recent overexposures. High levels of exposure are associated with much shorter latency and more rapid disease progression, resulting in early death [Bang et al., 1999].

Mazurek et al. (2009) examined annual CWP mortality rates and years of potential life lost (YPLL),[51] based on 28,912 decedents from 1968 through 2006 for whom CWP was identified as the underlying cause of death. The overall finding was that:

> . . . CWP deaths among U.S. residents aged ≥25 years declined 73%, from an average of 1,106.2 per year during 1968–1972 to 300.0 per year during 2002–2006. . . . Age-adjusted death rates among residents aged 25–64 declined 96%, from 1.78 per million in 1968 to 0.07 in 2006; age-adjusted death rates among residents aged ≥65 years declined 84%, from 6.24 per million in 1968 to 1.02 in 2006 . . . [Mazurek et al., 2009].

[50] As in the case of NMRD mortality risk discussed earlier, the revised estimate of the coefficient of cumulative respirable coal mine dust exposure for estimating COPD Relative Risk lies halfway between the Attfield-Kuempel estimate of 0.00648 and the Miller COPD/17 estimate of 1.92 × 0.0016 = 0.00307 (i.e., (0.00648 + 0.00307)/2 = 0.00478). Therefore, relative risk (RR) in the revised model is given by: $RR = \exp(0.00478 \times 45 \times \mu)$, where μ is the mean respirable coal mine dust concentration experienced over a 45-year occupational lifetime. Standard errors for the revised coefficient were obtained by applying the standard propagation of errors formula for the average of two independent random variables (i.e., the 1.92-adjusted Miller and the Attfield-Kuempel estimates of the coefficient).

[51] The term ''years of potential life lost (also known as ''potential years of life lost'') is a measure of the relative impact of various diseases and lethal forces on society (see Last, John M., ed. 2001. *A Dictionary of Epidemiology,* Fourth Edition. New York: Oxford University Press, Inc.).

YPLL is computed by estimating the years that people would have lived if they had not died prematurely due to disease or other causes. YPLL is an important measure of premature mortality. YPLL is equal to the numerical difference between a predetermined endpoint age (i.e., 75, 85, etc.) and the age at death for a death or deaths that occurred prior to that endpoint age. In addition, the YPLL Rate is equal to the (Number of YPLLs divided by the population under endpoint age) × 100,000.

Annual CWP-attributable YPLL before age 65 years was also reported to have declined, ''from a high of nearly 1,800 in 1970 to a low of 66 in 2001.'' However, YPLL before age 65 years was found to have been increasing between 2002 and 2006. Unlike the commenter, the authors did not associate the observed increase in YPLL from 2002 and 2006 with any supposed decrease in exposures over that time period. Instead, the authors noted that the

> . . . annual CWP-attributable YPLL before age 65 years also have decreased, from a high of nearly 1,800 in 1970 to a low of 66 in 2001. However, the findings in this report indicate that YPLL before age 65 years have been increasing since 2002. This is consistent with the observed increase in the percentage of underground coal miners identified with CWP, in particular among younger workers.

The report did not examine historical changes in the age-composition of the mining population or analyze the effects that the changes would have on historical changes in YPLL. However, contrary to the commenter's implicit assumption of a progressive decline in exposures in the latter years of the study period, Mazurek et al. did pose the following possible explanations for the observed increase in YPLL:

> One cause of the increased YPLL in recent years might be greater exposure of workers to coal dust . . . Increased coal production per shift can make dust suppression more difficult. . . . Larger, more powerful machines generate larger quantities of dust in shorter periods, potentially exposing workers to higher concentrations of dust. . . In addition, the total number of hours worked in underground coal mines increased 25.6%, from an annual average of 1,671 per miner during 1978–1982 to 2,099 per miner during 2003–2007. Increased hours of work can result in increased inhaled dust, which might exceed the lungs' ability to remove dust. . . Finally, another cause of increased CWP-attributable YPLL could be missed opportunities by miners for early disease screening, which could exacerbate disease progression. [Mazurek et al., 2009].

None of these potential explanations invokes any decrease in mean cumulative exposure to explain the relatively recent increase in YPLL. Neither the results reported in Mazurek et al. (2009) nor the possible explanatory factors it discusses conflict in any way with ''the predictions of the QRA's risk modeling'' or show ''that the model predictions . . . may be incorrect.''

Some measure of the uncertainty implicit in the estimates of exposure under current conditions in the QRA for the proposed and final rules is given by QRA Figures 7, 8, and 9, along with the discussion of underlying assumptions in the Section 2 of the QRA for the final rule. In conjunction with new projections of exposures and residual excess risks under a 1.5 mg/m³ respirable coal mine dust concentration final standard, Section 4b of the QRA for the final rule discusses uncertainty in the exposures expected under the final standard and enforcement policies. In the remainder of this section, MSHA addresses uncertainty in the exposure-response models used in the QRAs for the proposed and final rules. Confidence bands graphically representing this source of uncertainty are provided in Section 4c of the QRA for the final rule.

a. CWP, Including PMF

Table 65 (in Appendix I) in the QRA for the final rule (Table 53 in the QRA for the proposed rule) provides the standard errors of all estimated coefficients used in the exposure-response models for CWP1+, CWP2+ and PMF. Nevertheless, some commenters objected to the absence of confidence bands in the graphic displays of these models (Figures 10 and 11 of both QRAs). In response to these commenters, 90-percent confidence intervals for the estimated excess risks attributable to respirable coal mine dust are shown for 73-year-old miners at three different exposure levels in Tables III–9 and III–10. Table III–9 pertains to geographic regions associated with low/medium rank coal and Table III–10 pertains to geographic regions with high rank coal. Assuming, as MSHA does, that the Attfield-Seixas models are reasonably accurate, there is a chance of approximately 1 in 20 that 45 years of occupational exposure at the specified level would result in fewer adverse outcomes, per thousand, than the left interval endpoint. Similarly, the chance is approximately another one in twenty that exposure at the specified level would result in adverse outcomes at a rate exceeding the upper confidence limit. For example, according to the Attfield-Seixas model, the likelihood is approximately 95 percent that 45 years of occupational exposure to high rank respirable coal mine dust at an average concentration of 1.5 mg/m³ would result in more than 53 excess cases of PMF per 1,000 miners at age 73 years.

TABLE III–9—MAXIMUM LIKELIHOOD ESTIMATES AND 90-PERCENT CONFIDENCE INTERVALS FOR EXCESS RISK OF CWP ATTRIBUTABLE TO RESPIRABLE COAL MINE DUST EXPOSURE, BASED ON ATTFIELD-SEIXAS MODEL FOR 73-YEAR-OLD MINERS AFTER 45-YEARS OF OCCUPATIONAL EXPOSURE AT LOW TO MEDIUM RANK COAL MINES

Mean respirable coal mine dust conc. mg/m³	Excess cases per thousand exposed miners					
	CWP 1+		CWP 2+		PMF	
1.0	98.3	73.0–125.6	57.5	29.7–92.3	20.0	5.7–63.3
1.5	163.5	119.4–211.7	100.8	48.9–170.7	50.2	8.8–121.2
2.0	238.2	172.2–309.5	156.0	71.6–273.0	77.0	12.1–203.0

TABLE III–10—MAXIMUM LIKELIHOOD ESTIMATES AND 90-PERCENT CONFIDENCE INTERVALS FOR EXCESS RISK OF CWP ATTRIBUTABLE TO RESPIRABLE COAL MINE DUST EXPOSURE, BASED ON ATTFIELD-SEIXAS MODEL FOR 73-YEAR-OLD MINERS AFTER 45-YEARS OF OCCUPATIONAL EXPOSURE AT HIGH RANK COAL MINES

Mean respirable coal mine dust conc. mg/m³	Excess cases per thousand exposed miners					
	CWP 1+		CWP 2+		PMF	
1.0	177.7	118.2–244.4	141.0	69.8–237.6	96.8	30.6–208.9
1.5	303.1	198.6–413.7	271.4	125.0–459.1	196.9	53.2–444.9
2.0	437.3	290.3–572.9	433.6	196.5–672.7	338.6	82.2–688.2

b. Severe Emphysema

Standard errors for all estimated coefficients in the Kuempel pulmonary impairment model are shown in Table 66 of Appendix J in the QRA for the final rule (Table 54 in the QRA for the proposed rule). Table III–11 below provides 90-percent confidence intervals for estimated excess risks of severe emphysema attributed by the model to respirable coal mine dust exposures at 45-year occupational lifetime average concentrations of 1.0, 1.5, and 2.0 mg/m³. As in Tables 16, 24, and 28 of both QRAs, these risks apply to never-smoking miners at age 73. According to this model, the likelihood is approximately 95 percent, for example, that white miners exposed to respirable coal mine dust at an average concentration of 1.5 mg/m³ will, at age 73 years, experience severe emphysema at a rate exceeding 49 cases per thousand exposed miners. Similarly, the likelihood is approximately 95 percent that this rate will be less than 156 cases per thousand.

TABLE III–11—MAXIMUM LIKELIHOOD ESTIMATES AND 90-PERCENT CONFIDENCE INTERVALS FOR EXCESS RISK OF SEVERE EMPHYSEMA ATTRIBUTABLE TO RESPIRABLE COAL MINE DUST EXPOSURE, BASED ON KUEMPEL PULMONARY IMPAIRMENT MODEL FOR 73-YEAR-OLD NEVER-SMOKING MINERS AFTER 45-YEARS OF OCCUPATIONAL EXPOSURE

Mean respirable coal mine dust conc. mg/m³	Excess cases of severe emphysema per thousand exposed miners			
	Racially "white" miners		Racially "non-white" miners	
1.0	61.0	31.6–94.3	94.3	50.3–141.0
1.5	98.7	49.6–156.3	147.0	77.5–220.7
2.0	141.2	69.0–227.4	202.1	105.8–301.7

c. Mortality Due to NMRD

Attfield and Kuempel (2008) did not provide standard errors or other measures of uncertainty for the model of NMRD mortality risk presented in their Table X (reproduced in Appendix K of the QRAs as Table 67 for the final rule and Table 55 for the proposed rule). However, in a communication from Dr. Attfield (U.S. Department of Labor, MSHA, Memorandum for the Record: Email from Michael Attfield, 2011), MSHA has obtained standard errors for the estimated coefficients pertaining to cumulative respirable coal mine dust exposure and geographical coal mining region. These are presented in Table III–12 below.

TABLE III–12—STANDARD ERRORS OF ESTIMATED COEFFICIENTS RELATED TO RESPIRABLE COAL MINE DUST EXPOSURE IN ATTFIELD-KUEMPEL NMRD MORTALITY MODEL

Variable	Standard error of estimated coefficient
Anthracite	0.16557
East Appalachia	0.18853
West Appalachia	0.16335
Midwest	0.21121
Cumulative respirable coal mine dust Exposure (mg-yr/m³)	0.00128

Miller et al. (2007) presented estimates and standard errors for the coefficients specified in 18 candidate models of NMRD mortality risk associated with respirable coal mine dust exposures in the United Kingdom (Miller et al., 2007, Table 5.12). In the model that best fits the data (NMRD/17), the estimated coefficient of cumulative exposure and its standard error were 0.0014 and 0.0001997, respectively, for respirable coal mine dust exposures expressed in units of mg-hr/m³. For exposures expressed in units of mg-yr/m³, the corresponding values are 0.0027 and 0.000383, assuming, as in the QRA, an average work-year of 1,920 hours.

Because of bias in the Attfield-Kuempel estimates due to underestimation of respirable coal mine dust exposure for the study cohort, as explained in the last paragraph of Section III.B.2.c. above, MSHA is using a model of NMRD mortality risk in which the Attfield-Kuempel coefficient of respirable coal mine dust exposure has been reduced by averaging it with the coefficient estimated from the NMRD/17 model. The modified coefficient is (0.00709 + 0.0027)/2 = 0.0049, with a standard error of

$$\sqrt{\frac{(0.00128)^2 + (0.000383)^2}{4}} = 0.000668$$

Table III–13 contains maximum likelihood estimates and 90-percent confidence intervals for the relative risk of NMRD mortality attributable to respirable coal mine dust exposure according to the Attfield-Kuempel model, the Miller NMRD/17 model, and MSHA's modified version of the Attfield-Kuempel model. All the risks shown in Table III–13 are relative to unexposed workers with identical smoking histories in the same coal mining region. A relative risk of 1.0 would indicate no expected effect of exposure, and values deviating from 1.0 describe predicted multiplicative effects.[52] For example, according to the modified Attfield-Kuempel model (refer to Table III–13, last column, below), 45 years of occupational exposure at an average respirable coal mine dust concentration of 1.5 mg/m³ increases the risk of NMRD mortality by an

[52] Relative Risk Interpretation: The relative risk is the risk of the exposed group compared to risk of a control group (unexposed workers with identical smoking histories in the same coal mining region). If the relative risk is equal to one, then the risk of developing disease for the exposed group is the same as the risk for the comparison group. This would indicate no association between exposure and the risk of disease. If the relative risk is greater than one, there is a strong positive association (risk of disease increases with increased exposure); whereas if the relative risk is less than one, there is a strong negative association (risk of disease decreases with increased exposure). If the confidence interval (CI) for relative risk contains the number one, this implies lack of statistically significant evidence for an association.

amount probably between 29 and 50 percent—with a 5-percent chance that the increase is less than 29 percent and a 5-percent chance that the increase is greater than 50 percent.

Table III–14 translates the relative risks shown in Table III–13 into excess risks (expected cases per thousand exposed miners) attributable to respirable coal mine dust exposure. As explained in Appendix K of the QRA for the final rule, this translation was based on a competing risk life-table analysis.[53] As before, these excess risks should be interpreted relative to unexposed workers with identical smoking histories in the same coal mining region. For miners exposed for 45 years to respirable coal mine dust at an average concentration of 1.5 mg/m^3, the modified Attfield-Kuempel model (see Table III–14, last column) predicts between 6.4 and 11.0 excess cases of NMRD mortality by age 73, per thousand exposed miners. By definition of the 90-percent confidence interval, there is (again according to the modified Attfield-Kuempel model) approximately a 5-percent chance that the excess NMRD mortality rate would be below 6.4 cases per thousand, and another 5-percent chance that it would be above 11.0 cases per thousand, for miners exposed at this level.[54]

TABLE III–13—MAXIMUM LIKELIHOOD ESTIMATES AND 90-PERCENT CONFIDENCE INTERVALS FOR RELATIVE RISK (RR) OF NMRD MORTALITY ATTRIBUTABLE TO RESPIRABLE COAL MINE DUST EXPOSURE AVERAGED OVER 45-YEAR OCCUPATIONAL LIFETIME, ACCORDING TO THREE ALTERNATIVE EXPOSURE-RESPONSE MODELS

Mean respirable coal mine dust conc. mg/m^3	Relative risk of NMRD mortality					
	Attfield/Kuempel (2008)		Miller et al. (2007) NMRD/17		Attfield/Kuempel modified by MSHA	
1.0	1.38	1.25–1.51	1.13	1.10–1.16	1.25	1.19–1.31
1.5	1.61	1.40–1.86	1.20	1.15–1.25	1.39	1.29–1.50
2.0	1.89	1.57–2.29	1.27	1.20–1.35	1.55	1.41–1.71

TABLE III–14—MAXIMUM LIKELIHOOD ESTIMATES AND 90-PERCENT CONFIDENCE INTERVALS FOR EXCESS RISK OF NMRD MORTALITY ATTRIBUTABLE TO RESPIRABLE COAL MINE DUST EXPOSURE AVERAGED OVER 45-YEAR OCCUPATIONAL LIFETIME, ACCORDING TO THREE ALTERNATIVE EXPOSURE-RESPONSE MODELS

Mean respirable coal mine dust conc. mg/m^3	Excess cases of NMRD mortality by age 73 years, per thousand exposed miners					
	Attfield/Kuempel (2008)		Miller et al. (2007) NMRD/17		Attfield/Kuempel modified by MSHA	
1.0	8.5	5.5–11.6	2.9	2.2–3.5	5.5	4.2–7.2
1.5	13.3	8.8–19.2	4.4	3.4–5.5	8.9	6.4–11.0
2.0	19.4	13.0–28.3	5.9	4.4–7.9	12.0	9.4–15.9

C. Feasibility

1. Pertinent Legal Requirements

Section 101(a)(6)(A) of the Federal Mine Safety and Health Act of 1977 (Mine Act), 30 U.S.C. 811(a)(6)(A), requires the Secretary of Labor, in setting health standards, to consider the feasibility of the standards. Section 101(a)(6)(A) of the Mine Act states that the Secretary, in promulgating mandatory standards dealing with toxic materials or harmful physical agents under the Mine Act, shall set standards to assure, based on the best available evidence, that no miner suffer material impairment of health from exposure to toxic materials or harmful physical agents over his working life. (30 U.S.C. 811(a)(6)(A)). In developing these standards, the Mine Act requires the Secretary to consider the latest available scientific data, the feasibility of the standards, and experience gained under other laws. Id.

Thus, the Mine Act requires that the Secretary, in promulgating a standard, based on the best available evidence, attain the highest degree of health and safety protection for the miner with feasibility a consideration.

In relation to feasibility, the legislative history of the Mine Act contemplates technology-forcing standards and standards that may include some financial impact. The legislative history states that:

* * * While feasibility of the standard may be taken into consideration with respect to engineering controls, this factor should have a substantially less significant role. Thus, the Secretary may appropriately consider the state of the engineering art in industry at the time the standard is promulgated. However, as the circuit courts of appeals have recognized, occupational safety and health statutes should be viewed as ''technology forcing'', and a proposed health standard should not be rejected as infeasible ''when the necessary technology looms on today's *horizon.'' AFL–CIO* v. *Brennan,* 530 F.2d 109 (3d Cir. 1975); *Society of Plastics Industry* v. *OSHA,* 509 F.2d 1301 (2d Cir. 1975), cert. denied, 427 U.S. 992 (1975). * * *

Similarly, information on the economic impact of a health standard which is provided to the Secretary of Labor at a hearing or during the public comment period, may be given weight by the Secretary. In adopting the language of section 102(a)(5)(A), the Committee wishes to emphasize that it rejects the view that cost benefit ratios alone may be the basis for depriving miners of the health protection which the law was intended to insure. The committee concurs with the judicial

[53] To obtain the values in Table III–14, relative risks calculated in the QRA for 162 different clusters of work locations were paired with the corresponding life-table determination of excess risk of NMRD mortality. These 162 pairs were then arranged in order of increasing relative risk, thereby forming a look-up table. Each relative risk in Table III–13 was then assigned an excess risk corresponding to that in the matched pair of the look-up table. Intermediate values were calculated using linear interpolation. The 162 matched pairs of relative and excess risks are shown in the corresponding cells of Tables 17 and 68 of the QRA for the final rule.

[54] The 90% confidence interval indicates the range within which there is approximately a 90% probability that the excess NMRD mortality rate lies. In the example, there is a 10% chance that the true excess NMRD mortality rate lies outside of the range of 6.4–11.0. Therefore, there is approximately a 5% chance that the true rate would be below 6.4 cases per thousand and another 5% chance that it would exceed 11.0 cases per thousand.

constitution that standards may be economically feasible even though from the standpoint of employers, they are ''financially burdensome and affect profit margins adversely'' (I.U.D. v Hodgson, 499 F.2d 647 (D.C. Cir. 1974)). Where substantial financial outlays are needed in order to allow industry to reach the permissible limits necessary to protect miners, other regulatory strategies are available to accommodate economic feasibility and health considerations. These strategies could include delaying implementation of certain provisions or requirements of standards in order to allow sufficient time for engineering controls to be put in place or a delay in the effective date of the standard. S. Rep. No. 95–181, at 21–22 (1977), reprinted in 1977 U.S.C.C.A.N. 3421–22.

Courts have interpreted the term ''feasible'' as meaning ''capable of being done, executed, or effected,'' both technologically and economically. See *Kennecott Greens Creek Mining Co.* v. *MSHA and Secretary of Labor,* 476 F.3d 946, 957 (D.C. Cir. 2007) (citing *American Textile Mfrs. Inst.* v. *Secretary of Labor (OSHA Cotton Dust),* 452 U.S. 490, 508–09 (1981)). In order for an agency's rules to be deemed feasible, the agency must establish ''a reasonable possibility that the typical firm will be able to develop and install engineering and work practice controls that can meet the [permissible exposure limit] in most of its operations.'' *Kennecott Greens Creek,* 476 F.3d at 957 (quoting *American Iron & Steel Inst.* v. *OSHA,* 939 F.2d 975, 980 (D.C. Cir. 1991)).

In promulgating standards, hard and precise predictions from agencies regarding feasibility are not required. The ''arbitrary and capricious test'' is usually applied to judicial review of rules issued in accordance with the Administrative Procedure Act. See *American Mining Congress* v. *Secretary of Labor,* 671 F.2d 1251, 1254–55 (10th Cir. 1982) (applying the arbitrary and capricious standard of review to MSHA rulemaking challenges). The legislative history of the Mine Act further indicates that Congress explicitly intended that the ''arbitrary and capricious test'' be applied to judicial review of mandatory MSHA standards. ''This test would require the reviewing court to scrutinize the Secretary's action to determine whether it was rational in light of the evidence before him and reasonably related to the law's purposes.'' S. Rep. No. 95–181, 95th Cong., 1st Sess. 21 (1977). In achieving the Congressional intent of feasibility under the Mine Act, MSHA may also consider reasonable time periods of implementation. *Id.* at 21.

Feasibility determinations involve complex judgments about science and technology. Therefore, in analyzing feasibility, an agency is not required to provide detailed solutions to every problem. Rather, it is sufficient that the agency provides ''plausible reasons for its belief that the industry will be able to solve those problems in the time remaining.'' *Kennecott Greens Creek,* 476 F.3d at 957 (quoting *National Petrochemical & Refiners Ass'n* v. *EPA,* 287 F.3d 1130, 1136 (D.C. Cir. 2002)). MSHA's feasibility determinations in this rulemaking are buttressed by its statistical findings that many mines are already in compliance with the requirements of the final rule. *See Kennecott Greens Creek,* 476 F.3d at 959; *American Iron & Steel Institute* v. *OSHA (AISI–II),* 939 F.2d 975, 980 (D.C. Cir. 1991). The fact that ''a few isolated operations within an industry will not be able to comply with the standard does not undermine a showing that the standard is generally feasible.'' 476 F.3d at 957 (quoting AISI–II, 939 F.2d at 980).

Finally, MSHA has authority to promulgate technology-forcing rules. When a statute is technology-forcing, the agency ''can impose a standard which only the most technologically advanced plants in an industry have been able to achieve-even if only in some of their operations some of the time.'' *Kennecott Greens Creek,* 476 F.3d at 957 (citing *United Steelworkers of America* v. *Secretary of Labor,* 647 F.2d 1189, 1264 (D.C. Cir. 1980) and quoting *AISI* v. *OSHA,* 577 F.2d 825, 832–35 (3d Cir. 1978)).

Economic feasibility presents different issues from that of technological feasibility. In the OSHA Cotton Dust case, the Supreme Court stated that a standard would not be considered economically feasible if an entire industry's competitive structure was threatened. According to the Court, the appropriate inquiry into a standard's economic feasibility is whether the standard is capable of being achieved. 452 U.S. at 508–509. To establish economic feasibility, MSHA is not required to produce hard and precise estimates of cost. Rather, MSHA must provide a reasonable assessment of the likely range of costs of its standard, and the likely effects of those costs on the industry. See *United Steelworkers of America* v. *Secretary of Labor,* 647 F.2d at 1264. The courts have further observed that granting companies reasonable time to comply with new exposure limits may enhance economic feasibility. *Id.* at 1264.

MSHA evaluated the technological and economic feasibility of meeting the requirements of the final rule. The technological feasibility of the final rule includes two determinations. MSHA determined that it is feasible to use the continuous personal dust monitor (CPDM) as a compliance device to sample coal miners' exposures to respirable coal mine dust. MSHA also determined that it is feasible for operators to achieve the 1.5 mg/m^3 standard (0.5 mg/m^3 for intake air and part 90 miners) using existing and available engineering controls and work practices. The final rule provides a reasonable amount of time of 18 months after the effective date of the final rule to implement the requirements concerning the use of CPDMs. It also provides a reasonable amount of time of 24 months after the effective date of the final rule to implement the standards. In addition, MSHA determined that the final rule is economically feasible.

2. Technological Feasibility of Using the CPDM as a Compliance Device To Sample Coal Miners' Exposures

This preamble discusses the development of the CPDM over the last 20 years. Development began in the 1990s following a 1992 report issued by MSHA's Coal Mine Respirable Dust Task Group (Task Group) and the 1996 Dust Advisory Committee Report in which both recommended the development of continuous personal dust monitor technology for use in underground coal mines. Prototypes were developed prior to the proposed Plan Verification rulemaking in the mid-2000s. The pre-commercial CPDM is the specific prototype that NIOSH and MSHA, along with input from the mining industry, decided to complete and test in 2006. The commercial CPDM was made available after MSHA's intrinsic safety approval of the pre-commercial CPDM in September 2008 and subsequent NIOSH approval in September 2011 following promulgation of revisions to 30 CFR part 74. Discussion on the development and testing of this technology is summarized below along with comments on the proposed rule.

a. Background Information on the Coal Mine Dust Personal Sampler Unit (CMDPSU) and Continuous Personal Dust Monitors (CPDM)

Since the 1970s, mine operators and MSHA inspectors have used the approved coal mine dust personal sampler unit (CMDPSU) to determine the concentration of respirable dust in coal mine atmospheres. The CMDPSU, which consists of a battery-powered pump unit, a cyclone (a type of particle-size selector) and filter assembly, is either worn or carried by the miner and, under MSHA's existing standards, remains operational during the entire shift or for 8 hours, whichever time is

less. The CMDPSU samples the mine atmosphere by drawing dust-laden mine air, at a flow rate of 2 liters per minute (L/min) through a 10-mm nylon cyclone that removes non-respirable dust particles from the airstream, allowing respirable dust particles to be deposited on the filter surface. The collection filter is enclosed in an aluminum capsule which is sealed in a protective plastic enclosure, called a cassette, to prevent contamination. After completion of sampling, the filter cassette is capped and sent to MSHA for processing, where it is disassembled to remove the filter capsule for weighing under controlled conditions to determine the amount of dust that was collected on the filter. The measured weight gain is used to determine the average concentration of respirable coal mine dust in the work environment of the affected miners.

Because samples are typically transmitted through the mail to MSHA for processing, results of sampling are often not known to mine operators, miners, and MSHA for at least a week or more. Consequently, if results indicate the presence of excessive dust concentrations, any corrective action taken to lower dust levels would only impact miners' exposure a week or more after sampling has been completed. The ability to continuously monitor and give mine operators and miners real-time feedback on dust concentrations in the work environment has been an MSHA goal for nearly three decades.

MSHA's commitment to advanced sampling technology, specifically technology that measures coal mine dust concentration continuously, is noted in the preamble to 30 CFR part 70 dust rules that became effective in April 1980 (45 FR 23990). In response to comments during that rulemaking regarding the machine-mounting of sampling devices that would give a continuous readout of dust concentrations, the Agency agreed that every effort should be made to advance sampling technology. In addition, MSHA stated that the Agency had embarked on an intensive program to develop a reliable machine-mounted continuous dust monitor. At that time, prototypes of such monitors had been developed and were being tested in several mines. Additionally, MSHA noted that the U.S. Bureau of Mines, now NIOSH, was pursuing research in this area. While found to be useful as an engineering tool to monitor the effectiveness of dust controls, those monitors, which were based on light-scattering technology, proved to be unsuitable for enforcement purposes at that time.

The health benefits of continuous monitoring were recognized by MSHA's Coal Mine Respirable Dust Task Group, established in 1991, and the Dust Advisory Committee. In 1992, the Task Group issued a report that concluded that continuous monitoring of the mine environment and dust control parameters offered the best long-term solution for preventing occupational lung disease among coal miners. It specifically recommended development of monitoring technology capable of providing both short-term as well as full-shift concentration measurements. Similarly, the Dust Advisory Committee unanimously recommended in its report issued in 1996 that continuous personal dust monitoring (CPDM) technology, once verified as reliable, be broadly used by MSHA for assessing operator compliance efforts in controlling miners' dust exposures and for compliance purposes.

In response to the recommendations by the Task Group and Dust Advisory Committee, NIOSH undertook an aggressive research and development program in the 1990s to produce a prototype technology for a new type of personal dust monitor that would provide a direct measurement of respirable coal mine dust levels in the mine atmosphere on a real-time basis, unlike the existing sampling system used since 1970. The new technology would eliminate the delay in obtaining an offsite laboratory analysis which, on average, requires a week or more before the results are known to the mine operator and MSHA. Such technology, which is referred to generically as a ''continuous personal dust monitor'' (CPDM), would enable a mine operator to be more proactive in taking corrective measures to avoid miners' exposure to excessive respirable coal mine dust levels and in optimizing mining procedures and dust control parameters to continuously maintain respirable coal mine dust concentrations at or below the dust standard.

NIOSH's efforts to advance the technology for directly measuring and displaying the amount of respirable coal mine dust contained in mine air in real-time resulted in the development of a prototype CPDM in 2003. The prototype CPDM represented the first significant advance in respirable coal mine dust sampling technology in more than 30 years. This prototype dust monitor consisted of a respirable dust sampler, a gravimetric analysis device, and an on-board computer that was incorporated into the miner's cap lamp battery case as a single package located on the belt. The cap lamp battery case contained all the components, including two separate batteries, to enable the dust monitor and cap lamp to operate independently. The CPDM was configured to have dimensions and weight similar to those of the current lead-acid type miner's cap lamp battery. Air from a miner's work environment entered the sampling device through an inlet located adjacent to the lens of the cap light on the miner's hard hat and flowed via a flexible tube that ran parallel to the lamp cord to the belt-mounted device. The air stream was first coursed through a size selector, a Higgins-Dewell (HD) cyclone, at a flow rate of 2.2 L/min to separate the non-respirable dust, so that only airborne particles that could penetrate to the lung were analyzed by the device. From there, the air stream flowed through: (1) A heater that removed excess moisture; (2) a 14-mm diameter glass fiber filter; (3) a flow rate sensor; and (4) a computer-controlled pump.

The prototype CPDM employed a unique inertial mass sensor system called the Tapered Element Oscillating Microbalance (TEOM® system). The TEOM system consists of a hollow tapered tube called the tapered element, which is clamped at its base and free to oscillate at its narrow or free end on which an exchangeable filter cartridge is mounted. Electronics positioned around the TEOM system cause the tapered element to oscillate (or resonate) at its natural frequency. When dust particles are deposited on the collection filter, the mass of the collection filter increases, causing the natural oscillating frequency of the tapered element to decrease. Because of the direct relationship between mass and frequency change, the amount of respirable coal mine dust deposited on the filter can be determined by measuring the frequency change. The concentration of respirable coal mine dust in the mine atmosphere was then determined by a computer incorporated in the CPDM prototype. The computer divided the mass of dust collected by the volume of mine air that passed through the monitor during the sampled period. The result was reported on the monitor's digital display. The data were retained for downloading onto any personal computer using accompanying software. To accommodate monitoring over a full shift, the prototype monitor was designed to operate continuously for up to 12 hours. The display on the device continuously showed: (1) The average concentration from the beginning of the shift; (2) the percent of the respirable dust standard that had been reached; and (3) the respirable dust concentration calculated at distinct 30-minute

intervals. Through the display, both the miner wearing the device and the mine operator were aware of the concentration of respirable coal mine dust at any time during the shift. This information could be used to validate whether dust control parameters were working as intended to ensure that miners were not being exposed to excessive dust concentrations.

While the performance of the prototype CPDM to accurately and precisely measure respirable coal mine dust in the mine environment and its durability under in-mine conditions had not been extensively evaluated when MSHA published its proposed Plan Verification rule (68 FR 10784, March 6, 2003), preliminary indications from the limited testing performed by NIOSH suggested that the prototype CPDM had the potential to provide timely information on dust levels. Although MSHA had confidence in this technology, a final determination of the applicability and suitability of CPDMs under conditions of use being proposed was not expected until after completion of the scheduled laboratory and in-mine testing and evaluation at the end of 2003. MSHA recognized that to be accepted by the mining community, the new CPDM must reliably monitor respirable dust concentrations in the mine environment with sufficient accuracy to permit exposures to dust concentrations to be effectively controlled on each shift. As part of the comprehensive dust control program in the proposed Plan Verification rule, MSHA proposed a new standard to permit, but not require, the use of such monitors to encourage the use of CPDM technology.

Public hearings on the proposed Plan Verification rule, together with MSHA's proposed Single Sample rule (68 FR 10940, March 6, 2003), were held in Pennsylvania, West Virginia, Indiana, Kentucky, Alabama, and Colorado in May 2003. Commenters expressed concern that the proposed sampling program did not incorporate the new CPDM technology. After reviewing the favorable performance of the prototype CPDM in initial in-mine tests, MSHA announced in July 2003 and August 2003, respectively, that it would suspend all work to finalize the proposed dust rules published in March 2003, and the proposed single sample rule published in July 2000, to pursue accelerated research on the new CPDM technology being tested by NIOSH. NIOSH research verifying the CPDM technology, as reliable under in-mine conditions, was being conducted. The comment period was extended indefinitely to assemble the best information available on CPDM technology and its application in coal mines. On successful completion of in-mine performance verification testing of the new technology, MSHA would move forward with a final rule to incorporate new requirements for monitoring exposures that reduce miners' risk of black lung disease.

After enlisting the collaboration of various stakeholders representing industry and organized labor in the final testing of the pre-commercial CPDM, MSHA and NIOSH purchased 25 units for the collaborative study, which was initially conducted in 10 underground mines. This was followed by extended testing at 4 additional mines. Additional test data were also collected by MSHA at the request of NIOSH at 180 randomly-selected mechanized mining units across 10 MSHA coal districts for the purpose of evaluating the equivalency of the CPDM compared to using the then approved CMDPSU.

In September 2006, NIOSH published the results of the collaborative research effort designed to verify the performance of the pre-commercial CPDM in laboratory and underground coal mine environments. According to the NIOSH Report of Investigations 9669, ''Laboratory and Field Performance of a Continuously Measuring Personal Respirable Dust Monitor,'' (Volkwein et al., NIOSH, 2006), the testing of the pre-commercial CPDM under a broad range of test conditions verified it to be accurate and precise in providing end-of-shift dust concentration information. It also stated that the device was acceptable to miners from an ergonomic standpoint, and when worn by miners during normal work, the device demonstrated durable performance with about a 90% availability rate, which is similar to existing sampling devices. This study demonstrated that the pre-commercial CPDM technology was suitable for use in coal mines to monitor and prevent overexposures to respirable coal mine dust.

In September 2008, the commercial model of the CPDM successfully passed MSHA's intrinsic safety tests permitting the device to be purchased for use in coal mines as an engineering tool.

Based on the results of the collaborative study, MSHA published a Request for Information (RFI) on October 14, 2009 (74 FR 52708) on the feasibility of using the commercial CPDM technology to more effectively monitor and control miners' exposure to respirable coal mine dust during a working shift. Most commenters generally agreed that requiring the use of a CPDM would enhance the protection of miners' health.

On April 6, 2010 (75 FR 17512), MSHA and NIOSH published a final rule that revised the approval requirements for the CMDPSU and established new performance-based requirements for the CPDM to permit the Secretaries of HHS and Labor to approve dust monitoring devices for use in coal mines based on new designs and technology capable of continuously monitoring and reporting concentrations of respirable coal mine dust during and at the end of a work shift.

On September 6, 2011, NIOSH approved a commercial CPDM as meeting the CPDM requirements of 30 CFR part 74. Sampling devices, such as the CPDM, can be used for compliance purposes only if they meet the specific performance criteria defined in 30 CFR part 74 and have been approved by the Secretaries of Labor and HHS for use as a compliance sampling device. The performance criteria in 30 CFR part 74 establish the requirements for bias, precision, and reliability that must be met for direct-reading devices such as the CPDM. The results of published NIOSH studies demonstrate that the CPDM meets these performance criteria.

The use of an approved CPDM, which affords real-time respirable coal mine dust exposure measurements, will significantly improve health protection for current and future coal miners by reducing their cumulative coal mine dust exposure and reducing their risk of developing and dying from occupational lung diseases. The approved CPDM is demonstrated to be accurate, precise, reliable, and durable under in-mine use conditions, and is commercially available.

The CPDM is capable of being used in a shift mode, in which the device is programmed by certified persons to operate for specific shift lengths (e.g., 8, 10, 12 hours) to monitor a Designated Occupation (DO) or another sampling entity's exposure, or in an engineering mode for short-term evaluations. If the device is operated in an engineering mode, the person would operate it for short periods of time within the shift to record respirable dust levels during specific mining activities or at specific dust-generation sources in the mine. The display has various screens that show the: (1) Time of day; (2) elapsed time since beginning of the shift; (3) total amount of respirable dust accumulated on the filter since the start of sampling, which is stored in an internal memory for analysis; (4) dust concentrations; and (5) a bar graph of the respirable dust concentration during the entire sampling period. On the bar

graph, each bar represents the average concentration value for each previous 30-minute interval, with a new bar added to the graph every 30 minutes. Also displayed and stored are sampling status conditions that have occurred during sampling. The terminology ''sampling status conditions'' is explained elsewhere in the preamble related to § 70.210. This, along with other information, is stored in the CPDM and can be accessed and downloaded with a personal computer at the end of the shift for analysis, recordkeeping, and posting.

The final rule, like the proposal, requires mine operators to use an approved CPDM to sample designated occupations (DOs) and other designated occupations (ODOs) in each MMU and each part 90 miner. In addition, it permits them to use the approved CPDM or CMDPSU to sample designated areas (DAs) and designated work positions (DWPs). However, the proposal would have required all underground coal mine operators to use approved CPDMs 12 months after the effective date of the final rule to sample DOs on each production shift and part 90 miners on each shift, seven calendar days per week (Sunday through Saturday), 52 weeks per year. The final rule differs from the proposed requirements in that mine operators are required to use the CPDM on consecutive production shifts to collect 15 valid representative samples from each DO and ODO and 5 valid representative samples from each part 90 miner every calendar quarter. In addition, the final rule permits operators of underground anthracite mines to continue to use the approved CMDPSU after the 18-month period. Specific details regarding the change in the period from the proposed 12 months to 18 months after the effective date of the final rule, the option to use CMDPSUs in underground anthracite mines instead of CPDMs, and the reduction in the CPDM sampling frequency, are discussed elsewhere in this preamble under final §§ 70.201, 70.208, 90.201, and 90.207.

b. Technological Feasibility Determination on the Use of the CPDM

MSHA concluded in the Preliminary Regulatory Economic Analysis to the proposed rule (PREA) that requiring the use of the CPDM to sample miner exposures to respirable coal mine dust was technologically feasible. NIOSH, through an informal partnership with MSHA, industry, and organized labor, conducted extensive testing of the CPDM in a variety of underground coal mines.[55] The in-mine testing verified the new sampling device to be accurate and reliable, ergonomically acceptable to miners, and sufficiently durable to withstand the rigors of the underground environment. This testing demonstrated that the CPDM is suitable for use in coal mines to monitor and prevent overexposure to respirable coal mine dust (Volkwein et al., 2004, NIOSH RI 9663; Volkwein et al., 2006, NIOSH RI 9669).

In the PREA, MSHA stated that the CPDM is a new technology and that there are only a few hundred of these devices currently in use. However, MSHA determined that the proposed 12–18 month phase-in period would allow sufficient time to manufacture the necessary quantity of CPDMs. It would also provide sufficient time for operators to conduct training on the use and care of the device.

Many commenters expressed support for using the CPDM as an engineering tool to identify dust sources and reduce dust exposure during a miner's work shift. Some of the commenters were opposed to using it for compliance purposes. Some commenters suggested that MSHA conduct a data-gathering study along with NIOSH and other interested parties using both the gravimetric and CPDM before requiring use of the CPDM. Other commenters suggested that MSHA delay requiring the use of the CPDM until further field testing in coal mines is conducted to address technical concerns about the readiness of the CPDM, its measurement accuracy, and its reliability for long-term use in coal mines. These commenters also suggested that ergonomic improvements be incorporated into the CPDM design to make it more worker-friendly since they believe its weight would cause serious harm to the musculoskeletal system of the miner.

Specifically, some commenters cited results of coal mine operator field testing involving side-by-side sampling in underground mines using the approved CMDPSU and the commercial CPDM. These commenters stated that the sampling results varied greatly and demonstrated that additional development of, and improvement on, the CPDM is needed to provide accurate results in underground mine environments. These commenters also claimed that their independent testing of the CPDM found the devices to be unreliable in typical underground conditions. When tested under the same environmental conditions, the commenters stated that multiple CPDMs reported a wide range of airborne dust concentrations, particularly when operating in elevated temperatures and humidity levels. For example, one commenter stated that only 554 of the 955 (58%) concentrations measured with the CPDM were within 25% of the concentrations measured with the CMDPSU. This commenter concluded that, since the NIOSH definition of accuracy is that the sampling device be accurate to within 25% of the actual concentration 95% of the time, the CPDM does not meet the NIOSH accuracy definition.

NIOSH reviewed the commenters' data regarding the sampling performance of the CPDM. In its comments on the proposed rule, NIOSH stated that it questioned the commenters' interpretation of the data for three reasons.

The analytical methodology used by the commenters was inappropriate for the conditions to which it was applied; several of the commenters inappropriately referred to their data by using a scientific term that could be interpreted in different ways; and none of the commenters' data included statistically representative samples that fully reflect the conditions observed nationwide in underground coal mines.

Regarding the comments that the CPDM did not meet the NIOSH Accuracy Criterion (Kennedy et al., 1995), NIOSH commented that this criterion is designed primarily this criterion is designed primarily for evaluating the accuracy of a sampling and analytical method under controlled laboratory conditions. Although the NIOSH Accuracy Criterion does not require field testing, it recognizes that field testing ''does provide further test of the method.'' However, in order to provide a valid basis for assessing accuracy and avoid confusing real differences in dust concentrations with measurement errors when testing is done in the field, precautions have to be taken to ensure that all samplers are exposed to the same concentrations. If not carried out correctly, field testing yields invalid comparisons and erroneous accuracy conclusions as it did in the commenters' limited field study.

In addition, NIOSH stated that the commenters did not properly define the term ''accuracy'' in their analysis. ''Accuracy'' is defined by referencing two statistically independent and fundamental parameters known as ''precision'' and ''bias.'' Precision refers to consistency or repeatability of results, while bias refers to a systematic error

[55] Section 501(a)(1) of the Mine Act, 30 U.S.C. 951(a)(1), provides that NIOSH shall conduct studies and research to improve working conditions and prevent occupational diseases in the coal mining industry.

that is present in every measurement. Since the NIOSH Accuracy Criterion requires that measurements consistently fall within a specified percentage of the concentration, the criterion covers both precision and uncorrectable bias. NIOSH's experimental design was developed such that the precision and bias of the CPDM could be estimated by regression analysis of data obtained in field environments. Regression analysis is a statistical methodology that uses the relationship between two or more quantitative variables so that one variable can be predicted from the other, or others. The CPDM performance was then compared to the defined and accepted reference standard within the mining industry, which is the gravimetric CMDPSU.

In its comment, NIOSH stated that when evaluating the performance of the CPDM, it collected and analyzed samples that were statistically representative of the nation's underground coal mining industry. The sample set was selected using the Survey Select procedures from the SAS statistical analysis software package. The samples were collected by MSHA inspectors at approximately 20 percent of active mechanized mining units. Statistically representative samples are critical for correctly estimating the bias of the CPDM relative to the gravimetric method of the CMDPSU. Bias may not be properly estimated from studies conducted in a limited number of mines or regions, regardless of the number of samples obtained. The methodology used by NIOSH to collect data was reviewed and approved by various members of the mining community.

In addition, NIOSH noted that none of the commenters' data sets were statistically representative of the entire underground coal mining industry. The largest data set MSHA received came from a commenter who collected 955 samples from 6 of its mines by having miners wear a CPDM and a CMDPSU (gravimetric sampler) concurrently. Unlike the commenter's data, NIOSH data were collected from over 100 mines. Therefore, the NIOSH data set is more representative of the underground mining environment and is more appropriate for evaluating the accuracy and precision of the CPDM and its use as a compliance instrument.

In terms of bias, NIOSH reviewed the results presented by the commenter and concluded that those results support those published by NIOSH. They show that the average concentration measured by the CMDPSU, 0.83 mg/m^3, was virtually identical to the CPDM average value of 0.82 mg/m^3. NIOSH further concluded, from reviewing both the commenter's and NIOSH's data sets, that there was no statistically significant difference between the data sets, and that the bias between the CPDM and the approved CMDPSU is zero. In so concluding, NIOSH noted that, to be strictly correct, dust concentration data are lognormally distributed and, therefore, a simple arithmetic average cannot be calculated from these data. The appropriate method is to average the logarithms of the numbers, followed by un-transformation of the logarithmic averages. This method yields average concentrations that are typically lower than simple arithmetic averages. However, the relative difference between the averages will remain the same in either case.

Regarding the comment that the CPDM variability was too large for it to be used as a compliance instrument, NIOSH commented that there will be no imprecision or variability in the regression if there is total control of all parameters in any given test. In addition, imprecision in a regression is a direct estimate of the degree to which there are unknown and uncontrolled parameters at work during the test. The variability reported by the commenter was primarily due to large sample variability, which was due to uncontrolled variables known to exist in field samples, even when two identical samplers were placed side-by-side. Because the commenter's experimental design did not control for the variability resulting from the samplers themselves, it was not an appropriate estimate of the CPDM's precision. Instead, the data introduced by the commenter included uncontrolled variability potentially caused by significant dust gradients known to exist, sampler inlet location differences, and the nature of mine ventilation. Ventilation currents found in mines can produce widely varying results or seemingly poor precision between two identical side-by-side instruments, even though their inlets may be separated by only a few inches. To correctly estimate the precision of the CPDM, an experimental design must minimize the uncontrolled variables in the sampling. Here, the commenter's data and analysis were based on a flawed experimental design and analysis.

In addition, spatial variability, or the differences in concentration related to location, while sometimes substantial, does not contribute to measurement error. As stated in § 72.800 of this preamble regarding a single, full-shift measurement of respirable coal mine dust, the measurement objective is to accurately measure average atmospheric conditions, or concentration of respirable dust, at a sampling location over a single shift. The average respirable coal mine dust concentration on a specific shift is being measured at the sampling location.

NIOSH has conducted the necessary scientific studies with approved methods and the results were published in a peer-reviewed document. Through years of work, NIOSH has demonstrated that the CPDM is an accurate instrument that meets the NIOSH Accuracy Criterion and, therefore, can be used as a compliance instrument. (Volkwein et al., NIOSH RI 9669, 2006). The recent NIOSH approval of the commercial CPDM, under 30 CFR part 74, further demonstrates that the CPDM is an accurate compliance sampling device for determining the concentration of respirable dust in coal mine atmospheres.

Some commenters expressed concerns regarding the reliability of the CPDM for long-term compliance use in mines based on their experience using the device. These commenters cited on-site voiding characterized in comments as reported instantaneous errors of samples as a persistent problem. They also stated that 35 to 80 percent of the units in use were returned for service and that the repair time was lengthy. One commenter stated that of the 40 CPDMs purchased, 14 units, or 35 percent, were returned to the manufacturer for repair over a 10-month period, while 5 of the units were returned for repair multiple times, suggesting the devices were less than mine-ready. According to this commenter, 20 percent of the 1,000 samples collected indicated that an error had occurred during sampling and over 6 percent indicated multiple errors. In addition, the analysis encountered numerous diagnostic failures with the CPDM units. Another commenter reported similar equipment and diagnostic issues, as well as failures when exposed to certain radio frequencies. According to this commenter, the failures were not reported by the CPDM and, as a result, may have produced false concentration measurements.

According to NIOSH's comment, these commenters relied on the analysis of data collected by the CPDM at multiple mines without an appropriate experimental protocol to control for data quality. Given that these commenters did not control critical variables like the level of operator training, sampling methodology, and sample size and distribution across mines, the data generated do not provide an appropriate estimate of the CPDM's reliability. In addition, these commenters misunderstood the CPDM error

messages received during their testing, believing that the messages indicated failure of the CPDM. The CPDM, as currently programmed, monitors its performance during sampling and registers any status conditions (errors) logged during the sample run. These messages are not indicative of a failure of the CPDM, rather they provide the user with valuable constructive feedback in real-time concerning sample validity. The frequency and type of these error messages are logged during sample collection. They will be used by MSHA to determine whether samples are valid or should be voided.

In its comment, NIOSH has identified several parameters currently being used as validation criteria. These are based on the existing list of sample validation criteria for the CMDPSU developed over time. Based on MSHA's previous experience, defining the final validation criteria requires routine use of the approved CPDM as a compliance instrument. Given the limited data set, including error messages, from only five mines cited by the commenters as evidence of CPDM failure, both NIOSH and MSHA consider the cited failure rate of 41 errors per 1,000 hours to be invalid. The NIOSH published data remains the most appropriate data set to assess the failure rate of the CPDM.

In addition to proper interpretation of the error messages, NIOSH commented that it used an experimental design in their study that controlled critical variables needed to ensure the quality of data collected. Two factors related to reliability were evaluated, critical repairs and remedial repairs. Critical repairs were considered those that required factory service while remedial repairs were those capable of being performed in the field. Using this experimental design, the critical repair rate of the pre-commercial devices was calculated to be 1.24 repairs per 1,000 hours, with a total rate of 4.75 repairs per 1,000 hours. These repair rates are an order of magnitude less than the failure rates suggested by some commenters due to their inappropriate analysis of the CPDM's error messages as described above. Furthermore, repair rates are expected to improve in general due to the quality control systems required for certification by 30 CFR part 74.

As of June 2011, the CPDM's manufacturer had reported improvements in repair rates. According to this manufacturer, 77 different units, representing 28.8 percent of the total units shipped, were returned a total of 115 times for repair in the previous two years. Repair rates decreased, quarter over quarter, after the first six to eight months of shipments due to process improvements. Also, repair turnaround times, which averaged 26 days per repair the first year following the product launch in May 2009, averaged 15.1 days between July 2010 and June 2011. The average turnaround time in 2011 was 4.7 days. Reliability of the CPDM has improved based on these data, the increasing population of CPDMs in the field, and the reduction in the number of units being returned for servicing, and the actions taken by the manufacturer to address reported field performance.

Some commenters expressed concerns about the CPDM operating reliably, when used in underground mining environments that have elevated temperatures and humidity levels, under certain laboratory conditions, and when exposed to certain radio frequency signals or electromagnetic interference (EMI). These commenters provided supplemental information and analysis of laboratory testing indicating that the CPDM does not respond reliably under all controlled conditions like those that can be encountered in an underground coal mine.

As discussed earlier, the CPDM was initially tested in 10 mines and then further tested in 4 other mines that included a variety of coal types, equipment types, and mining methods, operating conditions, geographic locations, and seam heights. Consequently, the CPDM was subjected to the typical temperature and humidity conditions normally encountered at an underground coal mine. Additionally, sampling packages that included one CPDM and two CMDPSUs were exposed to the full range of environmental conditions encountered at over 100 mines, a good representation of the entire underground mining sector. To be approved under 30 CFR part 74, the CPDM must operate reliably and accurately at any ambient temperature and varying temperatures ranging from −30 °C to + 40 °C; at any atmospheric pressure from 700 to 1,000 millibars; at any ambient humidity from 10% to 100% RH; while exposed to water mists generated for dust suppression; and while monitoring atmospheres including such water mists which is common at longwall mining operations. The differences resulting from temperature and humidity testing reported by a commenter are below the minimum detection limit of the commercial CPDM, which is 0.2 mg/m^3. Therefore, the commenter's conclusions, which are based on these test results, are inaccurate. In addition, the CPDM has a user-selected temperature operating range to optimize performance. The commenter's test procedures did not specify the selected operating range and did not indicate that this range was modified for different temperature ranges.

In addition, the commenter's laboratory testing involved a settling dust test under controlled conditions, which included the application of an outdated U.S. Department of Defense, Military Standard MIL–STD–810F, Method 510.4, Procedure III (January 1, 2000). This laboratory testing was not designed to evaluate the accuracy and precision of airborne dust sampling instruments. Therefore, the accuracy and precision conclusions are inaccurate. The conclusions are also inaccurate because the testing involved talc as a surrogate for respirable coal mine dust. Talc has a size distribution ranging from 0.8 to 1.3 μm and is not representative of respirable coal mine dust, which has a size distribution of 10 μm or less. Furthermore, because the dust chamber did not establish a uniform distribution of respirable dust within the chamber, the reported differences between the CPDMs and between the CPDMs and the CMDPSU would be expected. Since only one CMDPSU was used during testing, an estimate of sampler variability could not be obtained. Lastly, only 7 tests were completed and each test was of limited duration. As a result, the dust settling chamber results submitted by the commenter are flawed and not representative of the actual underground coal mining environment.

Some commenters stated that pre-programming of temperature range selection is difficult in areas such as Alabama which has unseasonable weather. These commenters also stated that high temperature or high humidity causes higher CPDM readings and that the 2006 NIOSH study did not discuss the effect of high temperatures or high humidity.

Certified persons pre-program the CPDMs with environmental conditions that the units are expected to be exposed to on the sampled shift. Temperature and humidity in underground coal mines are fairly uniform and stable and there is little variability experienced on a daily basis. Even when there are seasonal changes, the operators know the temperature and humidity ranges that apply to their mines; the values used to program the CPDMs need to be reasonable but not exact.

Regarding concern expressed about the reliability of the CPDM when exposed to certain radio frequency (RF) signals or electromagnetic interference (EMI), the commercial CPDM meets the

electromagnetic interference requirements of 30 CFR part 74. In addition, MSHA and NIOSH intend to modify 30 CFR part 74 to incorporate approval requirements on electro-static discharge and radiated RF susceptibility. The CPDM manufacturer has redesigned and incorporated changes to the commercial CPDM to ensure that it passes electro-static discharge and radiated RF tests before the CPDM is required to be used for compliance sampling. Testing by an independent lab will provide verification. These changes should eliminate the commenter's concerns.

Some commenters stated that CPDM calibration is too complex and difficult and operators will need to have two units ready for each person to be sampled in case a unit does not properly calibrate.

CPDMs are calibrated by certified persons approximately one to two times per year depending on the number of hours the unit has operated. In the event that a unit were to fail the pre-operational check during the pre-shift warm-up period, the operator would either use another CPDM for sampling, or notify the District Manager orally and in writing that sampling will not occur because a CPDM is not available.

Some commenters stated that the CPDM is not designed to perform in the wet, foggy, and misty atmosphere on the longwall face. They also stated that wetting of the dust inlet due to rain or roof sweats, water head bolters, shearers and jacksetters, and shoveling under the belt will prevent accurate measurement of respirable dust.

The CPDM is designed to perform in such mining environments and uses the cyclone and heating element to prevent moisture affecting the CPDM's determination of respirable dust concentration. This was one of the parameters considered when NIOSH tested the CPDM in underground mine environments, such as at the longwall face, for part 74 approval. The CPDM was found to produce accurate results in accordance with NIOSH's Accuracy Criterion.

One commenter stated that the CPDM collects different dust particle size than the CMDPSU making it inconsistent with prior definitions of hazardous respirable dust that supports the underlying risk and benefit research.

The CPDM and CMDPSU collect essentially the same dust particle size distribution, with the CPDM almost matching the CMDPSU. This is illustrated by the low 1.05 constant factor used by the manufacturer for programming the CPDM to automatically provide an MRE-equivalent concentration, compared with the 1.38 constant factor used for the CMDPSU. Both samplers are designed with the same type of cut points with each sampler using a different cyclone. Each sampler also runs at a different flowrate, which makes the cyclones behave similarly, resulting in the CPDM and CMDPSU capturing almost identical dust particle sizes. This was also a consideration when NIOSH tested the CPDM for part 74 approval.

Some commenters stated that there is no blank cassette analysis to protect against the known deficiencies in the filter system that cause false weight gains.

For a CPDM, there is no need to pre-weigh a filter or to perform a blank cassette analysis to check the filter. During the unit's 30-minute warm-up period, the device zeroes the filter to set a baseline at the beginning of the shift. Anything on the filter or any deficiency in the filter is eliminated as a potential false weight gain. The CPDM then registers any net change in weight of the filter during the shift to correlate the change to a respirable dust concentration measurement.

Some commenters stated that repeated, current lab quality control procedures, audits and checks to help reduce error are not employed for the CPDM. One commenter stated, for example, that lab examinations to determine sample discoloration or evidence of rock dust or other contaminants are eliminated, increasing the probability of inaccurate exposure assessments. Other commenters stated that MSHA currently employs procedures in the sample analytical lab to prevent contamination-induced false results, such as ''oversized,'' nonrespirable particles or sample contamination from other sources. These commenters expressed concern that such protections will no longer be available if the CPDMs are adopted as a compliance mechanism. The commenters stated that CPDMs use an electronic vibration measurement to determine sample weight and the collection filters are not examined by any laboratory for reasons that void large numbers of current samples.

There are no such laboratory examination procedures because the CPDM filters will not be sent to laboratories. The CPDM recognizes when contamination is entering the system (e.g., when water enters the unit, or the unit is overloaded when dropped into a dust powder) and then triggers sampling status condition codes (referred to as error codes in the proposed rule). MSHA's experience is that a relatively small number of samples are voided for contamination or oversize particles. The most common reason that samples are voided is for excess samples that are sent by the operator. For example, of the 41,701 operator CMDPSU samples submitted to MSHA in 2009, approximately 15.6% were voided. Of those voided samples, approximately 5.48% were voided for submission of excess samples, 0.11% for oversize particles, and 0.50% for contaminated samples (U.S. Department of Labor, MSHA, 2012a).

Some commenters stated that, based on limited experimentation, a new but suspect conversion factor (1.05 CPDM vs. 1.38 CMPDSU) is used to relate CPDM results to the British MRE sampler on which U.S. health-based dust risks, benefits, and limits were based.

As noted in the preamble to the proposed rule, NIOSH researchers (Page et al., 2008) determined that measurements of respirable dust concentrations using the CPDM and CMDPSU are comparable. The MRE was used as the basis for the existing coal mine respirable dust standards and had been designed specifically to match the United Kingdom British Medical Research Council (BMRC) criterion. The CMDPSU is used with a 1.38 multiplier to convert readings to the BMRC criterion.

In order to compare CPDM measurements with those of the CMDPSU, NIOSH conducted field research. Researchers used a stratified random sampling design that incorporated a proportionate allocation strategy to select a sample of MMUs representative of all U.S. underground coal mines. A sample of 180 MMUs was chosen, representing approximately 20% of the MMUs in production at the time the sample was selected (September 2004). Dust concentrations were monitored concurrently by both CMDPSUs and CPDMs for a full shift. A total of 129 valid CPDM/CMDPSU dust sample sets were obtained. A weighted linear regression analysis of this database shows that, in comparison with the CMDPSU, the CPDM requires a mass equivalency conversion multiplier of 1.05 [95% Confidence Interval (1.03 to 1.08)] to produce a concentration that is an MRE-equivalent concentration similar to the CMDPSU. This research shows that the two types of sampling units are very comparable due to this linear relationship.

One commenter stated that the CPDM does not distinguish between coal dust, rock dust, or any other dust that may be in the air.

No approved sampling device distinguishes between types of respirable dust measured at coal mines. The respirable dust standards in Parts 70, 71, and 90 are environmental standards that apply to respirable coal mine dust in the mine atmosphere. Any respirable dust in the mine atmosphere is considered respirable coal mine dust to which miners are exposed and, when measured, is counted for determining compliance with the respirable dust standards.

Some commenters stated that requiring miners to frequently read the CPDM monitor is a safety concern because it distracts miners while doing their job. One commenter noted that use of the CPDM interfered with shuttle car operator's running of the shuttle car.

MSHA recognizes that anything new has the potential to attract attention. However, it is the certified person, not the miner, who is required under final § 70.205(c) to monitor the dust concentration being reported by the device at mid-shift or more frequently as specified in the operator's approved mine ventilation plan. Under final § 70.201(h), miners will be provided training on the various types of information displayed on the CPDM screen. At that time, operators can stress that miners should only make such observations when it is safe to do so.

Some commenters pointed to studies that show that carrying a load can result in both physiological and biomechanical changes, discomfort, higher rates of musculoskeletal disorders (MSDs) and increased risk of falls. For example, a NIOSH study, Information Circular (IC) 9501-Miners' Views about Personal Dust Monitors (Peters et al., 2008), provided limited insight into ergonomic issues associated with wearing a CPDM. Commenters noted that the NIOSH study followed a previous model, which found that perceived negative features or barriers could affect an individual's actions regarding the use of the CPDM to assess and reduce his or her dust exposures. Commenters stated that, for the NIOSH report, 30 miners were interviewed and that some miners reported issues with sitting in equipment due to the limited space in operator compartments and with the CPDM getting bumped when working in confined areas. In addition, some miners said when the CPDM was attached to the belt with no clips, it sometimes falls off the belt, and when pouches were provided to hold the CPDM, sometimes there was not enough room on the belt for the pouch because of the other pouches already on the belt. Commenters noted that 11 miners who had worn the CPDM responded to a questionnaire and that 82 percent had problems that included discomfort, weight issues, difficulty wearing it on the miner's belt, being in the way when interfacing with equipment, and many errors occurring.

The 2008 NIOSH study (Peters et al., 2008) cited by commenters was based on a pre-commercial model of the CPDM. Since that time, the manufacturer has improved the unit's design, incorporating a better means of attaching the unit to the miner's belt and providing a shorter cap lamp cord. These improvements allow better positioning of the CPDM on the miner. NIOSH evaluated the commercial CPDM model and, in September 2011, determined that it met the CPDM approval requirements of 30 CFR part 74, which include that the CPDM be designed and constructed so that miners can wear and operate the CPDM without impeding their ability to perform their work safely and effectively.

In addition, many commenters expressed concern about the weight of the CPDM and the size and stiffness of the sampling hose and light cord assembly. Some commenters stated that requiring miners to wear the CPDM, many of whom have become accustomed to wearing the smaller and lighter cap light compared to the lead acid battery, will suffer serious musculoskeletal disorders, which have been on a decline.

MSHA notes that under the final rule, miners will wear the CPDM less since the frequency of required sampling is significantly reduced from the proposal, which would have required 24/7 sampling of the DO and the part 90 miner. This is discussed elsewhere in the preamble under final §§ 70.201, 70.208, and 90.207.

Also, NIOSH commented that when the configuration of the CPDM was conceived in 1999 at the urging of the mining community, miners typically wore both a self-contained self-rescuer (SCSR) on their mining belt and a battery to power their cap lamp. Integrating the CPDM with the cap lamp battery reflected the available technology at that time. The current CPDM integrates the dust sampler and cap lamp battery, with a total weight that is within 8 ounces of the traditional lead acid cap lamp battery alone, a power source that is still in use.

According to an MSHA survey of 418 coal mines in October 2010, which was completed after publication of the proposed rule, 47 percent of the cap lamps in use were being powered by lead-acid batteries. In its comment, NIOSH noted that traditional lead acid cap lamp batteries weigh over 5 pounds. The total relative increase in the weight of the miner's belt is low given that only 8 ounces is added by combining the CPDM with the cap lamp battery. Not only is the marginal weight change of the miner's ensemble an important factor regarding biomechanical loading, but the resultant weight distribution characteristics (especially height and anterior-posterior of center of mass) are important with respect to balance issues. Studies, by Lin et al. (1996) and Dempsey et al. (1996), show that user preferences and biomechanics of different loading configurations are complex but, the least problematic configuration was the placement of two symmetric loads below hip level with two shoulder straps and a waist belt. Although this configuration used criss-crossed straps, it was otherwise similar to a typical miner's belt configuration. A miner's belt may be more effective at reducing shoulder loads because it transfers the load to the hips, which reduces the risk of injury to the shoulders and back.

Commenters suggested that, because recent advances in cap lamp technology have reduced the size and weight of the battery, the CPDM should not be used as a compliance instrument until it accommodates this new technology. Other commenters suggested separating the dust sampler from the cap lamp. Ultimately, the existing design of the CPDM may be modified to accommodate the change in cap lamp technology. The CPDM manufacturer has reported plans to improve the ergonomic design of the unit. Changes include a shorter cap lamp cord to minimize tangling, especially in low coal; removal of the cap lamp due to recent approvals of wireless cap lamps; and possible reduction in weight.

Some commenters stated that the CPDM should not be required until it can measure silica exposures.

Neither the CMDPSU nor the CPDM is able to measure quartz in respirable coal mine dust samples. MSHA will continue to collect respirable dust samples to analyze for quartz to establish applicable respirable dust standards and limit miners' quartz exposure. Also, as discussed elsewhere in the preamble related to § 70.101, the final rule does not change the existing respirable dust standard when quartz is present.

Some commenters expressed concern that there is only one CPDM manufacturer and, therefore, requiring use of the CPDM results in guaranteed sales regardless of price, performance, or quality of service, and there will be little incentive for the manufacturer to address issues limited to a small

segment of customers. Based on its experience with the CPDM manufacturer, MSHA does not anticipate the concerns expressed by the commenters. The Agency anticipates a continuation of the same high level of cooperation that the manufacturer of the CPDM has shown to date.

Some commenters stated that there should be a 24-month interim period before a new standard becomes effective. The commenters suggested that during this period the gravimetric sampler should be used while a joint labor, industry, MSHA, and NIOSH committee consider problems that may arise as the CPDM and new standards are integrated into underground mining. As the mining industry knows, MSHA and NIOSH jointly approved the CPDM for use in underground coal mines, and determined that the device was accurate, precise, reliable, and durable under in-mine conditions. MSHA intends on taking the lead in conducting a retrospective study beginning February 1, 2017. MSHA also intends to evaluate the data collected using CPDMs to determine whether (1) the 1.5 mg/m^3 respirable dust standard should be lowered to protect miners' health; (2) the frequency of CPDM sampling should be increased; (3) engineering controls and work practices used by mine operators achieve and maintain the required respirable coal mine dust levels; and (4) samples taken on shifts longer than 8 hours should be converted to an 8-hour equivalent concentration to protect miners who work longer shifts. Using the results of this study, MSHA intends to identify best practices that can be shared with the mining community. Under the Department's Plan for Retrospective Analysis of Existing Rules, MSHA intends to consult with industry, labor, NIOSH, and other stakeholders to determine how these best practices can be replicated throughout mines to achieve similar results.

This retrospective study will be conducted in accordance with the Department of Labor's Plan for Retrospective Analysis of Existing Rules which complies with Executive Order (E.O.) 13563 ''Improving Regulation and Regulatory Review'' (76 FR 3821). E.O. 13563 requires agencies to—

> develop and submit to the Office of Information and Regulatory Affairs a preliminary plan, consistent with law and its resources and regulatory priorities, under which the agency will periodically review its existing significant regulations to determine whether any such regulations should be modified, streamlined, expanded, or repealed so as to make the agency's regulatory program more effective or less burdensome in achieving the regulatory objectives. [76 FR 3822]

The Department of Labor's Plan for Retrospective Regulatory Review—

> is designed to create a framework for the schedule and method for reviewing its significant rules and determining whether they are obsolete, unnecessary, unjustified, excessively burdensome, counterproductive or duplicative of other Federal regulations.

Sections 70.201 and 90.201 of the final rule provide that operators must use CPDMs 18 months after the effective date of the rule. In the event of any logistical or feasibility issues involving the availability of the CPDM, MSHA will publish a notice in the **Federal Register** to continue to use an approved CMDPSU to conduct sampling. In addition, assuming no technological issues arise concerning the use and manufacture of CPDMs, and depending on manufacturer projections, if CPDMs are not available in sufficient quantities, MSHA will accept, as good faith evidence of compliance with the final rule, a valid, bona fide, written purchase order with a firm delivery date for the CPDMs.

3. Technological Feasibility of Achieving the Required Dust Standards

MSHA concluded, in the PREA, that compliance with the respirable dust standards in the proposed rule was feasible on each shift because the sampling data indicated that mine operators are keeping miners' average exposures at or below the levels required under the existing standards, and dust exposures at most operations average less than the proposed standards of 1.0 mg/m^3 for underground and surface coal mines, and 0.5 mg/m^3 for part 90 miners and intake air. MSHA acknowledged, however, that some of the proposed requirements regarding the use of single full-shift samples to determine noncompliance on each shift and changes to the definition of normal production shift would result in higher exposure measurements when compared to the existing sampling program. MSHA concluded that existing engineering controls including ventilation, water sprays and environmentally controlled cabs along with changes in work practices can be used to further reduce dust levels. Engineering controls are the primary means used to control respirable coal mine dust exposures. Work practices may be used to further reduce dust levels. In addition, MSHA acknowledged that in rare instances, some operators, after taking these actions, may encounter implementation issues as they attempt to comply with the proposed requirements and need to take additional measures to comply with the proposed standards. To allow mine operators adequate time to comply with the proposed respirable dust standards, MSHA included a two-year phase-in period for the 1.0 mg/m^3 proposed standard for underground and surface coal mines, and a six-month phase-in period for the 0.5 mg/m^3 proposed standard for part 90 miners and intake air.

Many commenters expressed concern with complying with the proposed 1.0 mg/m^3 standard for underground and surface coal mines on each shift. They stated that they have incorporated all available engineering and administrative dust controls and that they cannot lower respirable dust levels any lower than the existing 2.0 mg/m^3 standard. In addition, several commenters stated that MSHA incorrectly assessed the feasibility of the proposed 1.0 mg/m^3 standard for underground coal mines. These commenters stated that the vast majority of operators cannot meet the proposed 1.0 mg/m^3 standard on a single shift sampling basis at any single mine over any substantial period of time. They stated that operators may be able to meet the proposed standard some of the time, but will not be able to meet the proposed standard all of the time, as would have been required by the proposed rule. Other commenters stated their calculations showed that, as opposed to less than 200 citations per year for violations of the current 2.0 mg/m^3 standard, a 1.0 mg/m^3 standard based on a single, full-shift measurement could result in more than 230,000 citations annually. In addition, some commenters stated that each violation would require abatement, a penalty, and mine plan amendments, and would likely result in mine interruptions until plan approvals can be obtained and abatement accomplished. These commenters stated that by averaging results from the current dust sampling system and not using the latest 2010 database of single shift sample results to determine compliance impacts under the proposed rule, MSHA improperly masked the feasibility of the proposal. Lastly, some commenters stated that MSHA did not support its conclusion that existing engineering controls and changes in work practices can be used to further reduce dust levels. These commenters, however, did not provide any definitive data to support their statements.

During the development of the final rule, MSHA evaluated the rulemaking record, including public comments, and the potential impacts of alternatives to

the proposed rule. As a result of this evaluation, the final rule addresses the commenters' concerns in several ways. First, the final rule includes a respirable dust standard of 1.5 mg/m³ for underground and surface coal mines. MSHA's rationale for the 1.5 mg/m³ standard is discussed elsewhere in this preamble under §§ 70.100 and 71.100. MSHA's analysis of the technological feasibility of the 1.5 mg/m³ standard for underground and surface coal mines and the 0.5 mg/m³ standard for part 90 miners and intake air on each shift is discussed below.

Second, the final rule requires sampling of designated occupations (DOs) on 15 consecutive shifts each quarter. The proposal would have required sampling of DOs on each and every shift.

Third, the final rule provides that noncompliance with the respirable dust standard is demonstrated during the sampling period when either two or more samples out of five operator samples or three or more samples out of fifteen operator samples meet or exceed the applicable excessive concentration value (ECV), or the average for all operator samples meets or exceeds the applicable ECV.[56] A detailed discussion on the ECVs is in Appendix A of this preamble. MSHA constructed the ECVs to ensure that a citation is issued when the respirable dust standard is exceeded. The ECVs ensure that MSHA is 95 percent confident that the applicable respirable dust standard has been exceeded. Each ECV accounts for the margin of error between the true dust concentration measurement and the observed dust concentration measurement when using the CMDPSU or the CPDM.

Under the proposal, noncompliance determinations would have been made on an operator's single full-shift sample that met or exceeded the ECV or a weekly accumulated exposure that exceeded the weekly permissible accumulated exposure.

Finally, MSHA has revised the methodology used to assess the technological feasibility of meeting the respirable coal mine dust standards. To evaluate the impact of the final rule, MSHA retained the adjustment factor used in the PREA for normal production. MSHA did not retain the adjustment factor to estimate an equivalent 8-hour concentration for work shifts longer than 8 hours. Like the proposal, MSHA's feasibility analysis is based on sampling data from samples collected in 2008 and 2009. Rather than using both operator and inspector samples as was done for the proposal, this final analysis is based solely on MSHA inspector samples. MSHA has more confidence in MSHA inspector samples for the reasons discussed in Section 1(a) of the QRA for the final rule.

As in the PREA, these data reflect measurements under the existing sampling program. The definition in the final rule for a normal production shift will result in higher exposure measurements when compared to the existing sampling program. Therefore, as in the PREA, each individual sample is adjusted to account for normal production as defined by the final rule.

Even without an adjustment for work shifts longer than eight hours, the final rule results in more representative measurement of dust concentrations to which miners are being exposed on a daily basis in the active workings. Under final §§ 70.201(c), 71.201(b), and 90.201(b), sampling is conducted over the entire work shift. Since the work shift for many miners normally extends beyond eight hours, the reported sampling results for the 2008 and 2009 period likely understate miners' everyday coal mine respirable dust exposures. MSHA anticipates an increase initially in the observed dust concentrations under the final rule.

To evaluate the impact of the proposed rule for feasibility purposes, MSHA applied two adjustment factors to the 2008–2009 data. The first factor adjusted the 2008–2009 sample data to estimate an equivalent 8-hour concentration for work shifts longer than eight hours. The second factor adjusted the sample data for normal production. After consideration of the comments and relevant data, MSHA is not including in the final rule the provision that adjusts respirable coal mine dust measurements for shifts longer than 8 hours. The rationale for not including this provision is discussed elsewhere in the preamble discussion of the equivalent concentration definition under § 70.2.

To evaluate the impact of the final rule for feasibility purposes, MSHA retained the adjustment factor for normal production that was applied to the 2008–2009 data. In deriving the normal production adjustment factor for underground mines, MSHA applied a conservative method using production data for the previous 30 production shifts collected from mine operators during the Agency's enforcement activities in October 2009. First, the average shift length was calculated for underground operations. Using 2009 shift length information for each mine stored in the MSHA Standardized Information System (MSIS) database, MSHA determined that the average shift length for longwall MMUs was 10 hours and the average for non-longwall MMUs was 9 hours. The 30-shift average production was calculated for each of the 193 MMUs that were inspected. These production values were then averaged across all non-longwall and longwall MMUs, yielding estimated overall 30-shift averages of 921 tons and 7,355 tons, respectively. These averages were then divided by the average shift length for the MMU type established earlier to estimate average production rate in tons per hour. For example, to estimate the overall longwall MMU production rate, 7,355 tons, which represents the full-shift production, was divided by 10 hours, yielding an estimated production rate of 736 tons/hour. The same calculation was performed for non-longwall MMUs resulting in a production rate of 102 tons/hour (921 tons ÷ 9 hrs).

Next, the production reported for each MSHA inspector and operator sample collected during CY 2009 was averaged across all non-longwall and longwall MMUs. This yielded overall 8-hour averages of 672 tons and 5,537 tons, respectively, for MSHA inspector samples, and 703 tons and 5,398 tons, respectively, for operator compliance samples. These averages were then divided by 8 hours, yielding estimates of the average production rate across the respective MMU types. For example, the production rate for operator samples was estimated at 88 tons/hour (703 tons/8 hr) for non-longwall MMUs and 675 tons/hour (5,398 tons/8 hr) for longwall MMUs.

These estimates of average production rates were used to derive the industry-wide production factors by dividing the estimated overall 30-shift average production rate by the overall CY 2009 average production rate. In the case of non-longwall MMUs, each operator DO concentration was multiplied by 1.16 (102/88 tons/hr). And, each longwall MMU sample was multiplied by 1.09 (736/675 tons/hr).

Although some commenters stated that MSHA's feasibility assessment of the proposed rule was based solely on historical averages, that assessment was based on the mean (or average) concentrations, the average deviation of sample concentrations from standards, and the percentage of observations above the standard. For the final rule, MSHA presents these summary statistics for more detailed occupations than were presented for the proposal

[56] In the final rule, compliance determinations are also based on single full-shift MSHA inspector samples. MSHA inspectors sample a small fraction of a mine's production shifts to ensure that dust levels are at or below the standard.

and also presents the median. MSHA also calculated the average deviations in a slightly different manner than was done for the proposal. Rather than computing the deviation from the existing standards as was done for the proposal, the deviation in this analysis is the deviation from the final standard or the existing standard, whichever is lower.

The means and medians of the detailed occupations and locations are measures of central tendency and help to answer the question of whether typical dust levels in each operation/location currently meet the standards. If both the mean and median of the inspector samples collected in various mines over the two-year period are less than the final standard, then MSHA concludes that typical dust levels for that occupation/location currently meet the standard. The percentage of observations currently above the final standards for each occupation/location indicates the probability that an MSHA inspector will find a violation for a single full-shift sample exceeding the standard in the final rule.[57] The average deviation of the sample concentrations from the existing standard or final standard provides an indication of the degree to which mine operators are currently meeting the standards in the final rule. In addition, the average deviation takes into account the reduced standards below 1.5 mg/m^3. A negative average deviation indicates how much exposures average below the 1.5 mg/m^3 standard and any reduced standard below 1.5 mg/m^3 that was in effect at the time the samples were taken.

Summary data for various types of coal mining are presented in the following sections. After each presentation, MSHA also discusses the currently available dust control technology which can be used to reduce exposures that exceed the final standard. As was noted in the PREA, these technologies are also discussed in several NIOSH publications available at: *http://www.cdc.gov/niosh/mining/topics/RespirableDust.html*. In response to comments, the discussions of the control technologies are more extensive in this assessment than those presented in the assessment of the proposed rule.

MSHA reviewed MMU data where an inspector collected a respirable dust sample that, after adjustments to represent the normal production on that shift, would have exceeded a concentration of 1.5 mg/m^3. Specifically, MSHA looked at all longwall and approximately 20% of non-longwall MSHA MMU dust surveys collected during the fourth quarter of calendar year 2009 where the adjusted concentrations would have exceeded 1.5 mg/m^3. MSHA reviewed measurements of the engineering controls in use on the day each sample was collected to assess whether using additional engineering controls would have likely reduced the dust concentration to levels at or below 1.5 mg/m^3. Every survey indicated that additional control measures are available that would be likely to reduce the respirable dust concentration to 1.5 mg/m^3 or less. MSHA determined that many MMUs could: Increase air quantity, air velocity, the number of water sprays, and the water pressure; balance the quantity of air delivered to the face with the scrubber air quantity; and/or change from blowing face ventilation to exhausting face ventilation. Changing one or more dust controls is an option at all MMUs that MSHA reviewed. On nearly all MMUs that used blowing face ventilation and a scrubber, the air quantity provided was less than the scrubber air quantity, causing an imbalanced system and the potential for respirable dust overexposures. Many MMUs using exhausting face ventilation had air quantities that would produce Mean Entry Air Velocities (MEAV) of less than 100 feet per minute (fpm), which indicates that the air provided could be increased to provide greater protection of miners' health. The number of water sprays, while important, is not the only spray variable affecting dust control; the location, flow rate, spray pattern, and droplet size are variables that impact dust levels where miners work. The dust control data that MSHA reviewed is contained in two spreadsheets titled ''MSHA Longwall Surveys with Adjusted Concentrations of 1.5 mg/m^3 Dust Controls, Oct–Dec 2009'' and ''MSHA Random Non-Longwall Surveys with Adjusted Concentrations of 1.5 mg/m^3 Dust Controls, Oct–Dec 2009'' (U.S. Department of Labor, MSHA, 2012b and 2012c). Detailed discussions of these dust control technologies follow.

Some commenters expressed concern with the phase-in periods in proposed §§ 70.100, 71.100, and 90.100 regarding the respirable dust standards, § 70.101 regarding the respirable dust standard when quartz is present, and § 75.350 regarding the respirable dust standard in the belt air course. The final rule is changed from the proposal. It includes a 24-month implementation date in each of these sections to provide an appropriate amount of time for mine operators to comply with the standards in the final rule. Comments on the proposed phase-in periods and MSHA's rationale for the 24-month period in the final rule are discussed elsewhere in this preamble under final §§ 70.100, 70.101, 71.100, 75.350, and 90.100.

a. Surface Coal Mines and Facilities

Table IV–1 presents a summary of the 2008–2009 sampling data for surface coal mines and facilities by selected occupations. Of the more than 4,500 samples taken by MSHA inspectors at surface coal operations and facilities during 2008 and 2009 approximately 5% exceeded the standard and the average deviation was 0.69 mg/m^3 below the standard. The mean and median of the samples were 0.47 mg/m^3 and 0.26 mg/m^3, respectively. MSHA believes that these data overstate the exposures at surface coal operations and facilities because, rather than conducting random sampling, MSHA inspectors tend to sample operations where they believe respirable coal mine dust levels are high. Based on these data, MSHA concludes that most operations at surface mines and facilities can meet the 1.5 mg/m^3 standard without significant changes on each shift.

TABLE IV–1—SUMMARY OF 2008–2009 SAMPLING DATA FOR SURFACE COAL MINES AND FACILITIES, BY SELECTED OCCUPATIONS

Occupation	Number of samples	Mean mg/m^3	Median mg/m^3	Pct. > standard *	Avg. deviation mg/m^3
Bulldozer Operator	1,118	0.28	0.16	1	-0.50
Cleaning Plant Operator	175	0.75	0.59	13	-0.75
Cleanup Man	108	0.55	0.44	2	-0.95
Crusher Attendant	104	0.62	0.35	12	-0.71

[57] For this analysis, MSHA used the standard even though a sample would have to meet or exceed the ECV for there to be a violation under the final rule.

TABLE IV–1—SUMMARY OF 2008–2009 SAMPLING DATA FOR SURFACE COAL MINES AND FACILITIES, BY SELECTED OCCUPATIONS—Continued

Occupation	Number of samples	Mean mg/m³	Median mg/m³	Pct. > standard *	Avg. deviation mg/m³
Fine Coal Plant Operator	177	0.84	0.71	14	-0.66
Highlift Operator/Front End Loader	160	0.28	0.12	1	-1.08
Highwall Driller	797	0.43	0.24	4	-0.44
Laborer/Blacksmith	179	0.52	0.34	8	-0.90
Mechanic	194	0.49	0.37	4	-1.00
Other **	799	0.47	0.28	5	-0.83
Refuse Truck Driver/Backfill Truck Driver	162	0.30	0.24	0	-1.13
Utility Man	386	0.71	0.44	12	-0.76
Welder (NonShop)	188	0.69	0.24	10	-0.81
Total	4,547	0.47	0.26	5	-0.69

* 1.5 mg/m³ or a reduced standard below 1.5 mg/m³.
** Occupations with fewer than 100 samples.
Source: Tabulation of MSHA MSIS Data.

The highest mean and median exposures and the greatest percentage of samples exceeding the standard were for the cleaning plant and fine coal plant operators. As MSHA stated in the PREA, workers in surface facilities can be protected by enclosing the dust-generating processes, placing the operator in an environmentally controlled booth, using dust collectors to limit the amount of dust that becomes airborne, ensuring that the equipment is being maintained and functioning properly, and following good work practices.

As MSHA noted in the PREA, engineering controls and work practices are also available to reduce the dust concentrations at other surface work locations. According to NIOSH's Best Practices for Dust Control in Coal Mining (Best Practices), most of the dust generated at surface mines is produced by mobile earth-moving equipment such as drills, bulldozers, trucks, and front-end loaders, excavating silica-bearing rock and minerals. There exist four practical areas of engineering controls to mitigate surface mine worker exposure to all airborne dusts, including silica. Those are drill dust collection systems including wet suppression, enclosed cab filtration systems, controlling dust on unpaved haulage roads, and controlling dust at the primary hopper dump. (Colinet et al., 2010 NIOSH Information Circular 9517, Best Practices for Dust Control in Coal Mining, (''NIOSH IC 9517''), pp. 65–72.)

MSHA concludes that it is technologically feasible for surface coal mines and facilities to comply with the 1.5 mg/m³ standard in the final rule on each shift.

In addition, a review of the 2008–2009 operator-submitted respirable coal mine dust samples used for the proposed rule shows 97 surface mines operating on reduced standards of 0.5 mg/m³ or less. Many mines submitted respirable dust samples that routinely indicate the mine is able to operate and still control dust at or below the 0.5 mg/m³ level. For operator-submitted respirable dust samples for 2008 and 2009, 65% of all valid samples were at or below 0.5 mg/m³. The engineering controls and work practices available to reduce quartz exposure at surface mines are the same as those described above for reducing dust levels at surface coal mines and facilities.

b. Intake Air at Underground Coal Mines

Table IV–2 presents a summary of the 2008–2009 inspector intake air samples at underground coal mines. Of the more than 8,200 samples taken by MSHA inspectors in underground coal operations during 2008 and 2009, less than 6% exceeded 0.5 mg/m³ and the average deviation was 0.33 mg/m³ below the 0.5 mg/m³ standard. The mean and median of the samples were 0.17 mg/m³ and 0.11 mg/m³, respectively. Based on these data, MSHA concludes that most intake air can meet the 0.5 mg/m³ standard without significant changes on each shift.

According to NIOSH's Best Practices, maintaining this concentration is not usually difficult, but it requires attention from mine operators to address activities that can raise intake air dust levels. Typically, high levels of intake air dust are sporadic and brief in nature due to activities in the intake air entries that may take place over the course of a working shift. These sporadic activities include delivery of supplies and/or personnel, parking equipment in the intake, rock dusting, scoop activity, and construction activity. (NIOSH IC 9517, 2010, p. 61.)

TABLE IV–2—SUMMARY OF 2008–2009 INSPECTOR INTAKE AIR SAMPLES AT UNDERGROUND COAL MINES

Location	Number of samples	Mean mg/m³	Median mg/m³	Pct. > 0.5 mg/m³	Avg. deviation mg/m³
Not Belt Air	7,655	0.15	0.10	3.5	−0.35
Belt Air	613	0.43	0.35	28.1	−0.07
Total	8,268	0.17	0.11	5.3	−0.33

Source: Tabulation of MSHA MSIS Data.

The highest mean and median exposures and the greatest percentage of intake air samples exceeding 0.5 mg/m³ were taken in belt entries. The average deviation for the belt air samples was less than 0.1 mg/m³ below the 0.5 mg/

m³ standard. One commenter specifically supported respirable dust control and reduction in dust levels for intake air because intake air goes straight to the face.

According to NIOSH's Best Practices, when belt air is used for face ventilation, dust generated in the belt area should be controlled. Dust controls at the belt head helped maintain low dust levels in the belt entry. Automated water sprays were used to suppress dust at the section-to-main belt transfer point. A belt scraper equipped with water sprays controlled dust by cleaning the outside surface of the belt after the coal had been transferred to the main belt. (NIOSH IC 9517, 2010, p. 61.)

In addition, because the potential for dust from the belt entry to contaminate the face area has increased in recent years due to the increased quantity of coal being transported by the belt, NIOSH states that the following practices can help control respirable dust levels in the belt entry: Belt maintenance, wetting the coal product during transport, belt cleaning by scraping and washing, use of a rotary brush that cleans the conveying side of the belt, and wetting dry belts. (NIOSH IC 9517, 2010, pp. 18–19.)

MSHA concludes that it is technologically feasible for mine operators to meet the 0.5 mg/m³ standard for intake air on each shift. As noted in the PREA, many of the high dust concentrations for intake air represented samples taken while belt entries were being used as intake air courses. Dust concentrations in the belt entry, when used as an intake air course, can be consistently maintained at or below the final standard by employing currently available engineering controls such as water sprays at transfer points to adequately wet the conveyor belt and transported coal, combined with regular belt maintenance and cleaning of the belt entry. Moreover, no mine is required to use belt entries as intake air courses and relatively few do (less than 40 mines in 2009). If maintaining the belt entries is burdensome, an operator has the option of using another entry for intake air.

c. Part 90 miners

Table IV–3 presents a summary of the 2008–2009 sampling data for part 90 miners. Of the 500 samples taken by MSHA inspectors for part 90 miners during 2008 and 2009, approximately 23% exceeded 0.5 mg/m³ and the average deviation was 0.13 mg/m³ below the applicable standard. The mean and median of the samples were 0.37 mg/m³ and 0.24 mg/m³, respectively. These data indicate that current dust levels for the part 90 miners meet the final 0.5 mg/m³ standard. In addition, dust levels for part 90 miners will likely decline under the final rule after operators implement controls to reduce the dust levels in the intake airways and active workings. Further, there are currently fewer than 70 part 90 miners out of an underground coal work force of approximately 50,000 miners. A mine operator may further reduce the dust levels of a part 90 miner by limiting the time that the part 90 miner spends in high dust areas, such as at the face for underground miners; on the surface, for example, an operator can move a part 90 miner to a less dusty job or place the miner in an environmental cab. Finally, part 90 miners can avoid areas of the mine that are under a reduced dust standard due to the presence of quartz. Therefore, MSHA concludes that it is technologically feasible for mine operators to meet the final 0.5 mg/m³ standard for part 90 miners on each shift.

TABLE IV–3—SUMMARY OF 2008–2009 SAMPLING DATA FOR PART 90 MINERS

Number of samples	Mean mg/m³	Median mg/m³	Pct. > 0.5 mg/m³	Avg. deviation mg/m³
502	0.37	0.24	23	−0.13

Source: Tabulation of MSHA MSIS Data.

d. Non-Longwall Underground Mining Operations

Table IV–4 presents a summary of the adjusted 2008–2009 sampling data for non-longwall operations in underground coal mines by selected occupations. Of the nearly 38,000 samples taken by MSHA inspectors at non-longwall operations in underground coal mines during 2008 and 2009, after adjustment, approximately 9% exceeded the standard and the average deviation was 0.68 mg/m³ below the standard. The mean and median of the samples were 0.75 mg/m³ and 0.59 mg/m³, respectively, approximately half of the 1.5 mg/m³ standard.

TABLE IV–4—SUMMARY OF ADJUSTED 2008–2009 SAMPLING DATA FOR NON-LONGWALL OPERATIONS IN UNDERGROUND COAL MINES, BY SELECTED OCCUPATIONS

Occupation	Number of Samples	Mean mg/m³	Median mg/m³	Pct. > Standard *	Avg. deviation mg/m³
Coal Drill Operator	194	0.75	0.61	8	−0.73
Continuous Mining Machine Helper	656	0.79	0.64	8	−0.63
Continuous Mining Machine Operator	7,595	0.99	0.81	17	−0.44
Cutting Machine Operator	185	1.14	0.91	25	−0.35
Electrician	949	0.40	0.31	2	−0.98
Laborer	257	0.40	0.30	5	−1.03
Loading Machine Operator	284	0.36	0.30	0	−1.12
Mechanic	406	0.56	0.45	4	−0.86
Mobile Bridge Operator	1,283	0.80	0.67	9	−0.69
Other **	407	0.59	0.41	6	−0.82
Roof Bolting Machine Operator	8,651	0.74	0.60	8	−0.70
Scoop Car Operator	3,574	0.69	0.53	8	−0.74
Section Foreman	385	0.64	0.50	7	−0.78
Shuttle Car Operator	11,867	0.68	0.54	7	−0.74
Tractor Operator/Motorman	275	0.53	0.41	3	−0.91

TABLE IV–4—SUMMARY OF ADJUSTED 2008–2009 SAMPLING DATA FOR NON-LONGWALL OPERATIONS IN UNDERGROUND COAL MINES, BY SELECTED OCCUPATIONS—Continued

Occupation	Number of Samples	Mean mg/m³	Median mg/m³	Pct. > Standard *	Avg. deviation mg/m³
Utility Man	775	0.63	0.51	5	−0.79
Total	37,743	0.75	0.59	9	−0.68

* 1.5 mg/m³ or a reduced standard below 1.5 mg/m³.
** Occupations with fewer than 100 samples.
Source: Tabulation of MSHA MSIS Data.

The highest mean, median exposures, the greatest percentage of samples exceeding the applicable standard, and the smallest average deviation below the applicable standard were for the cutting machine and continuous mining machine operators. These data are consistent with NIOSH's findings that the greatest source of respirable dust at continuous mining operations is the continuous mining machine. NIOSH's Best Practices states that, at most continuous mining operations, the DO is the continuous mining machine operator and that dust generated by the continuous mining machine has the potential to expose the continuous mining machine operator and anyone working downwind of the active mining. (NIOSH IC 9517, 2010, p. 41.)

In the PREA, MSHA stated that dust levels at non-longwall operations could be controlled using currently available engineering controls, implementing well-designed face ventilation systems and controls, and following good maintenance and work practices. This is consistent with NIOSH's Best Practices, which states that ventilating air to a continuous mining section, whether blowing or exhausting, is the primary means of protecting workers from overexposure to respirable dust. In addition, proper application of water spray systems, ventilation, and mechanical equipment (scrubbers) provides the best overall means of respirable dust control. Also, the maintenance of scrubbers, water sprays, cutting bits and/or drill bits is basic to any effective dust control strategy and must be routinely practiced. Furthermore, suppression of dust is the most effective means of dust control. Suppression is achieved by the direct application of water to wet the coal before and as it is broken to prevent dust from becoming airborne.

Once dust is airborne, NIOSH states that other methods of control must be applied to dilute it, direct it away from workers, or remove it from the work environment. For example, redirection of dust is achieved by water sprays that move dust-laden air in a direction away from the operator and into the return entry or behind the return ventilation curtain. In addition, capture of dust is achieved either by water sprays that impact with the dust in the air to remove it or by mechanical means such as fan-powered dust collectors. Ventilating air dilutes and directs dust away from workers. Either blowing or exhausting ventilation is used on continuous mining sections. A cut sequence should be adopted so that cut-throughs are made from intake to returns when practical to prevent return air from blowing back over the operator. Handheld remote control of the continuous mining machine has made it possible for operators to stay outby the continuous mining machine while operating the machine; however, operator positioning is crucial depending on the ventilation system being used. The velocity and quantity of face ventilating air are important factors for controlling respirable dust exposure of the continuous mining machine operator. A good ventilation plan consists of sufficient mean entry air velocity to confine dust near the face and/or direct it toward the return entry with a high enough quantity of air for diluting generated respirable dust. (NIOSH IC 9517, 2010, pp. 41, 48, 54.)

Roof bolting machines are another source of dust at non-longwall underground coal mine operations. Most roof bolting machines are equipped with MSHA-approved dry dust collection systems to remove dust during drilling. However, roof bolting machine operators can be overexposed to dust from drilling, cleaning the dust collector, not maintaining the dust collector, or working downwind of the continuous mining machine. According to NIOSH, the largest source of operator dust exposure can occur from working downwind of the continuous mining machine. NIOSH states that if the dry dust collector is properly maintained and if the roof bolting machine is not working downwind of the continuous mining machine, very little dust should be measured in the roof bolting machine operator's work environment.

According to NIOSH, there are three major roof bolting respirable dust problem areas: (1) Filter leaking or plugging, (2) accumulation of dust in the collection system, and (3) low airflow at the bit due to hose, fitting, and relief valve leaks. NIOSH's best practices can help reduce dust exposure to the roof bolting machine operator by maintaining the dust collector system, cleaning the dust box, using dust collector bags, routing miner-generated dust to the return, and not working downwind of the continuous mining machine. (NIOSH IC 9517, 2010, p. 57).

Some commenters stated that MSHA's technological feasibility assessment of the proposed rule did not take into consideration that mine operators had optimized the dust controls in their operations to achieve compliance with the current 2.0 mg/m³ standard. These commenters further stated that there is no new technology that will allow mine operators to generally comply with the proposed 1.0 mg/m³ standard.

Under its existing dust standards, MSHA has found numerous instances involving mine operators using dust control technologies that were not in proper working order. For example, ventilation at the face is sometimes insufficient because of lost air due to inadequate or missing line curtains and stoppings. In addition, water sprays are sometimes inadequate because of insufficient pressure or improper or clogged nozzles. MSHA has also found scrubbers not properly maintained with clean filters or miners not being positioned in fresh air.

MSHA has also found numerous instances involving mine operators using dust control technologies together with improper work practices. The following information from NIOSH's Best Practices shows how work practices (e.g., miner and equipment positioning, and maintenance) can reduce a miner's exposure to respirable coal mine dust.

The velocity and quantity of face ventilating air are important factors for controlling respirable dust exposure of the continuous mining machine

operator. When blowing ventilation is used, the continuous mining machine operator should be positioned in the clean discharge air at the end of the blowing curtain or tubing with intake air sweeping from behind. The continuous mining machine operator should not proceed past the end of the line curtain. If the continuous mining machine operator must be on the return side of the curtain, some of the intake air should be bled over the line brattice to provide fresh air to the continuous mining machine operator. In addition, scrubber discharge must be on the opposite side of the line brattice to allow scrubber exhaust to discharge directly into return air. The air quantity provided at the end of the line curtain should be limited to 1,000 cfm over the scrubber capacity. Air quantities exceeding 1,000 cfm over the scrubber capacity can overpower the scrubber and push dust-laden air past the scrubber inlets. (NIOSH IC 9517, 2010, pp. 54–55.) MSHA has found miners working in the return air with scrubber exhaust not discharging directly into the return air and air quantities exceeding 1,000 cfm over the scrubber capacity.

When exhausting ventilation is used, intake air is delivered to the face in the working entry. The clean air sweeps the face, and the dust-laden air is then drawn behind the return curtain or through the exhaust tubing to the return entries. This type of system will keep mobile equipment in fresh air. It affords the continuous mining machine operator more freedom of movement than a blowing ventilation system. In addition, it allows more visibility around the loading area so that shuttle car operators can easily determine where the continuous mining machine operator is located when entering the face area.

Another advantage of exhausting ventilation is that shuttle car operators are always positioned in fresh air. The end of the ventilation curtain or tubing must be kept within 10 feet of the face when not using a scrubber to ensure that air reaches and effectively sweeps the face. The continuous mining machine operator should not proceed inby the end of the line curtain since this will expose the operator to dust-laden return air. If continuous mining machine operator dust levels are too high, the first thing to check is whether the operator is standing parallel to or outby the end of the line curtain. Scrubber exhaust must be on the same side of the entry as the line curtain to allow scrubber exhaust to discharge directly into return air. (NIOSH IC 9517, 2010, pp. 55–56.) MSHA has found instances of the exhaust curtain or tubing farther than 10 feet from the face when not using a scrubber, continuous mining machine operators standing parallel to or outby the end of the line curtain, and scrubber exhaust being recirculated rather than being discharged into the return air.

Bit type and bit wear can adversely affect respirable dust concentrations. Routine inspection of bits and replacement of dull, broken, or missing bits improve cutting efficiency and help minimize dust generation. (NIOSH IC 9517, 2010, p. 52.)

High-pressure sprays are recommended for redirecting of dust. However, care must be taken when determining location and direction because high pressure can cause turbulence, leading to rollback of dust laden air. Operators should examine, clean, or replace sprays if necessary before each cut. (NIOSH IC 9517, 2010, p. 47.) MSHA has found instances where water sprays different from those specified in the approved mine ventilation plan were being used and where some of the sprays were not operating properly.

Scrubbers lose as much as one-third of their airflow after just one cut. The most common cause of efficiency loss is filter panel clogging. Pitot tubes should be used to obtain air velocity readings as a measure of scrubber performance. When the dust is excessive, cleaning of the filter panel, the demister, and the scrubber ductwork, is required more often. Also, the spray nozzles in the ductwork should be checked to ensure they are completely wetting the entire filter panel and not just the center. In some mines, filters should be cleaned with water at least after each place change. In addition, inlets and ductwork may require more frequent cleaning. (NIOSH IC 9517, 2010, pp. 49–51.) MSHA has found instances where scrubbers were operating with clogged filters. MSHA has also found that some operators use less efficient filters. A less efficient filter traps fewer dust particles, but is used by some mine operators because it requires less frequent maintenance than an efficient filter which traps more dust.

In addition to dust created by the roof bolting machine itself, roof bolting machine operators can be exposed to continuous mining machine-created dust when bolting is required downwind of the continuous mining machine. According to NIOSH, regardless of the type of ventilation being used, the cutting sequence must be designed to limit the amount of time the roof bolting machine operator works downwind of the continuous mining machine. Properly sequenced cuts with double-split ventilation can eliminate the need to work downwind of dust concentrations created by the continuous mining machine. (NIOSH IC 9517, 2010, pp. 59–60.)

Because MSHA has found numerous instances involving mine operators using dust control technologies that were not in proper working order and improper work practices, both of which have contributed to miners' exposure to respirable coal mine dust in excess of the existing permissible levels, it is reasonable to conclude that mine operators have not optimized all existing dust controls. MSHA concludes that it is technologically feasible for mine operators to meet the 1.5 mg/m^3 standard for non-longwall underground coal mining operations using existing engineering controls along with proper work practices on each shift.

e. Underground Coal Mining Longwall Operations

Longwall coal mining operations generally have the highest respirable coal mine dust levels. In the PREA, MSHA stated that, in rare instances, some operators may encounter implementation issues as they attempt to comply with the proposed dust standards. Under the final rule, implementation issues are greatly reduced for longwall operators.

Table IV–5 presents a summary of the adjusted 2008–2009 sampling data for longwall operations in underground coal mines by selected occupations. Of the more than 2,000 samples taken by MSHA inspectors during 2008 and 2009, after adjustment, approximately 21% exceeded the standard and the average deviation was 0.39 mg/m^3 below the standard. The mean and median of the samples were 1.09 mg/m^3 and 0.98 mg/m^3, respectively. These data indicate that, after adjustment, typical dust levels at longwall operations are below the 1.5 mg/m^3 standard. The longwall operator on the tailgate side is the only occupation/location where more than 30 percent of the adjusted samples exceeded the standard.

TABLE IV–5—SUMMARY OF ADJUSTED 2008–2009 SAMPLING DATA FOR LONGWALL OPERATIONS IN UNDERGROUND COAL MINES, BY SELECTED OCCUPATIONS

Occupation	Number of samples	Mean mg/m³	Median mg/m³	Pct. > standard *	Avg. deviation mg/m³
Headgate Operator	352	0.74	0.60	8	−0.74
Jack Setter (Longwall)	726	1.16	1.04	22	−0.32
Longwall Operator (Headgate Side)	337	1.20	1.11	24	−0.27
Longwall Operator (Tailgate Side)	371	1.39	1.22	35	−0.09
Other **	253	0.76	0.58	11	−0.71
Total	2,039	1.09	0.98	21	−0.39

* 1.5 mg/m³ or a reduced standard below 1.5 mg/m³.
** Occupations with fewer than 100 samples.
Source: Tabulation of MSHA MSIS Data.

As MSHA stated in the PREA, existing technologies are available to reduce dust levels in longwall operations. Ventilation is the most effective control. The amount of ventilation reaching the face can be increased by better maintenance and positioning of the line curtains and stoppings, increasing the amount of air delivered to the longwall face, and reducing the restrictions in the intake entries. Under some circumstances, mine operators may have to develop additional airways. In addition, efficient and better positioned water spray nozzles as well as increased water pressure and volume can be used. Work practices, such as proper positioning of the miner as well as the cleaning and maintenance of the dust controls further reduce dust levels. The use of CPDMs will enable operators to ascertain the effects of these practices and how to combine their use most effectively.

NIOSH noted many areas where improvements could be made to reduce current dust levels in longwall operations. These areas include: (1) Reducing dust in the intake air entries by decreasing air velocities in the intake entries; (2) controlling dust generated by the shearer by ensuring sufficient wetting of the coal; (3) maintaining the cutting drum bits by promptly replacing damaged, worn, or missing bits; (4) controlling dust generated by the stageloader/crusher by fully enclosing the stageloader/crusher, wetting the coal in the stageloader and crusher area, and using scrubber technology to create negative pressure; (5) using a high-pressure water-powered scrubber; and (6) installing and maintaining gob curtains. (NIOSH IC 9517, 2010, pp. 17–26.)

Some commenters stated that, like non-longwall operations, dust controls for longwall operations have been optimized and there were no additional controls available to further reduce coal mine dust levels. In response to these comments, MSHA notes that the Agency has found that improvements have been made in respirable dust control at longwall operations since the 1990s. According to NIOSH, approximately 25% of the active longwall faces in the United States were surveyed to quantify dust generation from major sources and determine the relative effectiveness of the different control technologies. NIOSH found that the average face velocities increased by 28% (0.71 m/sec or 140 ft/min) when compared to air velocities reported in a mid-1990s longwall study. NIOSH also found that water to the shearer increased in an effort to control dust liberated from the face. Headgate splitter arm directional spray systems were observed on 90% of the surveyed longwalls. The exact type, number and location of these sprays varied significantly between mines, but all were operating on the principle of splitting the ventilating air as it reaches the headgate side of the shearer and holding the dust-laden air near the face. (Rider et al., 2011, pp. 2–3.) NIOSH stated that although average shift production rates rose approximately 53%, dramatic reductions in average dust levels, between 20% and 58%, were realized at each face sampling location when dust levels were compared to a 1990s study. (Rider et al., 2011, p. 7.)

However, despite these improvements, like non-longwall operations, MSHA has found that there are numerous instances involving mine operators using dust control technologies that were not in proper working order and using improper work practices, both of which have contributed to miners' exposure to excessive respirable coal mine dust. For example, MSHA has found instances where air being directed into the mine is lost before it reaches the face due to inadequate curtains and stoppings, miners were improperly positioned in the return air, and inadequate maintenance resulted in excessive dust levels.

NIOSH has also found instances involving mine operators using dust control technologies that were not in proper working order or improper work practices, both of which have contributed to miners' exposure to excessive respirable coal mine dust. NIOSH observed: (1) Longwall operations with improperly maintained brattice curtain behind the hydraulic support legs resulting in large voids with air escaping into the gob; (2) shearer operators located inby, rather than outby, the headgate drum exposed to elevated dust levels when the headgate drum cut into the headgate entry; and (3) an improperly angled hydraulically adjustable splitter arm allowed dust to migrate over the top of the splitter arm and into the walkway. (NIOSH IC 9517, 2010, pp. 23–24, 30.)

In addition, NIOSH notes that unidirectional cutting may allow for greater flexibility to place workers upstream of the dust sources than bidirectional cutting. Depending on roof conditions, this may allow the operators to modify the cut sequence so that shields are only advanced downwind of the shearer. Activating shield advance as close to the tailgate drum as possible and keeping jack setters upwind of the advancing shields may protect the jack setters from elevated dust levels by keeping them in a clean air envelope created by the shearer's directional spray system. (NIOSH IC 9517, 2010, p. 34.)

Based on MSHA's experience with and NIOSH's analysis of dust control techniques, MSHA concludes that it is technologically feasible for mine operators to meet the 1.5 mg/m³ standard for longwall underground coal mining operations using existing engineering controls along with proper work practices on each shift.

f. Underground Coal Mining in the Presence of Silica

Some commenters expressed concern about the feasibility of meeting reduced

dust standards due to the presence of silica. The available dust controls discussed previously are effective in reducing the amount of respirable coal mine dust, including silica, in the mine atmosphere. In addition, NIOSH recommends that if roof rock must be cut, it is often beneficial to cut the coal beneath the rock first and then back the continuous mining machine up to cut the remaining rock. This method of cutting leaves the rock in place until it can be cut out to a free, unconfined space, which creates less respirable dust (especially silica dust). (NIOSH IC 9517, 2010, p. 53.) NIOSH also notes that if the continuous mining machine operator works downwind of the roof bolting machine, as much as 25% of the continuous mining machine operator's quartz dust exposure can be attributed to dust from the bolting operation. NIOSH notes that the problem is usually a lack of maintenance of the dust controls on the roof bolting machine. (NIOSH IC 9517, 2010, p. 60.)

4. Economic Feasibility of Complying with the Final Rule

MSHA has traditionally used a revenue screening test—whether the yearly costs of a rule are less than 1 percent of revenues, or are negative (i.e., provide net cost savings)—to establish presumptively that compliance with the regulation is economically feasible for the mining industry. Recent Census Bureau data show that mining in general has operating profits greater than 17 percent of sales and corresponding after tax profits of approximately 10 percent.[58] The Agency believes that with these average profit levels, when the cost of a regulation has less than a 1 percent impact on the affected industry's revenues, it is generally appropriate to conclude that the regulation is feasible.

In estimating costs of a rule, it is important to distinguish between compliance costs (costs that the affected industry incur to comply with the rule) and transfer payments. As a result of additional citations that MSHA estimates will be issued under the final rule, operators will incur penalty payments. Penalty payments are considered transfer payments from the affected party to the Federal government resulting from violations of the final rule; transfer payments are not considered compliance costs. However, transfer payments are important for describing the distributional effects of a rule. Therefore, to determine whether the final rule is economically feasible, MSHA has included as total costs the estimated compliance costs and penalty payments.

Using the screening test noted above, MSHA has concluded that the requirements of the final rule are economically feasible. MSHA estimates that the annualized costs of the final rule, including transfer payments, to underground coal mine operators is $27.1 million ($26.2 million of compliance costs and $0.9 million of penalty payments), which is approximately 0.13 percent of total annual revenue of $20.2 billion ($27.1 million/$20.2 billion) for all underground coal mines.

MSHA estimates that annualized costs of the final rule, including transfer payments, to surface coal mine operators is $4.02 million ($4.0 million of compliance costs and $24,900 of penalty payments), which is approximately 0.02 percent of total annual revenue of $17.9 billion ($4.02 million/$17.9 billion) for all surface coal mines.

5. Conclusion

MSHA has concluded that the final rule is technologically feasible both in terms of sampling respirable dust concentrations with the CPDM and the availability of engineering controls to meet the respirable coal mine dust standards of 1.5 mg/m^3 and 0.5 mg/m^3 for intake air and part 90 miners. The CPDM is accurate, reliable, and ergonomically correct. In addition, current dust levels for most sampled occupations and locations were typically found to be below the applicable standards. Existing engineering controls including ventilation, water sprays and environmentally controlled cabs along with proper work practices can be used to further reduce dust levels. Mine operators are not maintaining optimal dust controls at all times. MSHA and NIOSH both have found instances where air being directed into the mine is lost before it reaches the face due to operators' failing to maintain ventilation controls with proper curtains and stoppings, miners are improperly positioned in the return air, and there is inadequate maintenance, all resulting in excessive dust levels. Correcting existing problems will allow mine operators to further reduce dust levels without having to make substantial additional expenditures in dust controls.

Since the compliance cost estimates for both underground and surface coal mines are below one percent of their estimated annual revenue, MSHA concludes that compliance with the provisions of the final rule will be economically feasible for the coal industry.

IV. Section-by-Section Analysis

A. 30 CFR Part 70—Mandatory Health Standards—Underground Coal Mines

1. Section 70.1 Scope

Final § 70.1, like the proposal, states that part 70 sets forth mandatory health standards for each underground coal mine subject to the Federal Mine Safety and Health Act of 1977, as amended.

MSHA received several comments requesting that the Agency extend the scope of the rule to various facilities, contractors, and contract employees. The final rule, like existing § 70.1, applies to all underground coal mine operators and protects the health of all miners working in underground coal mines.

2. Section 70.2 Definitions

The final rule does not include the proposed definitions for *Weekly Accumulated Exposure* and *Weekly Permissible Accumulated Exposure* that would have applied when operators use a CPDM to collect respirable dust samples under proposed part 70. These two definitions are not needed since the proposed weekly sampling requirements are not included in the final rule.

Act

The final rule, like the proposal, defines Act as the Federal Mine Safety and Health Act of 1977, Public Law 91–173, as amended by Public Law 95–164 and Public Law 109–236.

Active Workings

Final § 70.2, like the proposal, makes no change to the existing definition of active workings.

Approved Sampling Device

The final rule, like the proposal, defines an *approved sampling device* as a sampling device approved by the Secretary and Secretary of Health and Human Services (HHS) under part 74 of this title. Whenever a sampling device is used by operators to comply with the requirements of part 70, the device must be approved for use in coal mines under part 74 (Coal Mine Dust Sampling Devices). MSHA did not receive any comments on the proposed definition and the definition is finalized as proposed.

Certified Person

Final § 70.2 makes nonsubstantive changes to the existing definition of certified person. It does not include the

[58] Most recent Census Bureau data can be found at *http://www2.census.gov/econ/qfr/current/mmw1.xls* on the line for Mining.

parenthetical text following the references to §§ 70.202 and 70.203.

Coal Mine Dust Personal Sampler Unit (CMDPSU)

The final rule, like the proposal, defines a coal mine dust personal sampler unit (CMPDSU) as a personal sampling device approved under 30 CFR part 74, subpart B. This definition is included to distinguish between the two types of coal mine dust monitoring technology approved under part 74 and to clarify the applicability of the final rule to each approved sampling device. The existing gravimetric sampling device used by operators is a CMDPSU. MSHA did not receive any comments on the proposed definition and the definition is finalized as proposed.

Concentration

Final § 70.2, like the proposal, makes no change to the existing definition of concentration.

Continuous Personal Dust Monitor (CPDM)

The final rule, like the proposal, defines a *continuous personal dust monitor* as a personal sampling device approved under 30 CFR part 74, subpart C. This definition is included to distinguish between the two types of coal mine dust monitoring technology approved under part 74 and to clarify the applicability of the final rule to each approved sampling device. MSHA did not receive any comments on the proposed definition and the definition is finalized as proposed.

Designated Area (DA)

The final rule is similar to the proposal. It defines *designated area* (DA) as a specific location in the mine identified by the operator in the mine ventilation plan under § 75.371(t) of this title where samples will be collected to measure respirable dust generation sources in active workings; approved by the District Manager; and assigned a four-digit identification number by MSHA. The proposal would have defined the DA as an area of a mine identified by the operator in the mine ventilation plan. The final definition includes a specific reference to § 75.371(t). This is consistent with the existing definition. In addition, like the proposal, the definition includes language from existing § 70.208(e) regarding how DAs are denoted. MSHA did not receive any comments on the proposed definition.

Designated Occupation

Final § 70.2 includes a nonsubstantive change to the existing definition of designated occupation. It includes the abbreviation MMU for mechanized mining unit.

District Manager

Final § 70.2, like the proposal, makes no change to the existing definition of District Manager.

Equivalent Concentration

The final rule is changed from the proposal. Under the final rule, equivalent concentration is defined as the concentration of respirable coal mine dust, including quartz, expressed in milligrams per cubic meter of air (mg/m^3) as measured with an approved sampling device, determined by dividing the weight of dust in milligrams collected on the filter of an approved sampling device by the volume of air in cubic meters passing through the filter (sampling time in minutes (t) times the sampling airflow rate in cubic meters per minute), and then converting that concentration to an equivalent concentration as measured by the Mining Research Establishment (MRE) instrument. When the approved sampling device is:

(1) The CMDPSU, the equivalent concentration is determined by multiplying the concentration of respirable coal mine dust by the constant factor prescribed by the Secretary.

(2) The CPDM, the device shall be programmed to automatically report end-of-shift concentration measurements as MRE-equivalent concentrations.

Like the proposal, the introductory paragraph in the definition under the final rule provides that dust concentration measurements from an approved sampling device will be converted to MRE-equivalent concentrations. Unlike the proposal, the final rule includes quartz in the definition as that is also an adjusted MRE-equivalent concentration. Also, the final definition, unlike the proposal, does not adjust the MRE-equivalent concentration for shifts longer or shorter than 8 hours to an 8-hour equivalent concentration.

Final paragraph (1), like the proposal, applies when the approved sampling device is the CMDPSU and is derived from existing § 70.206 which describes converting a concentration of respirable dust as measured with the CMDPSU. For the CMDPSU, the constant factor is 1.38. This compensates for the difference in the dust collection characteristics and makes the measurements equivalent to what would be obtained using an MRE instrument.

Final paragraph (2) of the definition applies when the approved sampling device is the CPDM. It states that when using the CPDM, the device must be programmed to automatically report end-of-shift concentration measurements as MRE-equivalent concentrations.

The manufacturer's programming will use the constant factor determined by the Secretary for HHS specific to this approved sampling device to provide an MRE-equivalent concentration.

MSHA acknowledges that working conditions for miners have changed in recent decades with the result that miners, on average, work longer hours over the course of a shift, week, year and/or lifetime. In an attempt to address the additional exposure that comes from such a change in working conditions, the proposal would have required the respirable coal mine dust sample results to be expressed in terms of an 8-hour equivalent concentration for shifts longer than 8 hours, regardless of how many hours the miners worked over the course of a week, a month, or a lifetime to capture the effect of longer shifts. In addition, MSHA requested comment on the recommendation in the 1995 NIOSH Criteria Document to lower exposure to 1.0 mg/m^3 for up to a 10-hour work shift over a 40-hour workweek.

Some commenters stated that the effect of the 8-hour conversion would be that, for miners working the same number of hours per week, miners who worked 8 hours could be exposed to more respirable dust than miners who worked longer shifts. One commenter pointed out that, for the same 40-hour week, a miner working five 8-hour shifts could be exposed to more dust than a miner working four 10-hour shifts. Some of the commenters expressed concern that the 8-hour conversion, when applied to shift lengths of 10 or 12 hours, would result in concentration limits well below the 8-hour concentration limit. They stated that this would force them to reduce the lengths of their shifts in order to comply with the limit, decreasing the efficiency of their mines. Another commenter stated that the 8-hour conversion formula was too complicated and confusing for miners who work extended shifts and that miners would not be able to figure out their exposure limits. The commenter stated that they appreciated the Agency taking into account the fact that most miners work more than an 8-hour shift, but urged MSHA to adopt a simplified approach.

MSHA reviewed its data on shift length and hours worked. The data show that the majority of miners currently work longer than 40 hours per

week, whether they are working 8-hour shifts or longer shifts. The data also show that some miners are working 8-hour shifts 6 days per week, while some miners are working 10-hour shifts 4 or 5 days per week.

MSHA also reviewed the available data on health outcomes as a function of the respirable dust dose over a single shift. As stated above in the discussion regarding the QRA, the data show disease causation with long-term exposures. As noted in NIOSH's CIB, ''although no epidemiologic data exists that implicate longer hours as a contributory causative factor for CWP, working longer hours leads to the inhalation of more dust into the lungs.'' However, as stated above, shift length cannot predict the number of hours miners are exposed to respirable coal mine dust in the long-term. While it is possible that shift length could contribute to disease, the available evidence is insufficient to support a linkage at this time. As such, MSHA believes that the link between longer shifts and resulting disease requires further examination and study. MSHA did not receive comments to support this linkage.

After consideration of the relevant data and in response to comments, MSHA believes a concentration limit, with sampling performed for a full shift, is the most appropriate approach to account for the longer total exposure to which miners now on average are exposed. MSHA believes that this approach, which captures increased exposures regardless of shift length, accomplishes some of the purpose of the 8-hour equivalent concentration. Accordingly, MSHA has not included the conversion to an 8-hour concentration in the final ''equivalent concentration'' definition. By not including the 8-hour conversion in the final rule, MSHA is preserving the status quo. However, the final rule requires operators to sample during the entire shift that a miner works and is exposed to respirable coal mine dust, even if the shift exceeds 8 hours. Full-shift sampling will provide additional health protection over and above what is currently provided for miners who work longer than 8-hour shifts.

In the future, MSHA intends to evaluate samples taken on shifts longer than 8 hours, additional studies, data, literature, and any other relevant information to determine whether an 8-hour equivalent concentration is necessary to protect miners who work longer shifts.

Mechanized Mining Unit (MMU)

The final definition of a mechanized mining unit (MMU) is clarified from the proposal. It is defined as a unit of mining equipment including hand loading equipment used for the production of material; or a specialized unit which uses mining equipment other than specified in § 70.206(b) or in § 70.208(b) of this part. It further provides that each MMU will be assigned a four-digit identification number by MSHA, which is retained by the MMU regardless of where the unit relocates within the mine. It also provides that when:

(1) Two sets of mining equipment are used in a series of working places within the same working section and only one production crew is employed at any given time on either set of mining equipment, the two sets of equipment shall be identified as a single MMU.

(2) Two or more sets of mining equipment are simultaneously engaged in cutting, mining, or loading coal or rock from working places within the same working section, each set of mining equipment shall be identified as a separate MMU.

Several commenters stated that the proposed definition was confusing and unclear or that it conflicted with the requirements of proposed § 75.332 pertaining to working sections and working places. In response to these comments, the final definition includes several clarifications. The definition includes references to final § 70.206(b) concerning bimonthly sampling and § 70.208(b) concerning quarterly sampling to clarify when a specialized unit is an MMU, i.e., when directed by the District Manager in accordance with §§ 70.206(b) or 70.208(b). The proposed definition included a reference to § 70.207(b), which is redesignated in the final rule.

The definition also includes the statement that the four-digit identification number is retained by the MMU ''regardless of where the unit relocates in the mine.'' This language is similar to the existing sampling requirements for MMUs under § 70.207(f)(1), which contains identical language.

Paragraphs (1) and (2) further clarifies that two sets of equipment will be identified as a single MMU when only one production crew is employed ''at any given time on either set of mining equipment'' or when two sets of mining equipment are ''simultaneously engaged in cutting, mining, or loading coal or rock from working places.'' Paragraphs (1) and (2) are similar to the existing sampling requirements for MMUs under § 70.207(f)(2), which contains similar language.

MRE Instrument

Final § 70.2, like the proposal, makes no change to the existing definition of MRE instrument.

MSHA

Final § 70.2, like the proposal, makes no change to the existing definition of MSHA.

Normal Production Shift

The final rule is changed from the proposal. It defines *normal production shift* as a production shift during which the amount of material produced by an MMU is at least equal to 80 percent of the average production recorded by the operator for (1) the most recent 30 production shifts or (2) for all production shifts if fewer than 30 shifts of production data are available.

The proposal would have defined normal production shift as the amount of material produced by an MMU that is at least equal to the average production recorded by the operator for the most recent 30 production shifts or for all production shifts if fewer than 30 shifts of production data are available.

Several commenters supported the proposed definition, agreeing that exposure monitoring should be conducted during shifts that represent typical production levels. One commenter added that the proposed definition would fix a loophole that permits operators to sample for compliance with the respirable dust standard when production is very low. The commenter added that sampling under the proposed definition would result in a better understanding of the exposures occurring under normal operating conditions.

Other commenters expressed a variety of concerns, most related to the variability of production and feasibility of reaching the minimum production level contained in the proposal. They indicated that the proposed production level was too high and, as a result, more operator samples would be considered invalid and voided, and more sampling would be needed. Some of these commenters noted that dynamic factors such as equipment breakdowns or variable mining conditions could cause fluctuations in production, resulting in the sampled shifts not meeting the proposed definition. One commenter stated that the number of needed samples would probably double as a result of the averaging period and the required tonnage. Another commenter stated that 50 percent of the company's production shifts would not meet the

proposed definition. This same commenter recommended that ''normal production shift'' be defined as 80 percent of the prior 30-shift average production, while another commenter suggested that MSHA should consider using 75 percent of the prior 30 days' average to reduce the number of invalid samples.

MSHA has considered all comments received and the concerns expressed regarding the feasibility of reaching the proposed minimum production level. In response, MSHA has changed the production level in the final *normal production shift* definition to 80 percent. The purpose for defining normal production shift is to achieve reliable measurements of miners' day-to-day exposures to respirable coal mine dust that occur during production under normal mining conditions. It is important for miner health and safety that operator sampling occur during shifts that represent typical production and mining conditions on the MMU. The level of coal production has a significant impact on dust generation. As production increases, the amount of generated respirable coal mine dust also increases. Samples that are collected on shifts when production is much less than what generally occurs cannot reflect typical dust concentration levels to which miners are exposed or normal mining activity on the MMU. Such measurements underestimate miners' typical dust exposures. Under the existing definition, operators are required to sample when production is at least 50 percent of the average production reported during the operator's last sampling period (i.e., last set of five valid samples). The existing 50 percent production level is not representative of typical dust concentration levels under normal mining conditions.

The Dust Advisory Committee recommended that respirable dust samples be taken when production is sufficiently close to normal production, which it stated should be defined as 90 percent of the average production of the last 30 production shifts.

In its 1995 Criteria Document, NIOSH recommended that, consistent with standard industrial hygiene practice (which requires exposure measurements be collected during typical work shifts), for a production shift to be considered a ''normal production shift,'' it must produce at least 80 percent of the average production over the last 30 production shifts. NIOSH further stated that a production-level threshold should ensure that exposure conditions are comparable between sampled and unsampled shifts.

The final 80 percent production level responds to commenters' concerns, is the same as the recommendation in the 1995 NIOSH Criteria Document, and is consistent with the 1996 Dust Advisory Committee Report. It is also consistent with MSHA's longstanding practice that MSHA inspectors' respirable dust samples be collected when production is at least 80 percent of the average of the previous 30 production shifts. The 80 percent production level under the final definition reflects typical conditions under which miners work, particularly in combination with the final rule's requirement that operators sample miners during the entire time that miners work, which is discussed elsewhere in the preamble related to § 70.201(c). The final definition is more protective of miners than the existing definition.

Like the existing operator sampling program, if a ''normal production shift'' is not achieved, MSHA may void the sample collected during that shift. MSHA recognizes that under the final rule, the total number of required operator samples to be collected on the MMU will increase from that required under the existing standards. However, as discussed elsewhere in the preamble related to § 70.206(d), a valid equivalent concentration measurement that exceeds the standard by at least 0.1 mg/m^3, even when production is lower than the 80 percent threshold, will be used to determine the equivalent concentration for that MMU.

Under existing practice, if an operator encounters unique mining conditions that reduce production, such as when the coal seam narrows due to a rock intrusion running through the coal bed, MSHA allows the operator to submit any relevant information to the District Manager so that average production levels can be adjusted to ensure samples are considered valid in that they represent current, normal mining conditions. This practice provides sufficient flexibility to account for unique fluctuations in the mining process. Under the final rule, MSHA will continue this practice.

Like the proposal, the final rule retains the proposed time period, that is, the most recent 30 production shifts, in determining whether a production shift is considered a *normal production shift.*

During the comment period, MSHA requested comment from the mining community on whether the average of the most recent 30 production shifts would be representative of dust levels to which miners are typically exposed. This request was made in the preamble to the proposed rule, the Agency's opening statements at the public hearings, and a **Federal Register** notice (76 FR 12649, March 8, 2011). MSHA did not receive any comments on this proposal.

MSHA considers the time frame in the existing definition, which requires samples to be collected for the ''last 5 valid samples,'' to be inadequate and not a representative period that reflects typical production. MSHA's existing practice for inspector sampling is to use 30 production shifts as a time period for establishing typical production. Based on agency experience and as stated in the proposed rule, using 30 production shifts provides sufficient historical data to give a reliable representation of an MMU's typical production. Averaging production over the 30 production shifts, instead of the last 5 valid samples, accounts for any fluctuations in mining cycles, including those in which production is higher than usual. In addition, both the 1995 NIOSH Criteria Document and 1996 Dust Advisory Committee Report recommended that the last 30 production shifts be used as the benchmark to gauge production levels.

Also, the final definition, like the proposal, requires that when an MMU has operated for fewer than 30 production shifts, the average production of all production shifts would be considered to determine a ''normal production shift.'' MSHA did not receive comments on this proposed provision and it is finalized as proposed. MSHA believes it is essential to use records from all of an MMU's production shifts when it has operated for fewer than 30 shifts because this would result in the most reliable determination of the MMU's production and a miner's exposure.

One commenter who did not support the proposed definition expressed concern that operators would have to track more production shifts in order to meet the required production level. Comments on the production records required to be made to establish a ''normal production shift'' are discussed elsewhere in the preamble related to final § 70.201(g).

Finally, some commenters suggested that the definition of ''normal production shift'' could be eliminated by using personal samples to measure miner's actual exposure since it would not matter what the production was during the sampling period. Comments on personal sampling are discussed elsewhere in the preamble related to final § 70.201.

Other Designated Occupation (ODO)

The final rule includes nonsubstantive changes from the

proposal. It defines other designated occupation (ODO) as an occupation on a mechanized mining unit (MMU) that is designated for sampling required by part 70 in addition to the DO. It further provides that each ODO will be identified by a four-digit identification number assigned by MSHA.

MSHA received one comment related to the proposed definition. The commenter requested that MSHA consider personal sampling of miners in lieu of sampling the ODOs. MSHA has addressed this comment elsewhere in the preamble under final § 70.201. The final rule, consistent with the Mine Act, requires environmental sampling to accomplish the objective of controlling respirable dust to protect the health of miners. The definition of ODO is finalized as proposed.

Production Shift

Final § 70.2 includes nonsubstantive changes to the existing definition of production shift. It includes the abbreviations MMU for mechanized mining unit and DA for designated areas.

Quartz

The final rule is changed from the proposal. It retains the existing definition of quartz, which is defined as crystalline silicon dioxide (SiO_2) not chemically combined with other substances and having a distinctive physical structure.

The proposal would have defined *quartz* to mean crystalline silicon dioxide (SiO_2) as measured by: (1) MSHA Analytical Method P–7: Infrared Determination of Quartz in Respirable Coal Mine Dust; or (2) Any method approved by MSHA as providing a measurement of quartz equivalent to that obtained by MSHA Analytical Method P–7.

MSHA received one comment on the proposed definition. The commenter expressed concern regarding notice of any analytical measurement method that MSHA could approve as equivalent to Analytical Method P–7. In response, MSHA has concluded that a change in the proposed definition is not necessary because the existing Analytical Method P–7 used in determining the amount of quartz in respirable coal mine dust (U.S. Department of Labor, MSHA, 2011) is sufficient.

Representative Sample

The final rule defines representative sample as a respirable dust sample, expressed as an equivalent concentration, that reflects typical dust concentration levels and (1) with regard to an MMU, normal mining activities in the active workings during which the amount of material produced is equivalent to a normal production shift; or (2) with regard to a DA, when material is produced and routine day-to-day activities are occurring.

The proposed rule would have defined ''representative sample'' as a respirable dust sample that reflects typical dust concentration levels and normal mining activity in the active workings during which the amount of material produced is equivalent to a normal production shift. The final definition differs from the proposed definition in two ways. First, the final definition adds the language, ''expressed as an equivalent concentration'' to clarify that each respirable dust sample measurement must be converted to an MRE-equivalent concentration as defined under this final § 70.2. Second, similar to the existing definition of ''production shift'' in § 70.2, the final definition distinguishes between a representative sample for an MMU and a representative sample for a DA. To avoid confusion and to distinguish a representative sample on an MMU from one in the DA, the final definition clarifies that, for a DA, the representative sample is based on a shift during which material is produced and routine day-to-day activities are occurring in the DA. The definition for a DA is the same as the existing definition which does not take into account the amount of material produced.

MSHA received one comment related to the proposed definition. The commenter stated that there was no need to define representative samples and that MSHA should modify its sampling methodology such that personal samples, rather than occupational samples, are taken.

With respect to the commenter's recommendation that MSHA replace the occupational sampling methodology with personal sampling, MSHA addresses this comment elsewhere in the preamble under final § 70.201. In addition, the definition for representative sample ensures that respirable dust samples accurately reflect the amount of dust to which miners are exposed. Without a definition, operators could perform sampling at times that do not represent typical production which would under-represent, or bias, miners' dust exposures. Operator sampling must be conducted when miners are in positions and physical locations performing the same tasks that they perform on non-sampling days to constitute representative samples. To be considered a representative sample, operators should ensure that sampling occurs when mining activities, such as production methods, reflect that of non-sampling days (e.g., when approved cut sequences are followed, and the sequence of mining includes the turning of multiple crosscuts). The final definition of representative samples will provide protection for miners' health by allowing MSHA to accurately evaluate the functioning of operators' dust controls and the adequacy of operators' approved plans.

Respirable Dust

The final rule makes a nonsubstantive change to the existing definition of respirable dust. It defines respirable dust as dust collected with a sampling device approved by the Secretary and the Secretary of HHS in accordance with part 74 (Coal Mine Dust Sampling Devices) of this title. The final definition deletes from the existing definition, ''Sampling device approvals issued by the Secretary of the Interior and Secretary of Health, Education, and Welfare are continued in effect,'' because it is not needed. Approved sampling devices are approved by MSHA and NIOSH under 30 CFR part 74.

Secretary

The final rule makes a nonsubstantive change to the existing definition of Secretary. It defines Secretary as the Secretary of Labor or a delegate. It includes the gender neutral term ''a'' delegate rather than the existing term ''his'' delegate.

Valid Respirable Dust Sample

For clarification, the final rule revises the definition under existing § 70.2 for a *valid respirable dust sample* to mean a respirable dust sample collected and submitted as required by this part, including any sample for which the data were electronically transmitted to MSHA, and not voided by MSHA.

The final definition adds language to clarify that for CPDM samples, the data files are ''electronically'' transmitted to MSHA, and not physically transmitted like samples collected with the CMDPSU. The proposed rule did not include this clarification.

3. Section 70.100 Respirable Dust Standards

Final § 70.100(a) is changed from the proposal. It requires that each operator continuously maintain the average concentration of respirable dust in the mine atmosphere during each shift to which each miner in the active workings of each mine is exposed, as

measured with an approved sampling device and expressed in terms of an equivalent concentration, at or below: (1) 2.0 milligrams of respirable dust per cubic meter of air (mg/m^3); and (2) 1.5 mg/m^3 as of August 1, 2016.

Final paragraph (a)(1) is the same as proposed paragraph (a)(1). It retains the existing standard of 2.0 mg/m^3 on the effective date of this final rule. Final paragraph (a)(2) is redesignated from proposed paragraph (a)(3) and changes the date on which the 1.5 mg/m^3 standard is effective from the proposed 12 months to 24 months after the effective date of the final rule.

Unlike proposed paragraph (a)(2) and (a)(4), the final rule does not require that the standard be lowered to 1.7 mg/m^3 6 months after the effective date of the final rule, or to 1.0 mg/m^3 24 months after the effective date of the final rule.

MSHA proposed the 1.0 mg/m^3 standard in accordance with Section 101(a)(1) of the Mine Act, 30 U.S.C. 811(a)(1). Section 101(a)(1) of the Mine Act requires that the Secretary take certain action when a recommendation to issue a rule, accompanied by a Criteria Document, is received from NIOSH. The Secretary must refer the recommendation to an advisory committee, or publish the recommendation as a proposed rule, or publish in the **Federal Register** the determination and reasons not to do so.

In 1995, NIOSH published and submitted to MSHA a Criteria Document on *Occupational Exposure to Respirable Coal Mine Dust.* Consistent with Section 101(a)(1) of the Mine Act, the Secretary referred the NIOSH Criteria Document to an advisory committee (Dust Advisory Committee).

In the Criteria Document, NIOSH recommended that respirable dust exposures be limited to 1.0 mg/m^3 as a TWA concentration for up to 10 hours per day during a 40-hour work week as measured according to existing MSHA methods. This recommended exposure level (REL) was based on exposure-response studies of U.S. coal miners participating in the National Coal Workers' Health Surveillance Program (NCWHSP) and sampling data collected by the Bureau of Mines from 1969–1971 and MSHA from 1985–1988. NIOSH used an average concentration of 0.5 mg/m^3 of respirable dust in its disease risk estimates because, at that time, it constituted the lower range of the exposure data. NIOSH determined that extrapolations beyond the range of the existing exposure data would have carried considerable uncertainty. NIOSH found that, at a mean concentration of 0.5 mg/m^3, the excess risk of morbidity from progressive massive fibrosis at age 65 exceeded 1/1,000 for all durations of exposure and coal ranks evaluated, including 15 years of exposure to medium/low-rank coal, believed to be least toxic. NIOSH expected that long-term average dust concentrations would be below 0.5 mg/m^3 if miners' daily exposures were kept below the recommended exposure limit (REL) of 1.0 mg/m^3 (NIOSH 1995). NIOSH also recommended that the 1.0 mg/m^3 REL should apply to surface coal mines.

In 1996, the Dust Advisory Committee also recognized that overexposure to respirable coal mine dust remained a problem and recommended unanimously that MSHA consider lowering the allowable level of exposure to coal mine dust. The Committee reviewed MSHA monitoring data and scientific studies provided by NIOSH, including the NIOSH 1995 Criteria Document. The Committee concluded that

> there is substantial evidence that either a significant number of miners are currently being exposed to coal mine dust at levels well in excess of 2.0 mg/m^3 or that the current exposure limit for coal mine dust is insufficiently protective.

MSHA's QRA to the proposed rule used respirable dust exposure data collected from 2004 through 2008 and published quantitative studies on coal workers' morbidity from black lung (Attfield and Seixas, 1995), mortality from nonmalignant respiratory diseases (Attfield and Kuempel, 2008) and severe emphysema (Kuempel et al., 2009a) to estimate excess disease risks in U.S. miners. The QRA estimated disease risks after 45 years of single-shift occupational exposure at exposure levels under the existing standard. The QRA results indicated that, in every exposure category, exposure under the existing standards places miners at a significant risk of material impairment of health. In addition, MSHA found that average dust concentrations exceed the proposed respirable dust standard of 1.0 mg/m^3 at a number of work locations in every occupational category. The percentage of work locations that would exceed the proposed respirable dust standard of 1.0 mg/m^3 ranges from less than 1 percent for a few surface occupations to more than 70 percent for miners working on the longwall tailgate. The percentages are generally greater for underground occupations than for surface occupations. A statistically significant percentage of surface work locations (generally cleaning plant operations and surface drilling) have average dust concentrations exceeding the proposed exposure standard. For part 90 miners, the average dust concentration exceeds the proposed standard of 0.5 mg/m^3 at more than 20 percent of the work locations.

On March 8, 2011, MSHA issued a **Federal Register** notice (76 FR 12648) requesting comments on the proposed respirable dust concentration limits and requested alternatives. In addition, MSHA stated that the Agency received comments that some aspects of the proposed rule may not be feasible for particular mining applications and that MSHA is interested in comments.

MSHA received many comments on the proposed 1.0 mg/m^3 standard and the proposed phase-in periods of 24 months for the proposed 1.0 mg/m^3 standard and 12 months for the proposed 1.5 mg/m^3 standard. Many commenters supported the proposed 1.0 mg/m^3 standard. Other commenters suggested that MSHA, NIOSH, industry, and labor conduct a nationwide study using the CPDM to determine what dust concentrations are protective and achievable. MSHA intends to conduct a retrospective study that evaluates the 1.5 mg/m^3 respirable dust standard to determine if the standard should be further lowered to protect miners' health.

The final rule responds to commenters' concerns by establishing feasible dust standards and a uniform, longer 24-month implementation date for the final respirable coal mine dust standards. In addition, the final 1.5 mg/m^3 standard affirms MSHA's initial determination, set out in the proposal, that exposures at existing respirable dust levels are associated with coal workers' pneumoconiosis (CWP), chronic obstructive pulmonary disease (COPD) including severe emphysema, and death due to non-malignant respiratory disease (NMRD). All of these outcomes constitute material impairments to a miner's health or functional capacity. However, the final 1.5 mg/m^3 standard comports with MSHA's initial conclusion in the preamble to the proposed rule that some mine operators may encounter engineering control implementation issues as they attempt to comply with the proposed 1.0 mg/m^3 standard.

The final 1.5 mg/m^3 standard is projected to have a greater impact on risk for underground miners than for surface miners. Surveillance and exposure data have been collected on U.S. underground coal miners for over 40 years; there are few comparable studies on surface coal miners. The QRA to the final rule shows that surface work locations exceed the final 1.5 mg/m^3 standard on relatively few shifts and that the final 1.5 mg/m^3 standard is

projected to have relatively little impact for surface workers who are exposed to average concentrations below 0.5 mg/m³. However, the data also show that certain surface occupations are exposed to concentrations of respirable dust exceeding the final 1.5 mg/m³ standard. Table 28 of the QRA for the final rule contains more details on the projected reduction in the health risks for each occupational category.

The final 1.5 mg/m³ and 0.5 mg/m³ standards and single shift sampling evaluated in the QRA for the final rule, and other requirements of the final rule will reduce respirable dust levels for miners. These other requirements include: (1) Sampling for a full shift, (2) changing the definition of normal production shift, (3) requiring the use of CPDMs for sampling, (4) revising the sampling program, (5) requiring more timely corrective action on a single, full-shift operator sample, (6) changing the averaging method to determine compliance on operator samples, and (7) requiring records of on-shift examinations and corrective actions taken to assure compliance with the respirable dust control parameters. Collectively, MSHA expects these requirements will reduce respirable dust levels that miners face, further protect miners from the debilitating effects of occupational respiratory disease, and result in improvements that would be greater than those shown in Table 28.

MSHA will continue to examine closely the 1.5 mg/m³ standard. This will include evaluation of miners' exposure to respirable coal mine dust under exposure hours that are in excess of 8 hours per shift, changes to the definition of normal production shift, and while using a CPDM. MSHA intends to work closely with all segments of the mining community in its continuing assessment of the 1.5 mg/m³ standard to determine whether the final rule achieves MSHA's goals to lower and maintain respirable dust levels to protect miners' health.

MSHA gave serious consideration to establishing a 1.0 mg/m³ standard, as proposed, based on its determination that there is a significant risk to miners of material impairment of health when exposures meet or exceed the proposed standard. MSHA has concluded, however, that additional sampling and experience may be warranted for underground coal mines while other provisions of the final rule are in effect, including full-shift sampling, the revised definition of normal production shift, and use of the CPDM, and that comparable experience is warranted for surface coal mines, before considering a standard lower than 1.5 mg/m³.

MSHA's technological feasibility analysis of the 1.5 mg/m³ standard and comments on the technological feasibility of the proposed 1.0 mg/m³ standard are discussed elsewhere in this preamble under Section III.C., concerning the Technological Feasibility of Achieving the Required Dust Standards.

Some commenters stated that the proposed 1.0 mg/m³ standard is not based on the best available evidence but rather is based on faulty science and medical data. These comments and the underlying evidence, science, and medical data in support of the final 1.5 mg/m³ standard are addressed in Section III.A. of this preamble, concerning Health Effects.

Some commenters stated their calculations showed that, as opposed to fewer than 200 citations per year for violations of the current 2.0 mg/m³ standard, a 1.0 mg/m³ standard based on a single, full-shift measurement could result in more than 230,000 citations annually. In addition, some commenters stated that MSHA failed to consider that each violation would require abatement, a penalty, and mine plan amendments, and would likely result in mine interruptions until plan approvals can be obtained and abatement accomplished. Some commenters also stated that MSHA overestimated the number of citations for excessive dust that would be issued under the proposed rule. They anticipated that a citation would be issued for every sample that met or exceeded the ECV and for every sample that met or exceeded the WPAE (weekly permissible accumulated exposure). As clarified by MSHA at the final public hearing, it was never the Agency's intent to issue multiple citations for excessive dust on single samples taken for the same entity and also issue a citation when the WPAE was exceeded. Based on MSHA's evaluation of public comments and changes included in the final rule, MSHA has revised its projections for the number of citations that will be issued for excessive dust as a result of the final rule; these projections are discussed in Appendix A of the REA.

Regarding the proposed phase-in periods, some commenters stated that if black lung is a problem, then the Agency needs to act quickly. Other commenters stated that lowering the standard within these time periods was not achievable and asked for more time. The 24-month implementation date for the final 1.5 mg/m³ standard will allow the mining community the opportunity to identify and implement feasible engineering controls; train miners and mine management in new technology and control measures; and improve their overall dust control program. The Dust Advisory Committee unanimously recommended a phase-in period for any reduction to the existing standard. MSHA believes that 24 months will provide an appropriate amount of time for mine operators to feasibly come into compliance with the final respirable dust standard.

A few commenters stated that the results of respirable dust sampling suggest that the average dust concentration in many District 1 mines is under the proposed 1.0 mg/m³ standard. These commenters requested that anthracite mines be exempt from the final rule since overexposure to respirable dust above 1.0 mg/m³ is not a problem in these mines for various reasons: Low production, work shifts over 7 hours/day are not common, and the mines are very wet.

In response, MSHA's QRA for the final rule identifies NMRD mortality hazards not only for anthracite, but also for regions identified with high rank bituminous and low rank coal. Therefore, anthracite mines are not exempt from the dust standards in the final rule. Additional discussion on the health effects from exposure to respirable coal dust in anthracite mines is in Section III.B. of this preamble concerning the QRA.

Final § 70.100(b), is substantially the same as proposed § 70.100(b). It requires that each operator must continuously maintain the average concentration of respirable dust within 200 feet outby the working faces of each section in the intake airways, as measured with an approved sampling device and expressed in terms of an equivalent concentration at or below: (1) 1.0 mg/m³, and (2) 0.5 mg/m³ as of August 1, 2016.

Final paragraph (b)(1), like the proposal, requires that each operator maintain the concentration of respirable coal mine dust at or below 1.0 mg/m³. This standard is consistent with existing § 70.100(b).

Final paragraph (b)(2), like the proposal, requires that each operator maintain the concentration of respirable coal mine dust at or below 0.5 mg/m³ but, in response to comments, MSHA changed the implementation period from the proposed 6-month period to 24 months after the effective date of the final rule.

Proposed § 70.100(b)(2) would have provided a 6-month period for lowering the respirable dust standard in intake airways. MSHA proposed a 6-month period for the 0.5 mg/m³ standard because, based on Agency data for these

areas of the mine, MSHA believed this period would have provided an appropriate amount of time for mine operators to feasibly come into compliance. The proposed 6-month period for the proposed 0.5 mg/m³ standard was independent of proposed § 70.100(a)(2) regarding a 6-month period for the proposed 1.7 mg/m³ interim standard.

During the public comment period, MSHA solicited comment on the proposed phase-in period for lowering the dust standard for intake air courses. Commenters expressed concern that the proposed 6-month period was not sufficient for mine operators to develop, implement, and assess control measures necessary to meet the proposed 0.5 mg/m³ standard. In response to these comments, in the final rule MSHA changed the proposed 6-month period to 24 months after the effective date of the rule. The 24-month period is consistent with the period in final paragraph (a)(2). Like the 24-month period in final paragraph (a)(2), it will allow mine operators sufficient time to comply with the final 0.5 mg/m³ standard in paragraph (b)(2).

One commenter stated that sampling within 200 feet outby the working face is too close to locate the measuring point and that the best location to sample intake air is in the intake air course opposite the loading point.

MSHA has historically required that a lower dust standard be maintained in intake airways within 200 feet of the working faces (45 FR 23990, April 8, 1980). The purpose of the existing respirable dust standard for intake air is to ensure that the air ventilating working faces is sufficiently uncontaminated to assist in controlling respirable dust at the working faces (45 FR 23994). The final 0.5 mg/m³ standard will ensure that intake air ventilating the working faces is sufficiently clean before it reaches the working faces where major dust generating sources are located and where miners work. The required location of the sampling point, within 200 feet of the working face, is consistent with existing § 70.100, which has been in existence since 1980. The location provides an accurate sampling point for measuring respirable dust in intake airways. Similarly, under the final rule, maintaining the average concentration of respirable dust within 200 feet outby the working faces of each section in the intake airways at or below 0.5 mg/m³ ensures that relatively clean air is used to ventilate the face and where miners work. The lower standard will improve health protection for miners. Also, maintaining the lower dust level using available engineering controls makes it more likely that an operator can maintain compliance with respirable dust standards in the MMU.

One commenter stated that the proposed 0.5 mg/m³ standard is unattainable. MSHA has concluded that this standard is feasible. Of the more than 8,200 samples taken by MSHA inspectors in underground coal operations during 2008 and 2009, less than 6% exceeded 0.5 mg/m³. The feasibility of the 0.5 mg/m³ standard is discussed in more detail elsewhere in this preamble under Section III. C., concerning the Technological Feasibility of Achieving the Required Dust Standards.

One commenter suggested that the rock dust application requirements of the Emergency Temporary Standard published in September 2010 (75 FR 57849) and finalized in June 2011 (76 FR 35968) affect the levels of respirable dust in the intake airway to which miners are exposed and would make compliance with the proposed standard problematic. This comment is addressed elsewhere in this preamble under § 70.101.

4. Section 70.101 Respirable Dust Standard When Quartz is Present

Final § 70.101(a), like proposed § 70.101(a), requires that each operator must continuously maintain the average concentration of respirable quartz dust in the mine atmosphere during each shift to which each miner in the active workings of each mine is exposed at or below 0.1 mg/m³ (100 micrograms per cubic meter of air or μg/m³) as measured with an approved sampling device and expressed in terms of an equivalent concentration.

Final § 70.101(b), like proposed § 70.101(b), requires that when the equivalent concentration of respirable quartz dust exceeds 100 μg/m³, the operator must continuously maintain the average concentration of respirable dust in the mine atmosphere during each shift to which each miner in the active workings is exposed as measured with an approved sampling device and in terms of an equivalent concentration at or below the applicable respirable dust standard. It also states that the applicable dust standard is computed by dividing the percent of quartz into the number 10. It further requires that the application of this formula must not result in an applicable dust standard that exceeds the standard established by § 70.100(a).

Some commenters stated that they supported a separate standard for silica to better protect miners. One commenter suggested that MSHA develop a program to reduce miners' exposures to silica that would include training, engineering and administrative controls, and respiratory protection. Some commenters who supported a separate silica standard did not support the proposal which would reduce the respirable coal mine dust standard when silica is present. Some of these commenters stated that the proposed formula should be changed and should be based on the percentage of quartz as a percentage of the standard rather than a percentage of the total weight of the sample. In addition, some of these commenters stated that it may not be feasible for certain mining operations to continue to operate if they are on a reduced respirable dust standard that could be as low as, or lower than, 0.5 mg/m³.

Final § 70.101(a) and (b), like the proposal, do not change the existing respirable dust standard when quartz is present and is consistent with existing § 70.101. Existing § 70.101 protects miners from exposure to respirable quartz by requiring a reduced respirable dust standard when the respirable dust in the mine atmosphere of the active workings contains more than 5 percent quartz. Existing § 70.101 is based on a formula that was prescribed by the Department of Health, Education and Welfare (now DHHS). The formula, which applies when a respirable coal mine dust sample contains more than 5.0 percent quartz, is computed by dividing 10 by the concentration of quartz, expressed as a percentage. The formula results in a continuous reduction in the respirable dust standard as the quartz content of the respirable dust increases over 5 percent (i.e., the higher the percentage of quartz, the lower the reduced respirable dust standard).

The standard in final paragraph (a) is based on the formula in existing § 70.101. Final paragraph (a), like existing § 70.101, is designed to limit a miner's exposure to respirable quartz to 0.1 mg/m³ (100 μg/m³-MRE), based on the existing 2.0 mg/m³ respirable dust standard.

The question of revising the existing respirable dust standard when quartz is present by establishing a separate standard for silica will be considered for a separate rulemaking. In addition, comments on the feasibility of meeting reduced respirable coal mine dust standards due to the presence of silica are discussed elsewhere in this preamble under Section III.C. regarding Feasibility.

Some commenters suggested that the rock dust application requirements of the Emergency Temporary Standard

published in September 2010 (75 FR 57849) and finalized in June 2011 (76 FR 35968) affect the levels of silica to which miners are exposed and would make compliance with the proposed standard problematic. These commenters stated that applying rock dust introduces quartz into the sampling air stream thereby contributing to the total amount of respirable dust being measured and is a major source of weight gain in many samples.

If the rock dust used to maintain the incombustible content of the combined coal dust, rock dust, and other dust, meets the definition of rock dust under § 75.2, the applied rock dust does not need to contain a large portion of respirable dust and is allowed to contain a limited amount of silica. Mine operators can work with their suppliers to ensure the rock dust purchased contains a low percentage of respirable dust and very little, if any free silica. Limiting the percentage of respirable material and exercising care in the application of rock dust to limit the exposure of miners working downwind will reduce or eliminate the potential impact on respirable coal mine dust levels.

5. Section 70.201 Sampling; General and Technical Requirements

Final § 70.201 addresses general and technical sampling requirements concerning operator sampling. It includes requirements for sampling with the CPDM. Final § 70.201 is consistent with the Dust Advisory Committee's unanimous recommendation that CPDM technology, when verified, be broadly used along with other sampling methods for evaluation of dust controls at all MMUs and other high risk locations. The Committee further recommended that once verified as reliable, MSHA should use CPDM data for assessing operator compliance in controlling miner exposures and should consider use of CPDM data in compliance determinations. NIOSH has conducted the necessary scientific studies, whose results were published in a peer-reviewed document, which adequately demonstrated the CPDM to be an accurate instrument by meeting the long-standing NIOSH Accuracy Criterion. The recent MSHA and NIOSH approval of the CPDM, as meeting the intrinsic safety and accuracy requirements of 30 CFR part 74, shows that the CPDM is ready to be used as a compliance sampling device in coal mines.

Some commenters stated that operator sampling is not credible and that MSHA should be responsible for all compliance sampling.

The Dust Advisory Committee recommended that MSHA secure adequate resources to carry out compliance sampling but, in the interim, operator compliance sampling should continue with substantial improvement to increase credibility of the program.

In 2009, MSHA conducted a targeted enforcement initiative that focused on miners' exposures to respirable coal mine dust at selected underground coal mines. As a result of the lessons MSHA learned during this initiative, MSHA instructed underground coal mine operators to conduct audits of their respirable dust monitoring and control programs and address any deficiencies. A mine operator is responsible for providing a safe and healthful mining workplace and must design an adequate plan, implement and monitor it, and revise it, as needed. MSHA prepared specific information for miners and mine operators to use as a tool for ending black lung disease. The information provided specific instructions on actions that could be taken to respond to MSHA's program, End Black Lung Act—Now!

Following the 2009 enforcement initiative, MSHA conducted a weeklong dust control emphasis program. During this program, every coal mine inspector dedicated a part of each inspection to health-related activities and applied the lessons learned during the enforcement initiative. Based on these lessons learned, MSHA reviewed the quality of dust controls stipulated in approved ventilation plans, focusing on the primacy of engineering controls and evaluated respirable dust practices during regular inspections. In addition, MSHA training specialists monitored the quality of training provided by industry personnel on the risks of, and methods to prevent, black lung. MSHA is continuing its dust emphasis program in order to increase surveillance of operator sampling and take appropriate action to ensure that an effective system is in place to investigate practices or actions which would cause unrepresentative dust samples to be submitted. MSHA is also continuing to use a national group of MSHA health specialists to conduct focused health inspections. These inspections emphasize the importance of maintaining dust controls to protect miners.

Some commenters stated that existing sampling procedures do not reflect accurate measurements of miners' exposure to respirable coal mine dust. The accuracy of the CMDPSU and the CPDM is discussed in the section-by-section analysis concerning § 72.800 Single, Full-shift Measurement of Respirable Coal Mine Dust and Section III.C., Feasibility, respectively, of this preamble.

Some commenters stated that only the miner needs to be sampled to get a miner's exposure. This comment is addressed elsewhere in this preamble under § 70.201(c).

Final paragraph (a) is changed and clarified from the proposal. It requires that an approved CMDPSU be used to take bimonthly samples of the concentration of respirable coal mine dust from the designated occupation (DO) in each MMU until January 31, 2016. It also requires that, effective February 1, 2016, DOs in each MMU must be sampled quarterly with an approved CPDM as required by this part and an approved CMDPSU must not be used, unless notified by the Secretary to continue to use an approved CMDPSU to conduct quarterly sampling.

Final paragraph (a) changes the proposed implementation period for using the CPDM from 12 to 18 months after the final rule is effective. Paragraph (a) clarifies that during the 18-month period, an operator must take bimonthly samples of the DO in each MMU using a CMDPSU. It further clarifies that, after the 18-month period, bimonthly sampling will cease and the DO in each MMU must be sampled quarterly with an approved CPDM instead of a CMDPSU, unless the Secretary provides notification to continue using a CMDPSU for quarterly sampling.

On October 14, 2009, MSHA published a request for information (74 FR 52708) on the use of the CPDM as a sampling device to measure a miner's exposure to respirable coal mine dust. All commenters generally agreed that the required use of a CPDM would enhance the protection of miners' health.

On March 8, 2011, MSHA issued in the **Federal Register** a request for comments (76 FR 12648) and stated that in the proposal, MSHA also planned to phase in the use of CPDMs to sample production areas of underground mines and part 90 miners. MSHA solicited comments on the proposed phasing in of CPDMs, including time periods and any information with respect to their availability. MSHA requested commenters to provide the rationale if they recommended shorter or longer time frames (76 FR 12649).

Some commenters suggested that the proposed 12-month period should be lengthened; others suggested that it be shortened. A few commenters suggested that MSHA should extend the phase-in

period and allow the use of both, the CMDPSU and the CPDM, during the phase-in period because limiting the type of equipment when there is a new technology available can result in problems.

In response to the comments, final paragraph (a) extends the time after which only a CPDM can be used to conduct operator sampling, from 12 to 18 months to allow operators additional time to obtain CPDMs and train miners in the use of these devices. In addition, the requirement that a CMDPSU be used to conduct sampling during the 18 months following the effective date of the final rule addresses commenters' concerns that the proposed sampling provisions were too confusing. Final paragraph (a) simplifies the proposed sampling requirements by requiring that all operators continue to sample production areas bimonthly with the CMDPSU for the first 18 months after the effective date of the rule and that the operators stop sampling bimonthly and switch to quarterly sampling with the CPDM after the 18-month period. Additionally, maintaining operators' existing bimonthly sampling with a CMDPSU during the 18 months following the effective date of the rule allows operators time to concentrate on their dust control systems, train miners on the new sampling requirements, and learn how to operate the CPDM and certify persons to handle the CPDM.

MSHA is aware that the CPDM will be in demand and there is currently only one manufacturer of the device. MSHA has contacted the manufacturer and discussed the amount of time needed to produce the necessary quantity of CPDMs. In addition, MSHA considered the amount of time it would take for the Agency and operators to train necessary personnel in the use and care of the device. An 18-month period after the effective date of the final rule should be a sufficient amount of time for production of the CPDM and training on the use of the CPDM. Under the final rule, the amount of sampling and, thus, the number of CPDMs needed are significantly reduced from what the proposal would have required. However, if MSHA determines that there are logistical or feasibility issues concerning availability of the CPDM, MSHA will publish a notice in the **Federal Register** to continue to use an approved CMDPSU to conduct quarterly sampling. In addition, assuming no technological issues arise concerning the use and manufacture of CPDMs, and depending on manufacturer projections, if CPDMs are not available in sufficient quantities, MSHA will accept, as good faith evidence of compliance with the final rule, a valid, bona fide, written purchase order with a firm delivery date for the CPDMs.

Some commenters stated that MSHA underestimated the number of CPDMs needed to comply with the proposal. In the development of the final rule, MSHA discovered an error in MSHA's estimates for the number of CPDMs that would have been required to sample ODOs under the proposed rule. Chapter IV of the REA for the final rule discusses MSHA's underestimation and provides a revised calculation of the number of CPDMs that would have been needed under the proposal.

Final paragraph (b) is changed from the proposal. It requires that an approved CMDPSU be used to take bimonthly samples of the concentration of respirable coal mine dust from each designated area (DA) as required by this part until January 31, 2016. The proposal would have required quarterly sampling of the DA on the effective date of the final rule. The bimonthly sampling requirement of DAs for the first 18 months after the effective date of the final rule is consistent with the bimonthly sampling required by existing § 70.201. Continuing the existing bimonthly sampling of DAs during the 18-month period is also consistent with the bimonthly sampling of DOs in each MMU required by final paragraph (a). As discussed above, the 18-month period, after which the use of CPDMs is required, will provide sufficient time for manufacturers to produce the necessary quantity of units and for MSHA and operators to train personnel in the use and care of the CPDM. On February 1, 2016, final paragraph (b)(1) requires that DAs associated with an MMU be redesignated as Other Designated Occupations (ODO). Paragraph (b)(1) clarifies that ODOs must be sampled quarterly with an approved CPDM as required by this part and an approved CMDPSU must not be used, unless notified by the Secretary to continue to use an approved CMDPSU to conduct quarterly sampling. Final paragraph (b)(1) is derived from proposed paragraphs (b) and (c).

A few commenters stated that requiring existing DAs associated with an MMU to be redesignated as ODOs will not result in any increased protection for miners because the DO is the occupation that is most exposed to respirable dust. These commenters stated that the additional sampling is too burdensome and costly especially on small mine operators.

Existing DAs associated with an MMU are to be designated as ODOs because the sampling would be used to measure respirable dust exposure of occupations on an MMU rather than areas associated with an MMU. Examples of DAs associated with an MMU that would be designated as ODOs and an explanation of the frequency of sampling ODOs are in final § 70.208(b) concerning quarterly sampling. The final rule will help ensure that the sample reflects an accurate measurement of the occupation monitored and will provide comparable protection for ODOs and DOs. For example, ODOs identified by the District Manager would be based on MSHA's historical sampling data on the MMU. Sampling of ODOs such as shuttle car operators on MMUs using blowing face ventilation would be required because MSHA's data show that sampling only the DOs does not always adequately protect other miners in the MMU. In response to commenters' concerns, under § 70.208 of the final rule, operators will sample each DO and each ODO each calendar quarter until 15 valid representative samples are collected for each. The total number of samples required from the DO and ODO is less than the total proposed 24/7 sampling of the DO and sampling of the ODO for 14 shifts. The required sampling for a typical MMU using blowing face ventilation will have 1 DO and 2 ODOs and, under the final rule, will require sampling until 15 valid representative samples are collected each from that DO and each ODO during the calendar quarter. Sampling of an ODO must follow completion of sampling for the DO, and sampling of a second ODO must follow completion of sampling for the first ODO. Additional discussion of sampling ODOs that are redesignated from existing DAs is provided in § 70.208 regarding quarterly sampling of MMUs.

Final paragraph (b)(2) is similar to proposed paragraph (d). On February 1, 2016, final paragraph (b)(2) requires that DAs identified by the operator under § 75.371(t) of this chapter be sampled quarterly with an approved CMDPSU as required by part 70, unless the operator notifies the District Manager in writing that an approved CPDM will be used for all DA sampling at the mine. The notification must be received at least 90 days before the beginning of the quarter in which CPDMs will be used to collect the DA samples.

Paragraph (b)(2) clarifies that the quarterly sampling of the DAs applies to those DAs that are identified by the operators under § 75.371(t). In addition, paragraph (b)(2) clarifies that the operators may use the CMDPSU while conducting DA sampling but, if operators plan to conduct DA sampling using the CPDM rather than the

CMDPSU, operators must notify MSHA of their intent to do so. This clarification ensures that operators do not switch between sampling devices on successive quarterly sampling periods, or use both sampling devices during the same sampling period. The 90-day notification period allows MSHA sufficient time to modify MSHA's health computer system to accept CPDM electronic records for all DAs located at the mine.

One commenter stated that DA sampling should be eliminated because MSHA stated that using the CPDM is not the best use for sampling a DA. DA sampling provides important information needed to evaluate the dust controls used in the DA so that the mine operator can ensure that miners working in these areas are protected. Because the CMDPSU reports of sample results provide the necessary information for these area samples, and because the CPDM is designed to be worn, the final rule provides that a mine operator must use CMDPSUs for sampling DAs. However, a mine operator may, upon notifying the District Manager, use CPDMs for sampling all DAs in a mine.

Final paragraph (c) is the same as proposed paragraph (e). Like the proposal, it requires that sampling devices be worn or carried directly to and from the MMU or DA to be sampled and be operated portal-to-portal. In addition, it requires that sampling devices remain with the occupation or DA being sampled and be operational during the entire shift, which includes the total time spent in the MMU or DA and while traveling to and from the mining section or area being sampled.

Several commenters supported the proposal that sampling devices be operational while traveling to and from the mining section or area being sampled. Paragraph (c) clarifies the existing requirement that the sampling device be operated portal-to-portal. Miners are exposed to respirable dust while traveling to and from the working section or area being sampled. Many miners ride mantrips onto the section, some for as long as an hour, during which time miners are exposed to respirable dust. Sampling during travel time provides an accurate measurement of respirable dust exposures during usual work conditions because it accounts for all the time that a miner works and is exposed to respirable coal mine dust.

Many commenters expressed support for full-shift sampling. Some of these commenters indicated that it is not uncommon today for miners to work longer than the traditional 8-hour work shift and agreed that it is appropriate to determine miners' respirable dust exposure based on their full work shift. Other commenters acknowledged that turning off a sampler after 8 hours is not representative of the time that miners work and the respirable dust conditions in which they work.

MSHA agrees with commenters and believes that it is more appropriate to determine miners' daily exposures based on their full work shift. Full-shift sampling will provide operators with the opportunity to manage miners' exposure to coal mine dust so that miners will be adequately protected. MSHA estimates that the average work shift on active mining units is approximately 9 hours for non-longwall mining and 10 hours for longwall mining. Working shifts longer than 8 hours increases exposure to respirable coal mine dust, resulting in increased health risks to miners, both in terms of incidence and severity. In addition, limiting the sampling duration to 8 hours, when a miner's work shift may be 10 hours, 12 hours, or longer, does not provide an adequate assessment of the respirable dust exposure during the full shift. According to NIOSH's Current Intelligence Bulletin 64 (''CIB 64''), Coal Mine Dust Exposures and Associated Health Outcomes—A Review of Information Published Since 1995 (2011): ''U.S. coal miners are working longer hours, which leads to the inhalation of more respirable coal mine dust into the lungs.''

Final paragraph (c) is consistent with the 1996 Advisory Committee's Report, the 1995 NIOSH Criteria Document, and the conclusions of the 1992 Coal Mine Respirable Dust Task Group Report. This final provision is also consistent with generally accepted industrial hygiene principles today, which take into consideration all of the time a worker is exposed to an airborne contaminant, even if it exceeds 8 hours a day.

Therefore, final paragraph (c) requires operators to sample during the entire shift as discussed above, portal to portal, rather than a maximum of 8 hours. This will account for all the time that a miner works and allow more representative measurement of miners' exposures to respirable coal mine dust.

Final paragraph (c), like the proposal, continues the area sampling requirement of existing § 70.201(b). Under the final rule, the sampling device must remain with the occupation or DA being sampled during the entire shift to ensure that respirable dust concentration levels are continuously being monitored. If a miner in an occupation being sampled changes from one occupation to another during the production shift, the sampling device must remain with the occupation designated for sampling. For example, if using a CPDM to sample a DO (continuous mining machine operator) on a continuous mining section and the duties of the machine operator are divided equally between Miner 1 and Miner 2, the dust sampler must be worn for half the shift by Miner 1 and the other half by Miner 2, while each is operating the continuous mining machine. Similarly, a dust sampler must remain at the DA during the entire shift. Once sampling results are available, mine operators and MSHA would analyze the data to determine if adjustments need to be made (e.g., re-designating DOs or modifying dust control parameters).

In the March 8, 2011, request for comments (76 FR 12650), MSHA stated that some commenters suggested during the rulemaking hearings that, for compliance purposes, respirable dust samples should be taken only on individual miners in underground coal mines. MSHA further stated that, under the existing rule, MSHA enforces an environmental standard, that is, the Agency samples the average concentration of respirable dust in the mine atmosphere. MSHA also stated that the proposed rule would continue the existing practice that samples be collected from designated high-risk occupations associated with respirable dust exposure and from designated areas associated with dust generation sources in underground mines. MSHA solicited comments on the sampling strategy in the proposed rule, any specific alternatives, supporting rationale, and how such alternatives would protect miners' health.

Some commenters supported the continuation of area sampling. One of these commenters preferred area sampling over personal sampling stating that personal sampling would necessitate that every miner be sampled. This commenter also stated that a miner's activities, e.g., lunch break, should be considered as part of his normal activity and count towards normal exposure. Another commenter stated that area sampling makes sense only when using the CMDPSU.

Many commenters stated that they preferred personal sampling, particularly when using the CPDM, because the CPDM provides an accurate measurement of an individual miner's exposure rather than potential exposure at a single work location. Many of these commenters stated that the CPDM was designed and tested for personal sampling and personal exposure and that using it for area sampling defeated

its designated purpose because it was not designed to be hung and left unattended. These commenters also stated that the CPDM was designed to provide immediate information to the miner so that the miner could make immediate adjustments in behavior, tactical positioning in relation to dust sources, or mining procedures. A few commenters stated that not conducting personal sampling hinders an operator's ability to rotate miners to reduce exposures. Some commenters suggested that full-shift personal sampling of the highest risk miner on all production shifts would provide a valuable data base for researchers to use to pinpoint areas in need of improvement and provide miners with real time data that they could use to prevent overexposure resulting in reduced exposure to dust concentrations without any need to reduce the existing permissible level. Some commenters stated that area sampling is an antiquated practice and adds to sampling complexity by requiring new plan approvals and irrelevant details. Other commenters stated that passing the pump from miner to miner as is required during area sampling causes measurement errors and does not result in a true representation of the miner's exposure. A few commenters stated that individual sampling is preferred by industrial hygienists, and one commenter noted that personal sampling is consistent with the NIOSH recommendation and OSHA's sampling approach. A number of commenters stated that the final rule should provide for sampling underneath a respirator, in the miner's immediate breathing zone, instead of requiring atmospheric sampling.

The Advisory Committee recommended a mix of samples—personal, occupational, and area—to be a reasonable, systematic approach for the determination of miners' respirable dust exposure and subsequent control of exposure. The NIOSH Criteria Document stated that personal sampling is preferable and that area sampling should be substituted for personal sampling only where area sampling has been shown to measure an equivalent or higher concentration. However, the NIOSH Criteria Document also stated area sampling is sufficient under Section 202(b) of the Mine Act.

An area sample is one taken at a fixed location. It measures the concentration of respirable dust in that location and not necessarily the exposure of any individual. Area sampling under existing § 70.201(b) involves sampling the occupation or DA and has been in use by MSHA since 1970. Section 202(b)(2) of the Mine Act requires an operator to ''. . . continuously maintain the average concentration of respirable dust in the mine atmosphere during each shift to which each miner in the active workings is exposed. . . . '' The purpose of this provision, as set forth in Section 201(b) of the Mine Act, is to ensure that ''the working conditions in each underground coal mine are sufficiently free of respirable dust concentrations in the mine atmosphere to permit each miner the opportunity to work underground during the period of his entire adult working life without incurring any disability from pneumoconiosis or any other occupation-related disease during or at the end of such period.'' 30 U.S.C. 841(b). The area sampling requirement of the final rule is consistent with sections 201(b) and 202(b)(2) of the Mine Act. Rather than measuring the exposure of any individual miner for the duration of a shift, area sampling allows an operator to monitor the mine atmosphere with the greatest concentration of respirable dust in the areas where miners are working or traveling and to take corrective measures that protect each miner working or traveling in the area. For example, based on the various dust generating sources and the manner in which the face is ventilated, the area by the continuous mining machine operator on a continuous mining MMU is the area on a continuous mining MMU with the greatest concentration of respirable dust. Since miners are required to work in this area, operators are required to maintain the mine atmosphere in this area or location in compliance with the dust standard on each shift. By doing so, other miners in less risky occupations are protected from excessive dust concentrations.

While area sampling does not show a particular miner's dust exposure, the area sampling results will show whether miners are exposed to excessive dust concentrations. The objective of area sampling is to control the concentration of respirable dust to which miners are exposed in the workplace. In *American Mining Congress* v. *Secretary of Labor,* 671 F.2d 1251 (10th Cir. 1982), the Court found that area sampling was reasonable and consistent with the Mine Act.

If placed in a fixed location, the CPDM will provide an accurate measurement of the respirable dust in the atmosphere where miners work or travel. In addition, it will provide immediate information to the miners working in that location so that the mine operator could make immediate adjustments in controls in relation to dust sources to reduce dust generation or suppress, dilute, divert, or capture the generated dust. Compared with administrative controls or respirators, well-designed engineering controls provide consistent and reliable protection to all workers because the controls are less dependent on individual human performance, supervision, or intervention to function as intended. Area sampling with the CPDM will also provide information on miners' exposure in areas with the highest concentration of dust. This will give the mine operator and MSHA valuable data to pinpoint areas in need of improvement.

Passing the CPDM from miner to miner will not cause measurement errors because passing the CPDM is done in conjunction with a certified person. The certified person will ensure that the CPDM is properly handled when passed from one miner to the next. In addition, MSHA has not received any notification on dust data cards indicating any significant issues encountered during the switching of the existing CMDPSU since 1981. Area sampling effectively achieves the purpose of the Mine Act to protect the health of miners by requiring operators to maintain good air quality in the mine.

Final paragraph (c)(1) is the same as proposed paragraph (e)(1). It requires that when using a CMDPSU and the work shift to be sampled is longer than 12 hours, the operator must switch-out the unit's sampling pump prior to the 13th hour of operation.

Final paragraph (c)(2) is the same as proposed paragraph (e)(2). It requires that the operator switch-out the CPDM with a fully charged device prior to the 13th hour of operation, if the work shift to be sampled is longer than 12 hours.

In the March 8, 2011, request for comments (76 FR 12649), MSHA stated that the Agency understands that some work shifts are longer than 12 hours, and that dust sampling devices generally last for approximately 12 hours. MSHA solicited comments on appropriate time frames to switch-out sampling devices, CMDPSUs or CPDMs, to ensure continued operation and uninterrupted protection for miners for the entire shift.

Some commenters stated that switching out the pump prior to the 13th hour is financially burdensome to the operator because it will require purchasing additional pumps. Other commenters stated that until the CPDMs are available, the CMDPSU should only be used for 8 hours because mechanical problems may require a miner to work over 12 hours and additional samplers may not be readily available. Some

commenters stated that it would probably be best to change the sampling device after the end of an eight-hour shift to make certain the unit has enough battery life to cover the number of hours a miner works and the results of the samples could then be combined.

The CMDPSU manufacturer's instructional manual states that the typical battery-pack service life varies from a minimum of 8 hours to a maximum of 11.5 hours. However, the manufacturer's testing parameters are more rigorous than the conditions in the mine. The pumps are tested in extreme levels of coal mine dust which cause large amounts of dust to accumulate on the filter. This leads to high back pressure, requiring the pump to work harder, and resulting in a shorter battery life. With the use of proper dust controls, the pump will not have to work as hard, thereby prolonging the battery life. To address shifts greater than 12 hours, the final rule requires that the unit be switched-out prior to the 13th hour to prevent disruption in operation and to provide continued protection for miners. Mine operators who have knowledge that their sampling pumps will not last more than 12 hours should change them out sooner to ensure the full sampling period is covered. If the battery is depleted before the end of the shift, the sample would be voided.

NIOSH's Report of Investigations 9669, Laboratory and Field Performance of a Continuously Measuring Personal Respirable Dust Monitor (Volkwein et al., NIOSH (2006) suggests that 12 hours of battery power be provided to the CPDM. In addition, 30 CFR 74.7(i) requires the CPDM to have sufficient battery capacity to operate for 12 hours. The final rule is consistent with NIOSH's report and the existing CPDM approval requirements in 30 CFR part 74. It requires that the CPDM be switched-out prior to the 13th hour to prevent disruption in operation and to provide continued protection for miners.

Final paragraph (d) is substantially the same as proposed paragraph (f). It requires that, if using a CMDPSU, one control filter be used for each shift of sampling. Each control filter must: (1) Have the same pre-weight date (noted on the dust data card) as the filters used for sampling; (2) Remain plugged at all times; (3) Be used for the same amount of time, and exposed to the same temperature and handling conditions as the filters used for sampling; and (4) Be kept with the exposed samples after sampling and in the same mailing container when transmitted to MSHA. MSHA did not receive comments on the proposed control filter requirements.

Final paragraph (d), which requires an operator to use control filters when sampling, is consistent with accepted industrial hygiene principles and practice. A control filter is an unexposed filter of the same design as the filter used for sampling and is pre- and post-weighed on the same day as the filter used for sampling. MSHA first began using control filters in its enforcement program in May 1998 and continues this practice today. Control filters improve measurement accuracy by eliminating the effect of differences in pre- and post-exposure laboratory conditions, or changes introduced during storage and handling of the filter cassettes. The final rule extends the program in effect since July 2007, which allows operators to use control filters in the optional quartz sampling program, to the entire sampling program. The control filter must be used for all operator sampling to adjust the resulting weight gain obtained on each exposed filter by subtracting any change in the weight of the control filter from the change in weight of each exposed filter. This is especially important since the filter cassettes to be used by operators would be pre-weighed by the manufacturer and post-weighed by MSHA. To ensure the precision and accuracy of the pre-weight of filters, MSHA audits the daily production of filter cassettes. The program conforms to ANSI/ASQ Z1.4–2008, ''Sampling Procedures and Tables for Inspection by Attributes,'' which defines the criteria currently used to monitor the quality of the operator bimonthly sampling program.

Since the control filter would be used to adjust the resulting weight gain obtained on each exposed filter cassette, the control filter must have the same pre-weight date as the filter cassette to be used for sampling on the same shift. The pre-weight date is noted on the dust data card. To prevent exposure to the mine environment, the plugs attached to the inlet and outlet side of the cassette must not be removed. Also, it is important that the control filter be used for the same amount of time, and exposed to the same temperature and handling conditions as the ones that are used for sampling, i.e., carry the control filter in a shirt or coverall pocket while underground. While the control filter can be carried by any miner assigned to the MMU being sampled, it would be preferable if that miner performed the job of the DO. Finally, the control filter cassette must be kept together with the exposed samples after sampling and should be treated in the same manner as the exposed filters prior to being transmitted to MSHA. Failure to follow these instructions would be cause for voiding the sampling results.

Final paragraph (d)(4) requires that the control filter must be in the same mailing container as the exposed samples when transmitted to MSHA. This provision is new and will ensure that the control filter and the sample are linked during processing of the sample that is being submitted to MSHA.

Final paragraph (e) is the same as proposed paragraph (g). It requires that records showing the length of each production shift for each MMU be made and retained for at least six months and be made available for inspection by authorized representatives of the Secretary and the representative of miners, and submitted to the District Manager when requested in writing.

One commenter stated that production shift records should be retained for 12 months. A few commenters stated that the production shift records are unnecessary and excessively burdensome.

Under the final rule, mine operators need to know the length of the production shift to enter this information into the CPDM or record it on the CMDPSU dust card. The information is also necessary for MSHA to verify that an operator is accurately recording the production shift lengths for sampling. The 6-month retention period will give MSHA adequate time to review the records. Although some commenters suggested longer retention periods for production records, the Agency does not believe that a longer period is justified in light of the record's purpose.

Final paragraph (f) is the same as proposed paragraph (h). It requires that upon request from the District Manager, the operator must submit the date and time any respirable dust sampling required by this part will begin, and that this information be submitted at least 48 hours prior to scheduled sampling.

One commenter supported the proposal. Another commenter stated that the proposed requirement to submit information to MSHA 48 hours prior to scheduled sampling creates a burden on MSHA. One commenter suggested that less than 48 hours notice should be allowed for legitimate reasons provided the District Manager is notified of the change. The 48-hour notification requirement does not create a burden on MSHA; rather it provides MSHA with the opportunity to observe and monitor operator sampling to ensure that both operating conditions and sampling requirements are met. MSHA will consider mitigating circumstances if

conditions or activities outside the operator's control interfere with meeting the 48-hour requirement. Under those circumstances, however, the mine operator would need to notify the District Manager of any changes to the sampling schedule as soon as possible.

Final paragraph (g) is the same as proposed paragraph (i). It requires that to establish a normal production shift, the operator record the amount of run-of-mine material produced by each MMU during each shift to determine the average production for the most recent 30 production shifts, or for all the production shifts if fewer than 30 shifts of production data are available. It further requires that production records be retained for at least six months and be made available for inspection by authorized representatives of the Secretary and the miners' representative.

The final rule is consistent with the Dust Advisory Committee's recommendation that MSHA require the mine operator to maintain the appropriate production records. MSHA currently relies on production information provided by the operator to determine at what production level the mine ventilation plan should be evaluated. No production records are required for each MMU. Although operators must submit production data on a quarterly basis, the data are compiled for the entire mine. In addition, quarterly reports provide information on the amount of clean coal produced, which is much lower than the tonnage of total run-of-mine material produced, and is not useful for establishing what constitutes a normal production shift for each MMU for sampling.

MSHA will use the production records to establish a normal production level. If there were no records indicating typical production levels in the mine, MSHA would be unable to determine whether an operator's sampling of dust concentrations occurred during a shift that reasonably represented typical production levels and mining conditions.

One commenter stated that production records to establish a normal production shift would not be necessary once operators were required to sample with CPDMs every production shift, 7 days per week, 52 weeks per year. The final rule does not require 24/7 continuous sampling. This commenter also stated that, under the revised definition of an MMU, it would be difficult to separate production between two sets of equipment because shuttle cars may pull coal from different continuous mining machines.

The MMU production is associated with the amount of material cut and loaded by the mining machine (continuous mining machine, loading machine, etc.). The mine operator must relate the production of material to the MMU. Which shuttle cars are pulling from a specific MMU does not determine the amount of material produced by each MMU. MMU-specific information is available through various methods and MSHA believes that the majority of mines currently track production on a per-MMU basis.

One commenter requested a 12-month record retention period. The 6-month period will allow MSHA sufficient time to review the production records and, therefore, a longer retention period is not necessary. The 6-month time allows MSHA adequate time to be at the mine and have access to sampling data to determine if the samples are representative samples.

Final paragraph (h) is substantially similar to proposed paragraph (j). It requires that mine operators using CPDMs provide training to all miners expected to wear a CPDM. The training must be completed prior to a miner being required to wear a CPDM, and then every 12 months thereafter. This training must be provided to each miner working in a position as a DO or ODO. In addition, if a CPDM is used for DA sampling, and the DA location for the sample is on the miner performing specific tasks, the training must be provided to the miner that will be wearing the CPDM.

Many commenters supported initial and annual retraining requirements on the CPDM and indicated that the knowledge was necessary to help reduce dust exposure. One commenter generally stated that the proposed training requirements are burdensome for the mine operator. One commenter recommended that refresher CPDM training be provided every 6 months. A few commenters indicated that the 12-month retraining requirement is extensive and does not achieve any safety benefit for miners who only wear the CPDM and do not set it up.

The Mine Act recognizes the importance of miner training and education in the prevention of injury and disease. In accordance with Section 115(b) of the Mine Act, training must be provided during normal working hours and miners must be paid at their normal rate of pay while they take such training. In addition, if the training is provided at a location other than the normal place of work, miners must be compensated for the additional costs they may incur in attending such training sessions. 30 U.S.C. 825.

Initial training is appropriate to ensure miners wearing CPDMs understand the function and purpose of the equipment they are wearing and the importance of monitoring dust concentrations. Although certified persons set up the CPDMs, a miner who is trained on the use and operation of the sampler and information displayed on the CPDM is more likely to recognize potential problems and respond to them appropriately. Based on MSHA's experience and consistent with other 30 CFR training requirements, training is most effective when provided close to the time when the miner is expected to wear the CPDM and then reinforced every 12 months. It is essential that miners who wear a CPDM have a fundamental understanding of its operation even if they are not setting up the CPDM for sampling. Usage of the CPDM by miners, such as accessing information and collecting short-term samples, is discussed below concerning paragraphs (h)(3) and (h)(4).

MSHA received several comments both for and against including CPDM training in part 48 training. Several commenters suggested that the training should be included in part 48 new miner training, experienced miner training and annual refresher training. Other commenters stated that the initial and annual CPDM training should not be incorporated into part 48 training, generally stating that part 48 training already includes too much information, making it difficult for miners to retain all that is given. They indicated that it is important to give miners the needed time to learn about the CPDM.

After reviewing all the comments, MSHA determined that additional training should not be added to part 48 training. MSHA considered whether training on the operation and use of the CPDM could be adequately covered under part 48 training, taking into account the other subjects that part 48 is required to address. MSHA determined that it is impractical to include the proposed comprehensive training on CPDMs within the prescribed time limits under part 48. Additional time should be allotted for CPDM training under part 48. However, operators may choose to provide CPDM training separately from training under part 48, or may provide CPDM training on days that part 48 training is held as long as additional time is designated to ensure that training on the CPDM required under the final rule is sufficient.

Final paragraphs (h)(1)–(4) are similar to proposed paragraphs (j)(1)–(5). Proposed paragraph (j)(2) would have required all miners to be instructed on

how to set up the CPDM for compliance sampling. Some commenters stated this was unnecessary and were concerned that it could lead to persons who are not certified performing functions that require certification.

In response to the comments, the final rule requires mine operators to have certified persons set up the CPDM for compliance. Therefore, it is not necessary to train miners on the set up of the CPDM. Miners who are not certified persons are, however, required to be trained on topics that pertain to shift sampling under final paragraph (h). Final paragraph (h)(1) is similar to proposed (j)(5). It requires that the training include the importance of monitoring dust concentrations and properly wearing the CPDM. Final paragraph (h)(1) includes a conforming change. The proposal would have required training on the importance of ''continuously'' monitoring dust concentrations. Since continuous monitoring is not required by the final rule, the term ''continuously'' is not included in paragraph (h)(1). Commenters generally agreed that miners need to be trained on the importance of monitoring dust and how to wear the CPDM.

Final paragraph (h)(2) is the same as proposed (j)(1). It requires that training include explaining the basic features and capabilities of the CPDM. One commenter indicated that training miners in all functions of the CPDM may result in an uncertified person activating functions that only a person certified in sampling, maintenance, and calibration should be able to access. Most commenters supported the proposed requirement, noting that miners have a right to know the features and functions of the equipment, and its capabilities, as well as what the collected information means.

It is vital that miners are properly trained on the operation of CPDMs to ensure the integrity and credibility of the sampling process. For the sampling program to be effective, miners must understand the proper use of the CPDM and its operation. Well-informed miners are more likely to make the most of the capabilities of the new CPDM technology.

Final paragraph (h)(3) is similar to proposed paragraph (j)(3). Like the proposal, it requires that training include discussing the various types of information displayed by the CPDM and how to access that information. This training will provide a miner with an understanding of how to use the displayed data to assess any concerns of overexposure to respirable dust. Several commenters expressed concern about training on how to access information on a CPDM. One commenter stated that only persons certified in sampling, maintenance, and calibration should be able to access data that are not readily displayed during use. The commenter added that if miners access data, it would have negative effects on the sampling process.

To clarify, this training is limited to accessing information that is readily available by pushing a button located on the CPDM. This only changes the information provided on the display screen and does not affect programming of the CPDM to collect a full-shift sample. The training is necessary to provide users with an understanding of how to access the various screens and data displayed on these screens, but not to change the settings on the CPDM.

Final paragraph (h)(4) is the same as proposed paragraph (j)(4). It requires that training include how to start and stop a short-term sample run during compliance sampling. A short-term sample is an engineering evaluation, which runs for a term shorter than the full-shift sampling, and provides information on respirable dust levels in a particular location.

One commenter stated that it is not necessary to train a miner, who simply is going to wear the unit for sampling, on how to start, stop, reset, or to do any function that is required to be performed by a certified person.

It is important that miners be able to conduct, access, and view short-term sampling. This would not interfere with an ongoing compliance sampling run and would not change any programmed settings entered by a certified person. Short-term samples can provide a miner with immediate information regarding the real-time dust levels in his work location. As changes are made in dust controls on the MMU, or in the miner's physical location, short-term sampling will provide data concerning the miner's exposure to respirable dust. These data will be useful to the miner in making adjustments to his work practices. Miners do not need to be certified in sampling to be able to conduct the short term sampling.

Final paragraph (i) is similar to proposed paragraph (k). It requires that an operator keep a record of training at the mine site for 24 months after completion of the training. It also provides that an operator may keep the record elsewhere if the record is immediately accessible from the mine site by electronic transmission. It further requires that, upon request by an authorized representative of the Secretary, Secretary of HHS, or representative of miners, the operator must promptly provide access to any such training records. Final paragraphs (i)(1)–(3) require the record to include the date of training, the names of miners trained, and the subjects included in the training.

Final paragraph (i) makes a non-substantive change by replacing the proposed term ''2 years'' with ''24 months.''

Final paragraphs (i)(1)–(3) are new; they were added to clarify that the record must contain sufficient information for an authorized representative of the Secretary, Secretary of HHS, or miners' representative to determine that the operator has provided CPDM training in accordance with requirements in paragraph (h). This is the type of information that is generally required for all training records to establish that the training has occurred.

One commenter stated that the proposed requirement to keep records is burdensome. Another commenter favored the proposed retention period. Record retention for the 24-month period is important so that MSHA can determine that the required initial and retraining has been provided.

Final paragraph (j) is new. It provides that an anthracite mine using the full box, open breast, or slant breast mining method may use either a CPDM or a CMDPSU to conduct the required sampling. It requires that the mine operator notify the District Manager in writing of its decision to not use a CPDM. Final paragraph (j) is added in response to comments that the CPDM will be damaged or destroyed by miners going up and down the pitch in an anthracite mine. In addition to damage to the unit, MSHA has concluded from its experience with anthracite mines, that miners may also be injured due to the particular configuration of such mines. Therefore, final paragraph (j) allows operators to use either sampling device due to the potential hazards to the miner associated with mining in such confined spaces with extremely pitching coal seams.

Final paragraph (k) is similar to proposed § 70.209(h) and moved to this final § 70.201. It provides that MSHA's approval of the dust control portion of the operator's mine ventilation plan may be revoked based upon samples taken by MSHA or in accordance with this part 70. Paragraph (k) is consistent with existing § 70.208(f) and is moved to final § 70.201 to clarify that, consistent with existing enforcement policy, its provisions apply to all underground sampling entities and not just DAs.

One commenter stated that proposed § 70.209(h), which stated that MSHA

approval of the operator's ventilation system and methane and dust control plan may be revoked based on samples taken by MSHA or the operator, is excessive. The commenter stated that a ventilation plan is not inadequate because a sample exceeds the proposed ECV or the WAE exceeds the WPAE. The commenter further stated that the District Manager should be required to follow the procedures in MSHA's Program Policy Manual, Volume V, page 6, MSHA Initiated Plan Changes, to revoke the ventilation plan. Another commenter stated that mine operators have no effective remedy in plan disputes. This commenter stated that MSHA opposes expedited hearings before the Federal Mine Safety and Health Review Commission on this sort of issue, and that the backlog of cases precludes actual expedited consideration.

In response to comments, paragraph (k) clarifies that MSHA may revoke the respirable dust control portion of the ventilation plan based on sample results, but not the entire ventilation plan. MSHA intends to notify the operator, in the citation issued for excessive dust, of the revoked dust control portion of the approved ventilation plan. Final paragraph (k) ensures that respirable dust controls are updated timely to ensure miners' exposures to excessive respirable dust are controlled on each and every shift.

6. Sections 70.202 Certified Person; Sampling and 70.203 Certified Person; Maintenance and Calibration

Final §§ 70.202 and 70.203, like the proposal, retain the requirements in existing §§ 70.202(a) and 70.203(a) that respirable dust sampling be performed by a person certified to collect dust samples and handle dust samplers while they are in operation, and that maintenance and calibration of approved samplers be performed by a person certified to perform such tasks.

Although the proposal did not include revisions to the existing requirements in §§ 70.202(a) and 70.203(a), one commenter recommended that MSHA eliminate the requirement that dust sampling and maintenance and calibration of approved sampling devices be performed by certified persons. The commenter stated that restricting dust sampling collection to certified persons does nothing to further the quality of the sampling process and that certification does not ensure that dust sampling is any better than if conducted by a non-certified person.

Certification ensures the validity of collected samples and the integrity of the dust sampling program. The collection of respirable dust samples by untrained persons, or with sampling devices that are not maintained as approved or calibrated in accordance with required procedures, would significantly affect the accuracy and quality of dust samples. Under that scenario, the entire dust program would be undermined and the protections from dust exposure afforded coal miners under the standards would be reduced. To maintain the integrity of MSHA's dust program, there must be competency standards for those entrusted with administering the program.

One commenter questioned the need for certified industrial hygienists to become MSHA-certified in sampling, stating that certified industrial hygienists are qualified to conduct respirable dust sampling and do not need further instruction or a separate certification. The commenter also pointed out that MSHA certification in such cases is costly.

MSHA recognizes that industrial hygienists have to meet certain educational and experience-based thresholds to become professionally certified and maintain certification as industrial hygienists. However, an independent MSHA certification process is needed for MSHA's dust sampling program. In general, industrial hygienists must demonstrate a basic technical understanding of industrial hygiene practices in a broad number of subject matters in order to become certified. However, the comprehensive nature of the industrial hygienist certification examination does not ensure that the individual has knowledge of MSHA-specific requirements that are necessary to carry out MSHA's dust monitoring program. A certification process specifically directed at evaluating familiarity with the intricacies of the dust sampling requirements is needed to maintain the quality of MSHA's dust program. For example, MSHA's certification process tests knowledge of key dust-related standards contained in 30 CFR; sampling and calibration equipment to be used; and procedures used for maintenance and calibration of this equipment. It also requires satisfactory completion of hands-on demonstrations of certain performance criteria. Each certification applicant must be explicitly aware of the responsibilities and the importance associated with sampling and maintenance and calibration certification, as well as the potential for civil and criminal sanctions that may apply if certified persons do not perform their duties properly. These specific requirements and issues are not part of the certification process for industrial hygienists.

Final §§ 70.202(b) and 70.203(b), like the proposal, retain the existing requirements that candidates for certification pass an MSHA-administered examination to demonstrate competency in respirable dust sampling procedures and in maintenance and calibration procedures, as appropriate. Also like the proposal, final §§ 70.202(b) and 70.203(b) add new provisions that require candidates for certification to complete an MSHA course of instruction prior to examination and certification. The instructional course requirements under final §§ 70.202(b) and 70.203(b) are consistent with the recommendation of the 1992 Coal Mine Respirable Dust Task Group.

MSHA received a number of comments on this provision. One commenter expressed support for the proposed requirement that persons complete a course of instruction prior to becoming certified. Another commenter recommended that the final rule include a provision requiring each mine to have a minimum of two persons trained in sampling at any given time.

Mine operators are in the best position to determine how many persons should be trained and certified in sampling and in maintenance and calibration to ensure the continuity of their operations given the operational demands of the mine, as well as the number of miners employed by the operator. Accordingly, the final rule does not specify how many persons that a mine operator must have trained or certified.

One commenter suggested that a single certification should permit a person to collect dust samples and perform maintenance and calibration of approved sampling devices.

Given the differences in duties between persons certified in sampling and those certified in maintenance and calibration, separate certifications are necessary.

One commenter found the exception in proposed § 70.203(b) that would allow maintenance of CMDPSU sampling head assemblies to be performed by persons certified either in sampling or maintenance and calibration to be confusing. As MSHA explained in the proposal, ''maintenance of the head assembly does not require a person to open, handle, disassemble, or reassemble the sampling device's internal components.'' As such, maintenance of the head assembly would not affect

electrical components and other intrinsic safety features that must be maintained in order for the CMDPSU to retain its approval under part 74. Therefore, the final rule, like the proposal, continues to reflect that necessary head assembly maintenance may be performed by persons certified in sampling, as well as those certified in maintenance and calibration.

Some commenters recommended a requirement that certified persons take regular refresher training. One of these commenters stated that certified persons should be required to receive training on sampling or maintenance and calibration of the CPDM every 6 months. Other commenters stated that certified persons should be retrained if they are unable to pass the recertification exam required every three years by proposed §§ 70.202(c) and 70.203(c). One of these commenters added that retraining should also be mandated when necessitated by equipment or procedural modifications. An additional commenter stated that the final rule should restrict certified persons' sampling or maintenance and calibration certification to the specific CPDM model on which the person received classroom instruction and examination.

To become certified under final §§ 70.202(b) and 70.203(b), each person seeking initial certification will have to complete both an MSHA course of instruction and pass an MSHA examination for the certification that the person is seeking. As explained in the proposal, it is essential for each person seeking initial certification in accordance with this rule to take classroom training prior to taking the MSHA competency examination. These requirements also strengthen the overall certification process. Like the proposed rule, final §§ 70.202(b) and 70.203(b) do not include provisions that would mandate periodic retaking of the applicable MSHA course of instruction once a person has received certification or has failed a subsequent competency examination. MSHA does not believe that there would be added value to require candidates for recertification to periodically retake the instructional course. They are able to review procedures and regulatory requirements on their own and will have had the benefit of regular, hands-on experience in either sampling, or maintenance and calibration procedures. Their competency will be adequately evaluated by whether they pass or fail the examination. To maintain certification in the tasks the certified person performs, every three years, a person must pass the applicable MSHA examination demonstrating competency in sampling procedures under final § 70.202(c) or competency in maintenance and calibration under final § 70.203(c). Accordingly, there is a continuing obligation that certified persons have to remain proficient in the use, handling, and/or maintenance and calibration practices of the approved device in use at their mine.

In addition, MSHA expects that any equipment or procedural modifications to the CPDM would be minor and would not necessitate requiring a certified person to repeat the instructional course. Given the expectation that CPDM design developments will be occasional and are unlikely to be drastic, there is no need to require retraining due to equipment or procedural modifications. For example, in MSHA's experience, design changes over the years to the CMDPSU, the approved respirable dust sampling device currently used in coal mines, has not necessitated limiting the person's certification to a particular CMDPSU model. Furthermore, MSHA does not anticipate technological advances in respirable dust sampling instrumentation so frequently or to such a degree that would warrant limiting certification to a particular CPDM model. MSHA understands that the current approved CPDM manufacturer offers various training opportunities for those in need of training on its products. Finally, MSHA believes that the periodic re-examinations required by final §§ 70.202(c) and 70.203(c) will ensure that certified persons are knowledgeable and maintain competency on the device in use at their particular mine. For this reason, final §§ 70.202(b) and 70.203(b) do not require persons seeking recertification to retake the courses of instruction prior to taking the periodic competency examinations required under final §§ 70.202(c) and 70.203(c).

To maintain certification, final §§ 70.202(c) and 70.203(c), like the proposal, require persons certified in dust sampling procedures or maintenance and calibration procedures to pass the applicable MSHA examination demonstrating competency in sampling procedures or maintenance and calibration procedures every three years. A certified person who fails the MSHA examination is no longer certified and is not permitted to perform the duties of a certified person. Also, a person who is certified on the effective date of the final rule will be required to retake and pass the applicable MSHA examination within three years of that date.

Commenters varied in opinion as to the need and practicality of re-examination. One commenter stated that the three-year re-examination frequency is too long a period of time, while other commenters believed it was too onerous. One of these commenters suggested that a five-year interval would be more appropriate, while another suggested allowing continuing education units as a more desirable alternative to re-examination.

After considering these comments, MSHA continues to believe that the proposed three-year re-examination interval is reasonable. MSHA recognizes the importance of routinely demonstrating, without too much passage of time, that certified persons remain competent in performing the essential skills required of them. Requiring persons to be re-examined at regular intervals as a condition of maintaining a valid certification will ensure that certified persons have a minimum threshold of proficiency at all times, as familiarity with proper procedures is integral to protecting the health of miners. To allow more than three years to pass, however, before re-testing certified persons could permit an inordinate period to elapse during which inadvertent, improper or erroneous sampling or maintenance and calibration practices might occur and go unchecked. MSHA also believes that testing more frequently than at three-year intervals could be unreasonably burdensome on operators and certified persons.

Another commenter recommended elimination of the re-examination provision. This commenter stated that certified persons should simply be permitted to sign an annual ethics statement. MSHA has not included this suggestion because merely signing an ethics statement does nothing to objectively demonstrate that a person maintains the proficiency needed to conduct respirable dust sampling or maintain and calibrate approved sampling devices. An annual self-certification pledge is akin to certifying persons for life, the very practice that MSHA has found to be deficient in ensuring that certified persons are qualified to perform the required sampling, and maintenance and calibration tasks. Certifying persons for life can result in diminished aptitude or proficiency in skills that can affect a person's competence to perform required tasks. It is absolutely critical that persons who are designated to perform dust sampling and maintenance and calibration of dust sampling equipment maintain the necessary competency to do so. Periodic re-

examination under final §§ 70.202(c) and 70.203(c) will ensure that certified persons maintain their knowledge, skills, and abilities to competently perform their duties.

Another commenter stated that it would be administratively impossible for MSHA to schedule and provide the number of re-examinations that would be required by proposed §§ 70.202(c) and 70.203(c). The commenter expressed concern that MSHA does not currently have the staff to instruct and administer tests to this many people and with such recurring frequency. Although MSHA understands the commenter's concern, the Agency will make arrangements to assemble and prepare the needed resources to carry out its administrative functions under the final rule.

Final §§ 70.202(d) and 70.203(d) are derived and clarified from the proposal. They provide that MSHA may revoke a person's certification for failing to properly carry out required sampling procedures or maintenance and calibration procedures, as appropriate. These final provisions are consistent with the Dust Advisory Committee's recommendation that MSHA consider a retraining and/or decertification procedure for certified persons who fail to perform their duties properly.

Final §§ 70.202(d) and 70.203(d) do not include the proposed provision that MSHA may revoke a person's certification for failing to pass the MSHA examination. The proposed provisions would have given MSHA discretion to revoke a person's certification for failing to pass the examination which is inconsistent with final §§ 70.202(c) and 70.203(c) which require that, to maintain certification, a person must pass the examination every three years.

MSHA received two comments on this provision. One commenter suggested that revocation should be mandatory in those cases where certified persons execute their duties improperly. MSHA has not adopted the suggestion. Because of the seriousness of decertification, each case should be judged on a case-by-case basis. In certain circumstances, decertification, or even criminal referral, may be appropriate. In other cases, however, decertification may not be warranted. In any event, it is important to permit the certified person the opportunity to present mitigating circumstances or otherwise rebut any evidence that MSHA would use in order to justify the person's decertification.

The second commenter suggested that, because MSHA seldom uses its decertification authority, MSHA should eliminate the revocation provisions. This commenter also suggested that MSHA should perform all respirable dust sampling in lieu of certifying and decertifying persons. MSHA has not adopted these suggestions. The authority to decertify a person is a significant factor in safeguarding the integrity of the sampling and maintenance and calibration processes, providing a healthful environment for miners, and maintaining miners' confidence and support for the dust program. MSHA's current decertification procedures and procedures regarding appeals of revocation are addressed in MSHA's Program Policy Letter (PPL) No. P12–V–01, March 8, 2012 (Reissue of P09–V–08—Procedures for Revoking MSHA Certifications to Take Respirable Dust Samples or to Maintain and Calibrate Approved Dust Sampling Devices). In addition, as explained elsewhere in this preamble, the responsibility to provide a safe and healthful environment for miners is primarily the operator's obligation.

Final §§ 70.202 and 70.203, like the proposal, does not include paragraph (c) in both existing §§ 70.202 and 70.203, which permit MSHA to temporarily certify a person to collect respirable dust samples or to maintain and calibrate approved sampling devices if the person has received specific instruction from an authorized representative of the Secretary. MSHA is not including the existing temporary certification provisions because MSHA's experience has been that people seek permanent certification, rather than temporary certification. MSHA received no comment on the proposed deletions of paragraphs(c) in existing §§ 70.202 and 70.203.

7. Section 70.204 Approved Sampling Devices; Maintenance and Calibration

Final § 70.204(a), like the proposal, requires that approved sampling devices be maintained as approved under 30 CFR part 74 and calibrated in accordance with MSHA Informational Report IR 1240 (1996) ''Calibration and Maintenance Procedures for Coal Mine Respirable Dust Samplers'' or in accordance with the manufacturer's recommendations, if using a CPDM.

Final paragraph (a) is similar to the proposal and clarifies that only persons certified in maintenance and calibration can perform maintenance work on ''the CPDM or the pump unit of the CMDPSU'' rather than ''the pump unit of approved sampling devices'' because the CPDM is a sealed unit. MSHA's experience with the CMDPSU is that maintenance and calibration of the pump unit requires a person to open, handle, disassemble, or reassemble the sampling device's internal components. Additionally, maintenance of the pump unit could affect the electrical components or other intrinsic safety features that must be maintained for the device to retain its approval and not become a source of possible ignition of a methane and oxygen atmosphere. Persons trained and certified in maintenance and calibration procedures on the CMDPSU have been determined to be competent and knowledgeable to properly perform pump unit maintenance on the CMDPSU. Final paragraph (a) clarifies that only persons certified in maintenance and calibration can perform maintenance on the CPDM. The CPDM is a new sampling device which is a sealed unit. To ensure proper performance of the CPDM and the integrity of the samples, it is critical that only persons trained and certified in maintenance and calibration be allowed to perform maintenance work on the CPDM.

One commenter generally supported the proposed provision; another one did not. The latter commenter questioned whether requiring maintenance and calibration be done according to the manufacturer's instructions was equivalent to open-ended incorporation by reference.

As required in other 30 CFR provisions, it is prudent and reasonable to require that the CPDM be calibrated according to manufacturer's recommendations. The CPDM is a new sampling device and the manufacturer has the knowledge and expertise to determine how the unit is to be calibrated. Maintaining the CPDM according to the manufacturer's recommendations will ensure that it is maintained as approved under 30 CFR part 74.

Final § 70.204(b) is substantially similar to proposed § 70.204(b). It requires that sampling devices be calibrated at the flowrate of 2.0 liters of air per minute (L/min) if using a CMDPSU, or at 2.2 L/min if using a CPDM, or at a different flowrate recommended by the manufacturer, before they are put into service and, thereafter, at time intervals recommended by the manufacturer or prescribed by the Secretary or Secretary of HHS. As a clarification regarding the calibration of flowrate, final paragraph (b) includes the phrase ''if using a CMDPSU, or at 2.2 L/min if using a CPDM,'' and does not include the phrase ''or prescribed by the Secretary or Secretary of HHS for the particular device.'' Calibration is determined by approval of the sampling device based

on the performance of the unit. The manufacturer must establish, for a device meeting part 74 requirements, the flowrate that produces a sample that measures respirable coal mine dust. In addition, like the proposal, final paragraph (b) allows the time intervals between calibrations to be performed according to the manufacturer's recommendations, as well as prescribed by the Secretary or Secretary of HHS. This will allow the Secretaries to establish a different calibration schedule when necessary to address problems associated with a particular sampling unit.

One commenter understood the flowrate provision in proposed paragraph (b) to mean that the manufacturer could change the flowrate and it would change the concentration measured. MSHA clarified at a public hearing that the flowrate is recommended by the manufacturer and approved by MSHA and NIOSH. Calibration of the sampling device is done following the manufacturer's specifications, but how the sampler is used in the field to collect samples is specified by NIOSH and MSHA.

Final paragraph (c), like the proposal, requires that if a CMDPSU is used to sample, it must be examined and tested by a person certified in sampling or in maintenance and calibration within 3 hours before the start of the shift on which the approved sampling devices will be used to collect respirable dust samples. This will ensure that the sampling device is clean and in proper working condition prior to use.

One commenter suggested that the preshift check could be done anytime before the start of the shift, not within 3 hours of the shift as specified in the proposed rule.

The requirement to examine and test the CMDPSU within 3 hours before the start of the shift is consistent with MSHA's existing policy. Since the 1980s, MSHA has interpreted the language ''immediately before each sampling shift'' required by existing §§ 70.204(d), 71.204(d), and 90.204(d) as being equal to no more than 3 hours (U.S. DOL, MSHA, MSHA Policy Memorandum No. 81–17 C, 1981; U.S. DOL, MSHA Program Information Bulletin No. P09–31, 08/25/2009). The 3-hour time frame in the final paragraph (c) provides operators transparency regarding their responsibilities for testing and examining sampling devices, flexibility, and assurance that the sampling devices work effectively during the next shift. This time frame also ensures that the sampling device is not assembled and exposed for extended periods to possible contamination and mishandling on coal mine property.

The examination and testing requirements for a CMDPSU are specified in paragraphs (c)(1) through (c)(5). Final paragraphs (c)(1) through (c)(4) are identical to the proposed rule. Final paragraph (c)(1) requires a thorough examination of all components of the cyclone assembly, including the interior of the connector barrel, vortex finder, cyclone body, and grit pot, to assure that they are clean and free of dust and dirt. Final paragraph (c)(2) requires the examination of the inner surface of the cyclone body to assure that it is free of scoring or scratch marks on the inner surface of the cyclone where the air flow is directed by the vortex finder into the cyclone body. Final paragraph (c)(3) requires examination of the external hose connecting the pump unit to the sampling head assembly to assure that it is clean and free of leaks. Final paragraph (c)(4) requires examination of the clamping and positioning of the cyclone body, vortex finder, and cassette to assure that they are rigid, in alignment, firmly in contact, and airtight. Final paragraph (c)(5), like the proposal, requires testing the voltage of each battery while under actual load to assure the battery is fully charged. This requires that a fully assembled and examined sampling head assembly be attached to the pump inlet with the pump unit running when the voltage check is made. The final requirement in (c)(5) is simplified by modifying the proposed language related to CMDPSU batteries. The proposal would have required that the voltage for nickel cadmium cell batteries must not be lower than the product of the number of cells in the battery multiplied by 1.25, and the voltage for other than nickel cadmium cell batteries must not be lower than the product of the number of cells in the battery multiplied by the manufacturer's nominal voltage per cell value. The final provision requires that the voltage for the batteries used in the CMDPSU must not be lower than the product of the number of cells in the battery multiplied by the manufacturer's nominal voltage per cell value. This revision allows replacement batteries of different designs to be used once approved. No comments were received on paragraphs (c)(1) through (c)(5).

Final paragraph (d)(1) requires that if using a CPDM, the person certified in sampling or in maintenance and calibration must follow the pre-operational examinations, testing, and set-up procedures, and perform necessary maintenance recommended by the manufacturer to assure its operational readiness within 3 hours before the start of the shift on which the device will be used to collect respirable dust samples. Final paragraph (d)(2) requires the certified person to perform other required scheduled examinations and maintenance procedures recommended by the manufacturer.

Final paragraphs (d)(1) and (2) are similar to proposed § 70.206(b)(2), (5), and (6). Proposed § 70.206 would have provided requirements for a CPDM Performance Plan. Proposed § 70.206(b)(2), (5) and (6) would have required the approved CPDM Performance Plan to include the names or titles of the responsible mine officials who are designated by the operator and the following information: The pre-operational examinations, testing and set-up procedures to verify the operational readiness of the sampling device before each sampling shift; the routine daily and other required scheduled maintenance; and procedures or methods for verifying the calibration of each CPDM. The proposed CPDM Performance Plan has not been included in this final rule. Additional discussion is provided in § 70.206 of this preamble concerning ''Bimonthly sampling; mechanized mining units.''

One commenter on the proposed CPDM Performance Plan requirements pointed out that proposed § 70.206(b)(5) would have required scheduled maintenance procedures but that those procedures come with the CPDM from the manufacturer and should not need to be submitted to MSHA as part of a plan. MSHA agrees and has not included this operator submission requirement in the final rule. Existing § 74.10 requires that manufacturers include operating and storage instructions and a maintenance and service life plan with each new CPDM device sold. Final paragraph (d) requires that such operating, maintenance, and calibration instructions be followed. The certified person must perform scheduled examinations and maintenance procedures recommended by the manufacturer.

Furthermore, final paragraphs (d)(1) and (2) are parallel to those requirements for the CMDPSU under final paragraph (c), except the certified person needs to follow the manufacturer's specifications for sampling or for maintenance and calibrations. Mine operators are in the best position to maintain equipment, tools, and instruments that they use to comply with the Mine Act and related standards. Under the existing standards, operators are responsible for ensuring that their CMDPSUs are properly maintained, and MSHA believes

application of this practice to the CPDM is reasonable.

Final paragraph (e), like the proposal and existing standard, incorporates by reference MSHA Informational Report IR 1240 (1996) referenced in final paragraph (a) of these sections. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. A copy is available on the MSHA Web site at *http://www.msha.gov* and may be inspected or obtained at MSHA, Coal Mine Safety and Health, 1100 Wilson Blvd., Room 2424, Arlington, Virginia 22209–3939 and at each MSHA Coal Mine Safety and Health District Office. Copies may be inspected at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html*. No comments were received on the proposal.

8. Section 70.205 Approved Sampling Devices; Operation; Air Flowrate

Final § 70.205(a) requires that approved sampling devices be operated at the flowrate of 2.0 L/min if using a CMDPSU, or at 2.2 L/min if using a CPDM, or at a different flowrate recommended by the manufacturer. The language was changed from the proposal to be consistent with final § 70.204(b), and the language ''if using a CMDPSU, or at 2.2 L/min if using a CPDM,'' was added to the final provision.

One commenter understood the flowrate provision to mean the manufacturer could change the flowrate and this would change the concentration measured. This comment is addressed elsewhere in the preamble under § 70.204(b).

Final paragraph (b), like the proposal, requires that if a CMDPSU is used, each device be examined during each sampling shift by a person certified in sampling. Like the existing standards, the purpose of the on-shift CPDM examinations required by final paragraph (b) is to verify that the device remains in the proper location and continues to operate properly.

Final paragraph (b)(1), like the proposal, requires that the CMDPSU be examined during the second hour of a sampling shift to assure it is in the proper location, operating properly, and at the proper flowrate. It further requires that if the proper flowrate is not maintained, the certified person must make the necessary corrective adjustments. In addition, final paragraph (b)(1), similar to the proposal, provides that the examination is not required if the approved CMDPSU is being operated in an anthracite coal mine using the full box, open breast, or slant breast mining method. Proposed paragraph (b)(1) would not have required the examination if the sampling device was operated in a breast or chamber of an anthracite coal mine where only the full box mining method was used.

One commenter questioned whether the on-shift examination of the sampling device should be required for anthracite mines. Based on MSHA's experience with anthracite mines, MSHA has determined that in the full box mining method, as well as open breast and slant breast mining methods, which are used only in certain anthracite mines, there is limited space for the certified person and that conducting this examination is potentially unsafe. Under the final rule, operators of anthracite coal mines are not required to perform the examination of the sampling device during the second hour of operation when the device is operated where these mining methods are used.

Final paragraph (b)(2), like the proposal, requires that the certified person check the CMDPSU during the last hour of operation to assure that it continues to operate properly, including at the proper flowrate. This provision also requires that, if the proper flowrate is not maintained, the respirable dust sample must be transmitted to MSHA with a notation on the back of the dust data card stating that the proper flowrate was not maintained. It further requires that other events occurring during the collection of the respirable dust sample that may affect the validity of the sample, such as dropping of the sampling head assembly onto the mine floor, must be noted on the back of the dust data card. No comments were received on the proposal.

Final paragraph (c) is changed from the proposal. It is similar to proposed § 70.206(b)(1) and (7). It requires that if a CPDM is used, the person certified in sampling must monitor the dust concentrations and the sampling status conditions being reported by the CPDM at mid-shift or more frequently as specified in the approved mine ventilation plan to assure that: The sampling device is in the proper location and is operating properly; and the work environment of the occupation or DA being sampled remains in compliance with the standard at the end of the shift. The language ''status conditions'' as it relates to CPDM sampling is terminology used in the approved CPDM manufacturer's literature.

Proposed § 70.206(b)(1) and (7) relating to the proposed CPDM Performance Plan would have required identifying information on the occupations, locations, and miners being sampled, and that the designated mine official monitor the frequency with which dust concentrations are reported by the CPDM during each sampling shift. Under the proposal, monitoring intervals would have been determined, in part, based on considerations such as the occupation being monitored, geologic conditions, the location in the mine from which the sample would have been taken, production levels, past exposure levels and similarity to current conditions, and mine experience.

The majority of comments on the proposed CPDM Performance Plan stated that another mine plan was not necessary. MSHA has determined that the CPDM Performance Plan would have been duplicative of many requirements in existing mine ventilation plans. Therefore, the proposed CPDM Performance Plan is not included in the final rule. Additional discussion on the proposed CPDM Performance Plan is located under final § 70.206 of this preamble.

Final paragraph (c) is similar to proposed § 70.206(b)(7) which would have required the CPDM Performance Plan to include reasonable monitoring intervals based on the conditions at each mine. Routine monitoring of dust concentrations during the sampling shift is important. It ensures that MSHA, mine operators, and miners know the dust concentrations where samples were taken so that timely corrective action can be taken as necessary. As such, final paragraph (c) requires that when a CPDM is in use, the certified person must monitor the dust concentration being reported by the device at mid-shift or more frequently as specified in the operator's approved mine ventilation plan. Mid-shift means the middle of the shift for whatever specific shift length worked. In addition, specifying the monitoring frequency as part of the approved ventilation plan will also allow the District Manager to assess the need, if any, for more frequent monitoring of dust concentrations on a mine-by-mine basis. For example, the District Manager may require the operator to more frequently monitor dust concentrations during the shift when CPDM sampling at the DO has shown repeated overexposures.

For the same reason discussed under final paragraph (b), final paragraph (c) does not require on-shift monitoring under this section when CPDMs are

operated in certain anthracite mining operations.

9. Section 70.206 Bimonthly Sampling of Mechanized Mining Units

Final § 70.206 regarding bimonthly sampling of mechanized mining units (MMUs) is similar to proposed § 70.207 regarding sampling of MMUs when using a CMDPSU. Unlike proposed § 70.206, the final rule does not include requirements for a CPDM Performance Plan. Proposed § 70.206 would have required each operator to develop and submit for approval a CPDM Performance Plan prior to sampling with the CPDM. The Plan would have required specific information on CPDMs and approval procedures for the Plan.

MSHA received many comments on the proposed CPDM Performance Plan. The majority of comments stated that another mine plan was not necessary. MSHA has determined that the CPDM Performance Plan would have been duplicative of many of the requirements in existing mine ventilation plans. In addition, the information that is needed to ensure the proper use of a CPDM is addressed by other provisions of this final rule or will be incorporated into each operator's ventilation plan. For example, certain provisions that would have been required under the CPDM Performance Plan are included in final §§ 70.204(d)(1) and (d)(2), and 70.205(c) and are discussed elsewhere in this preamble. As many of the requirements in the proposed CPDM Performance Plan are redundant with existing mine ventilation plans and most of the requirements of this final rule, MSHA determined that the CPDM Performance Plan is unnecessary. Miners will be adequately protected by the requirements of a mine's ventilation plan and this final rule. Accordingly, the proposed CPDM Performance Plan is not included in this final rule.

The title of § 70.206 is changed from proposed § 70.207. It does not include the term ''CMDPSU'' to avoid confusion with the sampling device required for bimonthly sampling of MMUs under this section and quarterly sampling of MMUs under final § 70.208. Final § 70.201(a) addresses the required sampling devices.

Final § 70.206 includes language that bimonthly sampling of MMUs is required until January 31, 2016 . This change clarifies that bimonthly sampling ceases 18 months after the effective date of the final rule.

Final paragraph (a) is redesignated from proposed § 70.207(a) and, like the proposal, requires that each operator take five valid representative samples from the DO in each MMU during each bimonthly period. The term ''representative samples'' replaces the term ''respirable dust samples'' that is used in the existing standard. The term ''valid representative samples'' used here and throughout the preamble and rule is a short form reference to the terms ''valid respirable dust sample'' and ''representative samples.'' Requiring ''valid representative samples'' ensures that samples taken by the operator reflect typical dust concentrations and conditions at the mine during normal mining activity. MSHA received one comment on the definition of representative samples. That comment is discussed elsewhere in this preamble under § 70.2.

Paragraph (a) further requires that DO samples be collected on consecutive normal production shifts or normal production shifts each of which is worked on consecutive days. This is consistent with the existing standard. MSHA received several comments on the definition of ''normal production shift.'' Those comments are addressed elsewhere in this preamble under § 70.2.

Final paragraph (a), like the proposal, provides that the bimonthly sampling periods are: (1) January 1—February 28 (29); (2) March 1—April 30; (3) May 1—June 30; (4) July 1—August 31; (5) September 1—October 31; and (6) November 1—December 31. The bimonthly sampling periods are identical to the existing standard.

Some commenters suggested that MSHA include a provision addressing malfunctions, suspected tampering and environmental conditions that could affect measurement of respirable dust levels. These commenters stated that mine operators should not be required to commit to long-term ventilation plan approvals for short-term issues due to environmental conditions when those conditions are not representative of the normal mining conditions used in the development of ventilation plans.

Mine operators have always had the opportunity to submit information on the back of dust data cards when they knew that a respirable dust sample collected to fulfill the requirements of part 70, 71, or 90 was not representative of normal conditions. The information submitted has been and will continue to be used to determine if the sample submitted by the operator is a valid sample. To clarify the responsibilities of the certified person responsible for collecting respirable dust samples, MSHA has included requirements for the submission of information on the back of dust data cards in final §§ 70.205(b)(2), 71.205(b)(2) and 90.205(b)(2).

Final paragraph (b) is redesignated from proposed § 70.207(b) and, like the proposal, requires that unless otherwise directed by the District Manager, the DO samples must be taken by placing the approved sampling device as specified in paragraphs (b)(1) through (10) of this section. The DOs specified in paragraphs (b)(1) through (10) are unchanged from the existing standard.

On March 8, 2011, MSHA issued in the **Federal Register** a request for comments (76 FR 12648, 12650) and stated that the proposed rule addresses: (1) Which occupations must be sampled using CPDMs, and (2) which work positions and areas could be sampled using either CPDMs or CMDPSUs. MSHA solicited comments on the proposed sampling occupations and locations, and on whether there are other positions or areas where it may be appropriate to require the use of CPDMs. MSHA also requested comments on whether the proposed CPDM sampling of ODOs on the MMU is sufficient to address different mining techniques, potential overexposures, and ineffective use of approved dust controls. MSHA did not receive comments on proposed § 70.207(b).

Final § 70.206(c) is redesignated from proposed § 70.207(c). It requires that when the applicable dust standard changes in accordance with final § 70.101 (Respirable dust standard when quartz is present), the standard will become effective 7 calendar days after the date of notification of the change by MSHA. The rationale for paragraph (c) is discussed elsewhere in this preamble under § 70.208(c).

Final paragraph (c) does not include the requirements in proposed § 70.207(c)(1) and (c)(2). Proposed § 70.207(c)(1) would have required that if all samples from the most recent bimonthly sampling period do not exceed the new standard, the operator would begin sampling on the affected MMU on the first production shift during the next bimonthly period following receipt from MSHA of the change in the standard. Proposed § 70.207(c)(2) would have required that if any sample from the most recent bimonthly sampling period exceeds the new standard (reduced due to the presence of quartz), the operator would have to make necessary adjustments to the dust control parameters in the mine ventilation plan within three days, and then collect samples from the affected MMU on consecutive normal production shifts until five valid representative samples are collected. It further provided that the samples collected would be treated as normal bimonthly samples under this part.

One commenter stated that one overweight sample was not an indication of a problem and that the ventilation plan did not need to be changed when one sample was high or the average of five samples was over the concentration standard. Other commenters stated that an operator cannot make ventilation plan changes without MSHA approval and that three days was too short a time period for the operator to resubmit the ventilation plan for changes.

After reviewing the comments, MSHA has determined to not include proposed paragraphs (c)(1) and (c)(2) in the final rule. The proposal would have required additional sampling requirements before the operator became aware of the new reduced standard. For consistency between the sampling requirements of the final rule, final paragraph (c) is the same as final § 70.207(b) regarding bimonthly sampling of DAs, § 70.208(c) regarding quarterly sampling of MMUs, § 70.209(b) regarding quarterly sampling of DAs, § 71.206(b) regarding quarterly sampling, and § 90.207(b) regarding quarterly sampling.

Final paragraph (d) is redesignated from proposed § 70.207(d) and makes non-substantive changes. Like the proposal, it requires that if a normal production shift is not achieved, the DO sample for that shift may be voided by MSHA. It further requires that any sample that, regardless of production, exceeds the standard by at least 0.1 mg/m^3 must be used in the determination of the equivalent concentration for that MMU. Paragraph (d) is similar to and consistent with final § 70.208(d) regarding quarterly sampling of MMUs.

One commenter stated that it was unfair for MSHA to count a sample that was over the standard when normal production was not achieved without giving the operator some credit for a sample that was below the standard when normal production was not achieved. The commenter also stated that if production is not met on a given shift and the sample is under the standard, it is still an indication of the miner's exposure.

Final paragraph (d) ensures that respirable dust sampling is representative of the activities that occur when sampling is not being conducted and dust generation sources are active. If normal production is not achieved, the samples can be expected to reflect an unrealistically lower reading of respirable dust levels in the mine atmosphere than what would be expected during typical mining conditions at the location where the miner is working. Without normal production, an accurate determination of the effectiveness of the dust control parameters in the approved ventilation plan cannot be established. If samples collected are in compliance with the respirable dust standard when normal production levels are achieved and the ventilation plan is followed, miners have a reasonable expectation that on shifts when samples are not collected, the respirable dust levels are in compliance with the respirable dust standard. Any sample that exceeds the standard while production is less than normal should be used to determine the respirable dust concentration of the MMU since operating at a higher production would likely increase miners' respirable dust exposure even more.

The above rationale is consistent with the 1995 NIOSH Criteria Document, the 1996 Dust Advisory Committee Report, and the 1992 Coal Mine Respirable Dust Task Group Report, all of which emphasized the need for mine operators to achieve normal production levels when evaluating the respirable dust parameters contained in the approved ventilation plan.

Another commenter expressed concern that MSHA would use an overly restrictive approach in evaluating samples, adding that, in the past, MSHA refused to void samples with oversized particles if there was a specific weight gain. To illustrate, the commenter stated that a sampling device could be dropped and filled with non-respirable dust from the mine floor and MSHA would not void the sample because it had a specific weight gain.

MSHA will continue to use the criteria listed in MSHA Method P–19 for evaluating samples for oversized particles (U.S. Department of Labor, MSHA Method P–19, 2012). Samples with net weight gains greater than 1.4 mg are opened and visually inspected for oversized particles. If this examination reveals the presence of foreign materials or other abnormalities, the sample is voided as contaminated. Any sample with a net weight gain of 6.0 mg or greater is subjected to further examination. The procedures used by MSHA's Pittsburgh Safety and Health Technology Center in MSHA Method P–19 are available on request. It is the operator's responsibility to submit samples that are collected according to the requirements of Title 30 of the CFR. As stated earlier, the operator has always had the opportunity to note on the back of the dust data card events that may make a sample non-representative. MSHA has incorporated the requirements for the operator to make notations on the back of the dust data card in final §§ 70.205(b)(2), 71.205(b)(2) and 90.205(b)(2).

Another commenter suggested that the word ''may'' in the proposal ought to be changed to ''must'' in the final rule so that DO samples would always be voided if a normal production shift is not achieved. MSHA is using ''may'' instead of ''must'' to allow samples that exceed the standard to be included in the average of samples submitted to fulfill the sampling requirements of final § 70.206. If normal production levels are not achieved and the sample collected nevertheless exceeds the standard by at least 0.1 mg/m^3, MSHA will use the sample to determine the equivalent concentration.

Final paragraph (e) is similar to proposed § 70.207(g) and (i). It requires that when a valid representative sample taken in accordance with this section meets or exceeds the excessive concentration value (ECV) in Table 70–1 that corresponds to the applicable standard and particular sampling device used, the operator must: (1) Make approved respiratory equipment available; (2) Immediately take corrective action; and (3) Record the corrective actions. The actions required by paragraph (e) are similar to those in proposed § 70.207(g) and (i).

Proposed § 70.207(g) would have required that, during the time for abatement fixed in a citation, the operator: (1) Make approved respiratory equipment available to affected miners in accordance with § 72.700; (2) submit to the District Manager for approval proposed corrective actions to lower the concentration of respirable dust to within the standard; and (3) upon approval by the District Manager, implement the proposed corrective actions and then sample the environment of the affected occupation in the MMU in the citation on each normal production shift until five valid representative samples are taken.

Proposed § 70.207(i) would have required that when the equivalent concentration of one or more valid samples collected by the operator exceeds the standard but is less than the ECV in proposed Table 70–1, the operator would have to: (1) Make approved respiratory equipment available to affected miners in accordance with proposed § 72.700; (2) take corrective action to lower the respirable dust concentration to at or below the standard; and (3) record the corrective actions taken in the same manner as the records for hazardous conditions required by existing § 75.363.

In the March 8, 2011, request for comments (76 FR 12648), MSHA stated that the Agency received comments that

the proposed rule should not require mine operators to record corrective actions or excessive dust concentrations as § 75.363 hazardous conditions. MSHA further stated that it ''would like to clarify that the proposal would require that operators record both excessive dust concentrations and corrective actions in the same manner as conditions are recorded under § 75.363'' and that ''MSHA would not consider excessive dust concentrations or corrective actions to be hazardous conditions, since the proposed requirement is not a section 75.363 required record'' (76 FR 12650).

Some commenters supported the requirements of proposed § 70.207(i) and some did not. Most commenters stated that a 1.0 mg/m^3 dust concentration is not a hazardous condition and a single shift sample should not require an operator to take action under proposed § 70.207(i).

In response to the comments, final paragraph (e) is changed from the proposal. It does not require action if the dust sample exceeds the standard but is less than the ECV in Table 70–1. Rather, it requires an operator to take certain actions when a respirable dust sample meets or exceeds the ECV in Table 70–1. The rationale for final paragraph (e) is the same as that for final §§ 70.207(d), 70.208(e), and 70.209(c) and is discussed elsewhere in this preamble under § 70.208(e) of this preamble.

Final paragraph (e)(1), like proposed § 70.207(g)(1) and (i)(1), requires that the operator make approved respirators available to affected miners in accordance with § 72.700. Some commenters expressed concern that it is inconsistent for MSHA to allow the use of respiratory equipment after a violation of the standard, but not allow respiratory equipment during other times to control miners' exposure. Other commenters, who generally supported requiring operators to make respiratory equipment available at the miner's request, stated that respirators should not be allowed while the operator is attempting to achieve compliance with the standard.

Final paragraph (e)(1) is derived from existing § 70.300, which requires an operator to make respirators available to all persons whenever exposed to concentrations of respirable dust in excess of the levels required to be maintained. The use of approved respiratory equipment should be encouraged until the operator determines the cause of the overexposure and takes corrective actions. Additional discussion on the use of respirators to control exposure to respirable coal mine dust is elsewhere in this preamble under § 72.700.

Final paragraph (e)(2) is similar to proposed § 70.207(g)(3) and (i)(2). It requires that the operator immediately take corrective action to lower the concentration of respirable coal mine dust to at or below the standard. Paragraph (e)(2) is consistent with existing § 70.201(d), which requires a mine operator to take corrective action to lower the concentration of respirable dust. Paragraph (e)(2) clarifies that corrective action must be taken immediately to protect miners from overexposures.

Corrective actions include, for example, engineering or environmental controls that control the level of respirable coal mine dust by: (1) Reducing dust generation at the source with the dust controls on the mining equipment; (2) suppressing the dust with water sprays, wetting agents, foams or water infusion; (3) using ventilation to dilute the dust; (4) capturing the dust with machine-mounted dust collectors; and (5) diverting the dust being generated by the mining process with shearer clearer or passive barriers. This provision will protect miners' health because the operator will be required to review the dust control parameters and determine what factors may have contributed to the overexposure. To avoid confusion with the proposal's timeframes as to when corrective action needs to be taken, final paragraph (e)(2) requires that the action needs to be taken immediately. MSHA will assess, on a case-by-case basis, the action that must be taken immediately and the appropriate timeframe within which it must occur. For example, under circumstances involving a relatively minor correction, ''immediately'' would mean before the next shift. Under circumstances involving the purchase of additional equipment or parts, MSHA will accept a bona fide purchase order as immediate corrective action. The purchase order must show the date of purchase and expected delivery, and the equipment or part must be installed as soon as it is delivered.

Final paragraph (e)(3) is similar to proposed § 70.207(i)(3). Final paragraph (e)(3) requires the mine operator to make a record of the corrective actions taken. The record must be certified by the mine foreman or equivalent mine official no later than the end of the mine foreman's or equivalent mine official's next regularly scheduled working shift. It also requires that the record be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration. It further requires that the records be retained at a surface location at the mine for at least 1 year and be made available for inspection by authorized representatives of the Secretary and the representative of miners.

One commenter supported proposed § 70.207(i)(3) which would have required the mine operator to make a record of the corrective action taken in the same manner as required by existing § 75.363. Other commenters stated that the proposal was unnecessary and costly. One commenter stated that entering the corrective actions in the book of hazards sets up the operator for an unwarrantable failure order because the operator would be required to document the circumstances as a hazard and then could fail to correct the hazard if the corrective actions did not reduce the dust levels to meet the standard. Other commenters stated that examinations conducted under § 75.363 are for hazardous conditions found during the shift by the certified person conducting the examination. They further stated that hazardous conditions found during the § 75.363 examination must be corrected immediately, but any violation of the respirable dust standard cannot be corrected immediately because the overexposure is not known until after the shift is over and the District Manager must first approve the corrective action.

As stated previously, ''MSHA would not consider excessive dust concentrations or corrective actions to be hazardous conditions, since the proposed requirement is not a section 75.363 required record.'' To avoid confusion with the existing requirements at § 75.363 regarding ''Hazardous conditions; posting, correcting and recording,'' final paragraph (e) does not contain any reference to § 75.363 or the term ''hazardous conditions.'' However, the certification and record retention requirements of final paragraph (e)(3) are similar to those required for records under existing § 75.363. Under § 75.363(c), the record must be made by the certified person or verified by the certified person and must be countersigned by the mine foreman or equivalent mine official. Paragraph (e)(3) is necessary because it provides useful information to a mine operator, miners, and MSHA regarding the corrective actions taken and whether the dust control parameters in the approved ventilation plan are adequate. The record of the corrective actions taken should be made by a responsible mine official, such as the mine foreman or equivalent mine official. Records and certification of corrective action taken

help identify excessive dust concentrations so they can be addressed appropriately to better ensure miners' health. In addition, retaining records at the mine for at least one year is consistent with many existing MSHA record retention standards, particularly the proposal's incorporation of existing § 75.363(d). Record retention is necessary to help the mine operator, MSHA, and the miners' representative identify problems with dust controls and ensure that excessive dust concentrations are corrected. The cost associated with the record requirement is shown in Chapter IV of the Regulatory Economic Analysis (REA).

Unlike proposed § 70.207(g)(2), final paragraph (e) does not require the submission of corrective actions to the District Manager for approval. Comments on proposed § 70.207(g)(2) are discussed under final paragraph (h)(4).

For consistency between the sampling requirements of the final rule, final paragraphs (e)(1)–(3) are identical to final § 70.207(d)(1)–(3) regarding bimonthly sampling of designated areas, § 70.208(e)(1)–(3) regarding quarterly sampling of MMUs, § 70.209(c)(1)–(3) regarding quarterly sampling of designated areas, § 71.206(h)(1)–(3) regarding quarterly sampling, and except for conforming changes, to § 90.207(c)(1)–(3) regarding quarterly sampling.

Final paragraph (f) is redesignated and changed from proposed § 70.207(e). Paragraph (f)(1) is similar to proposed § 70.207(e) regarding sampling of MMUs when using a CMDPSU and paragraph (f)(2) is similar to proposed § 70.208(e) regarding sampling of MMUs when using a CPDM. Paragraph (f) states that noncompliance with the standard is demonstrated during the sampling period when: (1) Two or more valid representative samples meet or exceed the excessive concentration value (ECV) in Table 70–1 that corresponds to the applicable standard and particular sampling device used; or (2) The average for all valid representative samples meets or exceeds the ECV in Table 70–2 that corresponds to the applicable standard and particular sampling device used.

In the March 8, 2011, request for comments (76 FR 12649), MSHA stated that the Agency is interested in commenters' views on what actions should be taken by MSHA and the mine operator when a single shift respirable dust sample meets or exceeds the ECV. MSHA also requested comments on alternative actions, other than those contained in the proposal, for MSHA and the operator to take if operators use a CPDM. MSHA further stated that it is particularly interested in alternatives and how such alternatives would be protective of miners.

Many commenters expressed concern that compliance determinations would be made on the basis of a single-shift measurement. Proposed § 70.207(e) would have required that when using a CMDPSU, no valid single-shift sample equivalent concentration meet or exceed the ECV that corresponds to the applicable standard in proposed Table 70–1.

In response to comments, final paragraph (f) provides two different methods by which compliance determinations can be made. The rationale for final paragraphs (f)(1) and (2) is the same as that for final §§ 70.207(e)(1) and (2), 70.208(f)(1) and (2), 70.209(d)(1) and (2), 71.206(i)(1) and (2), and 90.207(d)(1) and (2), and is discussed elsewhere in this preamble under § 70.208(f)(1) and (2).

For consistency between the sampling requirements of the final rule, final paragraphs (f)(1) and (2) are the same as final §§ 70.207(e)(1) and (2), 70.208(f)(1) and (2), 70.209(d)(1) and (2), and, except for conforming changes, final §§ 71.206(i)(1) and (2), and 90.207(d)(1) and (2).

Comments on the ECVs in proposed Table 70–1 are discussed elsewhere in this preamble under § 70.208(f). In addition, a detailed discussion on the derivation of the ECVs in both final Tables 70–1 and 70–2 is included in Appendix A of the preamble. Comments that questioned the accuracy of a single sample in making a compliance determination are addressed elsewhere in this preamble under § 72.800.

Final paragraph (g) is changed and redesignated from proposed § 70.207(f). It requires that unless otherwise directed by the District Manager, upon issuance of a citation for a violation of the standard involving a DO in an MMU, paragraph (a) of this section will not apply to that MMU until the violation is abated and the citation is terminated in accordance with paragraphs (h) and (i) of this section.

Final paragraph (g) includes an exception to allow the District Manager flexibility to address extenuating circumstances that would affect sampling. An example of extenuating circumstances would occur when an uncorrected violation would require abatement sampling that continues into the next sampling period.

In addition, final paragraph (g) clarifies that a violation must be abated and the citation must be terminated, in accordance with final paragraphs (h) and (i), before resuming bimonthly sampling. Final paragraphs (h) and (i) are discussed below. Final paragraph (g) is similar to existing § 70.207(c). MSHA did not receive comments on the proposal.

For consistency between the sampling requirements of the final rule, except for conforming changes, final paragraph (g) is the same as final §§ 70.207(f), 70.208(g), § 70.209(e), 71.206(j), and 90.207(e).

Final paragraph (h) is redesignated from and is similar to proposed § 70.207(g). It requires that upon issuance of a citation for violation of the standard, the operator must take the following actions sequentially: (1) Make approved respiratory equipment available; (2) immediately take corrective action; (3) record the corrective actions; and (4) conduct additional sampling. The actions required by paragraph (h) are similar to those in proposed § 70.207(g)(1)–(3) and (i)(3) discussed under final paragraph (e). Paragraph (h) includes the term ''sequentially'' to ensure that corrective actions are taken in the order they are listed.

Final paragraph (h)(1), like proposed § 70.207(g)(1), requires that the mine operator make approved respiratory equipment available to affected miners in accordance with § 72.700 of this chapter. Comments on proposed § 70.207(g)(1), together with the rationale for final paragraph (h)(1), are discussed under final paragraph (e).

Final paragraph (h)(2) is similar to proposed § 70.207(g)(3). It requires that the operator immediately take corrective action to lower the concentration of respirable coal mine dust to at or below the standard. Paragraph (h)(2) is similar to proposed § 70.207(g)(3) which would have required a mine operator to implement the proposed corrective actions. The types of corrective actions that could be taken are discussed under paragraph (e)(2). The rationale for final paragraph (h)(2) is the same as that for final paragraph (e)(2). As explained for final paragraph (e)(2), in the event of extenuating circumstances in which corrective actions cannot be taken immediately, i.e., the corrective action involves the purchase of additional equipment or parts, MSHA will accept a bona fide purchase order as immediate corrective action. The purchase order must show the date of purchase and expected delivery, and the equipment or part must be installed as soon as it is delivered. Under those circumstances, MSHA will extend the timeframe in which additional sampling is to begin in accordance with paragraph (h)(4).

Final paragraph (h)(3) is similar to proposed § 70.207(i)(3) and is the same

as final paragraph (e)(3). It requires that the operator make a record of the corrective actions taken. The record must be certified by the mine foreman or equivalent mine official no later than the end of the mine foreman's or equivalent mine official's next regularly scheduled working shift. It also requires that the record must be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration. It further requires that the records must be retained at a surface location at the mine for at least 1 year and be made available for inspection by authorized representatives of the Secretary and the representative of miners. Comments on proposed § 70.207(i)(3) and the rationale for paragraph (h)(3) are discussed under paragraph (e)(3).

Final paragraph (h)(4) is similar to proposed § 70.207(g)(3). It requires that the mine operator begin sampling, within 8 calendar days after the date the citation is issued, the environment of the affected occupation in the MMU on consecutive normal production shifts until five valid representative samples are taken. Paragraph (h)(4) is consistent with existing § 70.201(d), which requires a mine operator to sample each production shift until five valid respirable dust samples are taken. In addition, it requires that the sampling must begin within 8 calendar days after the issuance of the citation. The 8 calendar days allow sufficient time for the operator to receive the citation and take corrective actions. Under proposed § 70.207(g)(2) and (3), sampling would have begun after submission to and approval by the District Manager of the corrective actions taken.

One commenter stated that the proposal is unfair to mine operators because MSHA Districts will not be able to process corrective action submissions in a timely manner. The commenter also stated that the requirement is too burdensome because it could result in many needless revisions to the ventilation plan by mine operators and that the approved corrective actions could be different from what is approved in the mine ventilation plan.

In response to the comments, final paragraph (h) does not include the proposed requirement that the operator submit corrective actions to the District Manager for approval before corrective action can be taken. In reevaluating the requirements of proposed § 70.207(g), MSHA determined that final paragraph (h) will allow for faster abatement of a citation because immediate action must be taken to correct the violation. The sampling conducted under paragraph (h)(4) will ensure that the corrective actions taken by the mine operator are effective in lowering the concentration of respirable dust to at or below the standard. However, to ensure that the sampling begins promptly after the operator implements the corrective actions, paragraph (h)(4) clarifies that the sampling must begin within 8 calendar days after the date the citation is issued.

For consistency between the sampling requirements of the final rule, except for conforming changes, final paragraph (h) is the same as final §§ 70.207(g), 70.208(h), 70.209(f), 71.206(k), and 90.207(f).

Final paragraph (i) is redesignated from and is substantially similar to proposed § 70.207(h). Paragraph (i) contains nonsubstantive and organizational changes from the proposal. It provides that a citation for a violation of the standard will be terminated by MSHA when: (1) Each of the five valid representative samples is at or below the standard; and (2) the operator has submitted to the District Manager revised dust control parameters as part of the mine ventilation plan that applies to the MMU in the citation, and the changes have been approved by the District Manager. It further provides that the revised parameters must reflect the control measures used by the operator to abate the violation.

Some commenters expressed concern with the proposed requirement that all five of the operator's samples must be at or below the standard for terminating a citation.

Requiring that each sample be at or below the standard provides MSHA with a stronger indication that the corrective actions were effective in continuously maintaining the average respirable dust levels in the mine atmosphere during each shift to which each miner in the active workings is exposed.

Several commenters stated coal mines should not be required to commit to long-term ventilation plan approvals for short-term issues particularly when those conditions are not representative of normal mining conditions when considering the development of ventilation plans.

The final rule, like the existing standards, requires that each operator must continuously maintain the average concentration of respirable dust in the mine atmosphere during each shift to which each miner in the active workings is exposed at or below the respirable dust standard. Like the existing standards, the revisions to the dust control parameters that are required to be submitted to MSHA by the operator under the final rule are parameters that the operator believes will result in compliance with the dust standard. If the operator encounters conditions where the existing dust control parameters are not effective in controlling the dust levels to at or below the respirable dust standard, the operator must adjust the dust control parameters as necessary to control the dust concentrations to at or below the standard.

Several commenters stated that submission of a change to the mine's approved ventilation plan is unfair and burdensome to mine operators. These commenters stated that the plan approval process places mine operators at a disadvantage because MSHA can shut down the MMU if the Agency does not get exactly what it wants and it is almost impossible for a mine operator to get an expedited hearing. They also stated that the proposal can result in considerable downtime for production because MSHA does not have the personnel to review and process revisions to the ventilation plans. They further stated that requiring different dust control parameters for each MMU creates a paperwork burden for mine operators and MSHA.

Mine ventilation plans are a long recognized means for addressing safety and health issues that are mine-specific. Individually tailored plans, with commonly accepted practices, are an effective method of regulating such complex matters as dust control. Existing § 75.370, regarding the submission and approval of mine ventilation plans, requires that each mine operator develop and follow a ventilation plan that is approved by MSHA and that is designed to control methane and respirable dust in the mine. Section 75.370 further requires that the plan be suitable to the conditions and mining system at the mine. It establishes the procedures for submittal, review, and approval of the plan to ensure that the plan for each mine addresses the conditions in that mine.

Requiring revisions to the dust control parameters as part of the mine ventilation plan for the MMU in the citation provides the necessary latitude to address the diversity of mining conditions found in coal mines nationwide. Details must be shown in the plan and must be specific to the conditions at each MMU. The paperwork burden associated with final paragraph (i) is shown in Chapter VIII of the REA.

MSHA is committed to the timely processing of plan revisions. The

Agency believes that the plan approval system will not result in considerable downtime for operators while MSHA reviews the plans. Circumstances that require expedited action are handled by the District Manager on a case-by-case basis. Generally, the District Manager is guided by whether the condition, if uncorrected, could result in a health or safety hazard or an imminent stoppage of production in the mine or an area of the mine. In addition, a mine operator may take action necessary to abate an imminent danger or hazardous condition, or to safeguard persons and equipment. In order to take such action, the operator would have to make a determination of the cause of the problem.

For consistency with the sampling requirements of the final rule, except for conforming changes, final paragraphs (i)(1) and (2) are the same as final §§ 70.207(h)(1) and (2), 70.208(i)(1) and (2), and 70.209(g)(1) and (2).

10. Section 70.207 Bimonthly Sampling; Designated Areas

Final § 70.207 is new, but is consistent with existing standards. It requires bimonthly sampling of DAs until January 31, 2016, which is 18 months after the effective date of the final rule. This section is included in the final rule to make the bimonthly sampling period for Designated Areas (DAs) the same as the bimonthly sampling period for MMUs under § 70.206. It is similar to proposed § 70.207 regarding bimonthly sampling of MMUs when using a CMDPSU, proposed § 70.208 regarding quarterly sampling of MMUs when using a CPDM, and proposed § 70.209 regarding quarterly sampling of DAs when using either a CMDPSU or CPDM. It is consistent with existing § 70.207 which requires bimonthly sampling of MMUs and existing § 70.208 which requires bimonthly sampling of DAs.

The proposal would have required that DAs be sampled quarterly and MMUs be sampled bimonthly on the effective date of the rule. Under the final rule, both MMUs under § 70.206 and DAs under this § 70.207 will continue the existing bimonthly sampling frequency and the existing number of required samples for a period of 18 months following the effective date of the rule. On February 1, 2016, quarterly sampling under §§ 70.208 for MMUs and 70.209 for DAs is required. This preserves the status quo for the first 18 months in order to provide operators time to concentrate on sampling changes related to full-shift sampling and taking representative samples, as that term is defined in final § 70.2. It also allows them more time to establish procedures for a new sampling frequency, and to upgrade existing controls, or to take additional measures to meet the increase in samples required after the 18-month period. Final § 70.201(b) addresses the sampling devices required for bimonthly sampling of DAs under this provision and for quarterly sampling of DAs under final § 70.209.

Final paragraph (a) is similar to proposed § 70.207(a) concerning bimonthly sampling of MMUs. It requires that each operator take one valid representative sample from each designated area (DA) on a production shift during each bimonthly period. Except for conforming changes, the periods for bimonthly sampling of DAs in paragraph (a) are the same as those in existing § 70.208(a). The bimonthly periods are: (1) February–March 31; (2) April 1–May 31; (3) June 1–July 31; (4) August 1–September 30; (5) October 1–November 30; and, (6) December 1–January 31.

Final paragraph (b) is similar to proposed §§ 70.207(c), 70.208(c), and 70.209(b) concerning when the respirable dust standard is changed when quartz is present. It requires that when the respirable dust standard is changed in accordance with § 70.101, the new standard will become effective 7 calendar days after the date of the notification of the change by MSHA. Paragraph (b) is essentially the same as existing §§ 70.207(b) and 70.208(b), but includes a clarification on the effective date of the new standard when there is a change in the applicable standard. The rationale for final paragraph (b) is the same as that for final § 70.208(c) and is discussed elsewhere in this preamble under § 70.208(c).

For consistency in the sampling requirements of the final rule, paragraph (b) is identical to § 70.206(c) regarding bimonthly sampling of MMUs, § 70.208(c) regarding quarterly sampling of MMUs, § 70.209(b) regarding quarterly sampling of DAs, § 71.206(b) regarding quarterly sampling, and § 90.207(b) regarding quarterly sampling.

Final paragraph (c) is essentially the same as existing § 70.208(c). It requires that upon notification from MSHA that any valid sample taken from a DA to meet the requirements of paragraph (a) of this section exceeds the standard, the operator must take five valid representative samples from that DA within 15 calendar days. It further requires that the operator must begin sampling of the DA on the first day on which there is a production shift following the day of receipt of notification. As stated previously, final paragraph (c) preserves the status quo for the first 18 months following the effective date of the final rule.

Final paragraph (d) is similar to proposed §§ 70.207(i)(1)–(3) and (g)(1)–(3). Final paragraph (d) requires that when a valid representative sample taken in accordance with this section meets or exceeds the ECV in Table 70–1 that corresponds to the applicable standard and particular sampling device used, the operator must: (1) Make approved respiratory equipment available to affected miners in accordance with § 72.700 of this chapter; (2) Immediately take corrective action to lower the concentration of respirable coal mine dust to at or below the standard; and (3) Make a record of the corrective actions taken. The record must be certified by the mine foreman or equivalent mine official no later than the end of the mine foreman's or equivalent mine official's next regularly scheduled working shift. Paragraph (d)(3) further requires that the record must be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration. It also requires that the records must be retained at a surface location at the mine for at least 1 year and be made available for inspection by authorized representatives of the Secretary and the representative of miners.

The rationale for final paragraphs (d)(1)–(3) is the same as that for final §§ 70.206(e)(1)–(3), 70.208(e)(1)–(3), and 70.209(c)(1)–(3), and is discussed elsewhere in this preamble under final § 70.208(e)(1)–(3).

For consistency between the sampling requirements of the final rule, final paragraphs (d)(1)–(3) are the same as final § 70.206(e)(1)–(3) regarding bimonthly sampling of MMUs, § 70.208(e)(1)–(3) regarding quarterly sampling of MMUs, § 70.209(c)(1)–(3) regarding quarterly sampling of designated areas, § 71.206(h)(1)–(3) regarding quarterly sampling, and except for conforming changes, § 90.207(c)(1)–(3) regarding quarterly sampling.

Final paragraph (e) provides two different methods by which compliance determinations can be made. Paragraphs (e)(1) and (2) provide that noncompliance with the standard is demonstrated during the sampling period when: (1) Two or more valid representative samples meet or exceed the ECV in final Table 70–1 that corresponds to the applicable standard and the particular sampling device used; or (2) The average for all valid

representative samples meets or exceeds the ECV in final Table 70–2 that corresponds to the applicable standard and the particular sampling device used. Paragraph (e)(1) is similar to proposed §§ 70.207(e), 70.208(d), and 70.209(c) regarding compliance based on a single sample measurement. Paragraph (e)(2) is similar to proposed § 70.208(e) regarding weekly permissible accumulated exposure. The rationale for final paragraphs (e)(1) and (2) is the same as that for final §§ 70.206(f)(1) and (2), 70.208(f)(1) and (2), and 70.209(d)(1) and (2), and is discussed elsewhere in this preamble under § 70.208(f)(1) and (2).

For consistency between the sampling requirements of the final rule, final paragraphs (e)(1) and (2) are the same as final §§ 70.206(f)(1) and (2), 70.208(f)(1) and (2), 70.209(d)(1) and (2), and, except for conforming changes, 71.206(i)(1) and (2), and, 90.207(d)(1) and (2).

Final paragraph (f) is derived and changed from proposed § 70.209(d). It requires that unless otherwise directed by the District Manager, upon issuance of a citation for a violation of the standard, paragraph (a) of this section will not apply to that DA until the violation is abated and the citation is terminated in accordance with paragraphs (g) and (h) of this section. Final paragraphs (h) and (i) are discussed below.

Final paragraph (f) includes an exception to allow the District Manager flexibility to address extenuating circumstances that would affect sampling. An example of extenuating circumstances would occur when an uncorrected violation would require abatement sampling that continues into the next sampling period.

Final paragraph (f) is similar to existing § 70.208(d). MSHA did not receive comments on the proposal.

In addition, for consistency between the sampling requirements of the final rule, except for conforming changes, final paragraph (f) is the same as final §§ 70.206(g), 70.208(g), 70.209(e), 71.206(j), and 90.207(e).

Final paragraph (g) is similar to proposed §§ 70.207(i)(3) and 70.209(e). It requires that upon issuance of a citation for a violation of the standard, the operator must take the following actions sequentially: (1) Make approved respiratory equipment available to affected miners in accordance with § 72.700 of this chapter; (2) immediately take corrective action to lower the concentration of respirable coal mine dust to at or below the standard; (3) make a record of the corrective actions taken. The record must be certified by the mine foreman or equivalent mine official no later than the end of the mine foreman's or equivalent mine official's next regularly scheduled working shift. Paragraph (g)(3) further requires that the record must be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration. It also requires that the records must be retained at a surface location at the mine for at least 1 year and be made available for inspection by authorized representatives of the Secretary and the representative of miners.

Paragraph (g)(4) requires that the operator must begin sampling within 8 calendar days after the date the citation is issued, the environment of the affected DA on consecutive normal production shifts until five valid representative samples are taken. In addition, paragraph (g) includes the term ''sequentially'' to ensure that corrective actions are taken in the order they are listed.

The rationale for final paragraphs (g)(1)–(4) is the same as that for final §§ 70.206(h)(1)–(4), 70.208(h)(1)–(4), and 70.209(f)(1)–(4), and is discussed elsewhere in this preamble under § 70.206(h)(1)–(4).

For consistency between the sampling requirements of the final rule, except for conforming changes, final paragraphs (g)(1)–(4) are the same as final § 70.206(h) regarding bimonthly sampling of MMUs, § 70.208(h) regarding quarterly sampling of MMUs, § 70.209(f) regarding quarterly sampling of designated areas, § 71.206(k) regarding quarterly sampling, and § 90.207(f) regarding quarterly sampling.

Final paragraph (h) is similar to proposed § 70.209(f). It provides that MSHA will terminate a citation for a violation of the standard when the conditions listed in paragraphs (1) and (2) are met. Paragraph (h)(1) requires that each of the five valid representative samples taken must be at or below the standard. Paragraph (h)(2) requires that the operator has submitted to the District Manager revised dust control parameters as part of the mine ventilation plan for the DA in the citation, and the changes have been approved by the District Manager. It further requires that the revised parameters reflect the control measures used by the operator to abate the violation. The rationale for final paragraphs (h)(1) and (2) is discussed elsewhere in this preamble under § 70.206(i).

For consistency between the sampling requirements of the final rule, final paragraphs (h)(1) and (2) are identical, except for conforming changes, to final §§ 70.206(i)(1) and (2), 70.208(i)(1) and (2), and 70.209(g)(1) and (2).

11. Section 70.208 Quarterly Sampling; Mechanized Mining Units

Final § 70.208, like the proposal, addresses sampling of mechanized mining units (MMUs). To be consistent with final § 70.201(a), it includes a clarification that the sampling requirements of this section start on February 1, 2016, which is 18 months after the effective date of the final rule. The title of the section is changed from the proposal by adding ''quarterly'' to distinguish the required sampling periods for MMUs under this section from final § 70.206, which requires bimonthly sampling for MMUs. It also does not include the term ''CPDM'' to avoid confusion with the sampling device required. Specifically, in accordance with final § 70.201(a), the operator is required to take quarterly samples of the DO and ODO in each MMU with an approved CPDM on February 1, 2016, unless directed by the Secretary to use the CMDPSU to collect quarterly samples.

Final paragraphs (a)(1) and (2) are changed from the proposal. Paragraph (a)(1) requires the mine operator to sample each calendar quarter: The designated occupation (DO) in each MMU on consecutive normal production shifts until 15 valid representative samples are taken. It further provides that the DM may require additional groups of 15 valid representative samples when information indicates that the operator has not followed the approved ventilation plan for any MMU.

Final paragraph (a)(2) requires that the operator sample each calendar quarter: Each other designated occupation (ODO) specified in paragraphs (b)(1) through (10) of this section in each MMU or specified by the District Manager and identified in the approved mine ventilation plan on consecutive normal production shifts until 15 valid representative samples are taken. It also requires sampling of each ODO type to begin after fulfilling the sampling requirements of paragraph (a)(1) of this section. It further requires that when the operator is required to sample more than one ODO type, each ODO type must be sampled over separate time periods during the calendar quarter.

Final paragraph (a)(3) is redesignated from proposed § 70.208(a)(2). It establishes the quarterly periods as: (1) January 1–March 31; (2) April 1–June 30; (3) July 1–September 30; and (4) October 1–December 31.

On March 8, 2011, MSHA issued in the **Federal Register** a request for comments (76 FR 12648). MSHA stated that the proposed rule addresses the frequency of respirable dust sampling when using a CPDM, and MSHA solicited comments on the proposed sampling frequencies and any suggested alternatives. MSHA asked if sampling of DOs were less frequent than proposed, what alternative sampling frequency would be appropriate. MSHA also requested that commenters address a sampling strategy in case of noncompliance with the respirable dust standard and provide a rationale for the strategy. In addition, MSHA asked whether CPDM sampling of ODOs should be more or less frequent than 14 calendar days each quarter, and whether the proposed CPDM sampling of ODOs on the MMU is sufficient to address different mining techniques, potential overexposures, and ineffective use of approved dust controls. Some commenters suggested that MSHA conduct the DO sampling on all shifts on which coal is produced during a calendar week. Several commenters opposed the proposed frequency of DO sampling, which would have required mine operators who use CPDMs to sample the DO in each MMU during each production shift, 7 days per week (Sunday through Saturday), 52 weeks per year. These commenters stated that the proposal was too expensive because it would require mine operators to purchase an unreasonably large number of CPDMs due to the number of MMUs in each mine. Some commenters stated that sampling every DO on every production shift was excessive and was not needed to objectively determine miners' exposure.

One commenter stated that proper control of respirable coal mine dust to below the standard will not assure operators that they will not be issued a violation for false overexposures due to the proposed sampling strategy and use of 24/7 continuous sampling on all shifts. Some commenters suggested that a miner should be allowed to request additional sampling not already designated for sampling by MSHA if the miner has reason to believe that miners are being exposed to excessive respirable dust. Another commenter suggested that the sampling should be a full-shift weekly dose not to exceed an average of 2.0 mg/m^3 for a 40-hour week.

One commenter stated that the proposed frequency of ODO sampling was confusing. This commenter stated that the proposal, which would have required sampling of ODOs in each MMU during each production shift for 14 consecutive days during each quarterly period, could not be accomplished because ODO personnel do not work 14 consecutive days. Another commenter suggested that ODOs should be sampled the same as DOs, 7 days a week, 52 weeks a year.

After considering all the comments, and based on MSHA's years' of experience, MSHA concludes that sampling on consecutive normal production shifts until 15 valid representative samples are taken is sufficient to provide samples that are representative of normal mining activities for DOs and ODOs during the production shifts. The proposal would have required sampling of ODOs in each MMU during each production shift for 14 consecutive days during each quarterly period. The 14-day period was intended to indicate the completion of multiple mining cycles. Subsequent to the proposal, MSHA surveyed its coal districts and found that, under normal mining conditions, the majority of MMUs should be able to complete at least two complete mining cycles while 15 representative samples are collected. A mining cycle consists of cutting straight entries and crosscuts or multiple passes with a longwall shearer in 15 shifts. If the mine produces coal on only one shift a day, the sampling period for a DO or ODO could be 15 consecutive normal production days. The sampling period for a DO or ODO could be as short as 8 consecutive normal production days, if the mine produces coal on two shifts a day. Sampling in accordance with paragraphs (a)(1) and (2) will provide representative measurements of respirable dust concentrations in the DO and ODO's work environment and allow both the operator and MSHA to evaluate the effectiveness of the dust controls being used. Accordingly, MSHA determined that DO sampling on every shift, every day, by each mine operator as proposed is not necessary. Miners will be adequately protected by the sampling requirements of paragraphs (a)(1) and (2) because the sampling results will provide mine operators with information to evaluate the dust controls specified in their approved ventilation plan and determine whether the controls are being maintained. As long as dust controls are properly maintained to ensure continuing compliance with the respirable dust standard, miners will be protected from overexposures.

If information indicates that a mine operator has not followed the approved mine ventilation plan for any MMU, (for example, mining when the ventilation curtains are not properly maintained, or water sprays are operated with inadequate pressure or some are inoperable), paragraph (a)(1) provides that the District Manager may require additional sampling of DOs by that operator. The additional sampling under paragraph (a)(1) is intended to ensure that miners are provided adequate protection from overexposure to respirable coal mine dust without requiring all mine operators to sample DOs each production shift, 7 days per week, 52 weeks per year as proposed.

Paragraph (a)(2) does not permit sampling of ODOs until after sampling of DOs under paragraph (a)(1) is completed. However, additional sampling of the DO, such as abatement sampling, will not affect the ODO sampling required under this paragraph (a)(2). Paragraph (a)(2) also does not permit simultaneous sampling of multiple ODO types. In doing so, paragraphs (a)(1) and (2) establish monitoring that protects miners through a longer period of sequential sampling. Sequentially sampling the DOs and ODOs spreads the sampling over a period that will ensure sufficient representative samples. Under paragraph (a)(2), sampling of a specific ODO, such as a shuttle car operator, will require all shuttle car operators on an MMU to be sampled during the same time period until the 15 representative samples are collected on each ODO. Sampling of the shuttle car operator cannot begin until sampling of the DO under paragraph (a)(1) is completed. For example: an MMU has a DO, and the following ODOs: One return air side roof bolting machine operator and two shuttle car operators. The DO is sampled until 15 representative samples are collected. Once the DO sampling is completed, then the return air side roof bolting machine operator is sampled until 15 representative samples are collected. When sampling of the roof bolting machine operator is completed, the 2 shuttle car operators are both sampled until 15 representative samples are collected on each. The shuttle car operators must be sampled at the same time so both shuttle car operators are carrying sampling units over the same time period.

The final rule's alternatives to the proposed sampling requirements for DOs and ODOs described above significantly reduce the quantity of CPDMs that operators will need to conduct MMU sampling. The proposal would have required sampling of DOs every shift, every day, and sampling of ODOs 14 consecutive days each quarter. Under the final rule, DOs are sampled less frequently than under the proposed rule, and under the final rule's

sequential sampling, DOs are sampled first, followed by sampling each ODO type over separate time periods. This sequential sampling allows a mine operator to use the same CPDM to conduct most MMU sampling.

Final paragraph (b) is similar to the proposal and requires that unless otherwise directed by the District Manager, the approved sampling device must be worn by the miner assigned to perform the duties of the DO or ODO specified in paragraphs (b)(1) through (b)(10) of this section or by the District Manager for each type of MMU. Depending on mine or physical conditions (e.g., mining height, no operating cab on the mining equipment to attach the sampling unit), the District Manager may designate an alternate sampling location than specified in paragraph (b). Paragraph (b) includes the term ''an approved sampling device'' as a clarification. Under the final rule, an operator is required to take quarterly samples of DOs in each MMU with an approved CPDM, unless directed by the Secretary to use the CMDPSU.

Paragraphs (b)(1) through (10) are substantially similar to the proposal. They identify the DOs that are required to be sampled under paragraph (a)(1) and the ODOs that are required to be sampled under paragraph (a)(2) for each specified MMU.

Paragraph (b)(1), like the proposal, requires that on a conventional section using a cutting machine, the DO on the MMU is the cutting machine operator.

Paragraph (b)(2), like the proposal, requires that on a conventional section blasting off the solid, the DO on the MMU is the loading machine operator.

Paragraph (b)(3) is changed from the proposal. It requires that on a continuous mining section other than auger-type, the DO on the MMU is the continuous mining machine operator or mobile bridge operator when using continuous haulage. The ODOs for this type of MMU are revised as follows: The roof bolting machine operator who works nearest the working face on the return air side of the continuous mining machine; the face haulage operators on MMUs using blowing face ventilation; the face haulage operators on MMUs ventilated by split intake air (''fishtail ventilation'') as part of a super-section; and the face haulage equipment operators where two continuous mining machines are operated on an MMU. The term ''shuttle car'' in the proposed rule is replaced with ''face haulage'' in the final rule. This clarifies the Agency's intent that any type of haulage on the MMU in this mining situation is required to be monitored for respirable dust exposure in the environment of the face haulage operator. The proposal used the most common haulage vehicle—shuttle car—when the intent was to cover all haulage operators including those on shuttle cars, ramcars, scoops, etc. Moreover, the proposal provided that the District Manager had the discretion to designate ODOs other than those specifically listed in proposed § 70.208(b). Face haulage operators are included in final paragraph (b)(3) because they frequently experience exposure to high dust levels. For example, some operators have two continuous mining machines on a single MMU but do not operate them at the same time. Starting operation of the second continuous mining machine after the first continuous mining machine stops mining subjects the MMU face haulage operators to respirable dust that has not cleared the entries of the MMU. Historically, mine operators who use a common dumping point for two MMUs will use face haulage equipment from either MMU as needed. Creating ODOs on face haulage equipment operators for this type of mining configuration will provide better protection from exposures to respirable dust for face haulage equipment operators. Finally, face haulage operators are included in final paragraph (b)(3) in response to comments on proposed § 75.332(a)(1), which would have required mine operators to provide separate intake air to each MMU on each working section. Comments on proposed § 75.332(a)(1) regarding split intake ventilation are discussed elsewhere in this preamble under § 75.332.

Paragraph (b)(4), like the proposal, requires that on a continuous mining section using auger-type machines, the DO on the MMU is the jacksetter working nearest the working face on the return air side of the continuous mining machine.

Paragraph (b)(5), like the proposal, requires that on a scoop section using a cutting machine, the DO on the MMU is the cutting machine operator.

Paragraph (b)(6), like the proposal, requires that on a scoop section blasting off the solid, the DO on the MMU is the coal drill operator.

Paragraph (b)(7), like the proposal, requires that on a longwall section, the DO on the MMU is the longwall operator working on the tailgate side of the longwall mining machine. The ODOs are the jacksetter who works nearest to the return air side of the longwall working face, and the mechanic.

Paragraph (b)(8), like the proposal, requires that on a hand loading section with a cutting machine, the DO on the MMU will be the cutting machine operator.

Paragraph (b)(9), like the proposal, requires that on a hand loading section blasting off the solid, the DO on the MMU will be the hand loader exposed to the greatest dust concentration.

Paragraph (b)(10), like the proposal, requires that on anthracite mine sections, the DO on the MMU will be the hand loader exposed to the greatest dust concentration.

In the March 8, 2011, request for comments (76 FR 12650), MSHA stated that the proposed rule addresses: (1) Which occupations must be sampled using CPDMs, and (2) which work positions and areas could be sampled using either CPDMs or CMDPSUs. MSHA solicited comments on the proposed sampling occupations and locations. For example, MSHA requested comment on whether there are other positions or areas where it may be appropriate to require the use of CPDMs. MSHA also asked whether the proposed CPDM sampling of ODOs on the MMU is sufficient to address different mining techniques, potential overexposures, and ineffective use of approved dust controls.

Some commenters stated that individual occupations with the highest potential for exposure should be sampled and MSHA should evaluate and determine if additional occupations need to be sampled. The final rule is based on historical sampling data on MMUs. The DOs and ODOs included in paragraphs (b)(1) through (10) are those occupations with the highest potential for exposure. Therefore, sampling these DOs and ODOs is the most effective method for protecting all miners from excess exposure to respirable coal mine dust.

One commenter expressed concern over giving the District Manager too much discretion in determining the ODOs to sample because the rules could change every time a determination was made by the District Manager. In response, MSHA notes that allowing the District Manager to identify ODOs is consistent with MSHA's existing policy concerning the designation of sampling entities under the existing standards for DAs and will continue to be based on MSHA's historical sampling data on MMUs.

One commenter recommended that if a mine operator must sample shuttle car operators on blowing type face ventilation, then shuttle car operators on exhausting type face ventilation should be sampled also. From MSHA's sampling experience, haulage operators working with exhausting face

ventilation position themselves in intake air when coal is being loaded by the continuous mining machine. By positioning themselves in this manner, the haulage operators are in a more protected environment during the time of greatest potential for exposure to respirable dust.

One commenter stated that other outby areas should be sampled such as conveyor belt entries, belt heads, and dumping points. MSHA recognizes that dust concentrations in the active workings of the mine can vary from location to location, even within a small area near a miner. MSHA will continue to require operator sampling of outby DAs. The requirements for DA sampling are contained in final §§ 70.207 and 70.209, which are discussed elsewhere in this preamble. Limiting the dust concentration in outby areas ensures that no miner in the active workings will be exposed to excessive respirable dust.

Final paragraph (c) is similar to proposed § 70.208(c) and clarifies the time frame for implementation when there is a change in the applicable standard. It requires that when the respirable dust standard is changed in accordance with § 70.101 (Respirable dust standard when quartz is present), the new standard will become effective 7 calendar days after the date of the notification of the change by MSHA. The ''date of notification'' is the date on the data mailer that MSHA currently sends, via U.S mail, to operators informing them of the quartz analyses that may result in a change in the respirable dust standard. Under proposed § 70.208(c), a new standard would have gone into effect on the first production shift following the operator's receipt of notification that the respirable dust standard is changed in accordance with § 70.101. However, MSHA may not always know the date that the operator received the notification. By allowing the new standard to become effective 7 days after the date of the notification of the change, i.e., the date on the data mailer, instead of requiring the standard to become effective on the next production shift, MSHA will maintain the existing, historical practice of providing 7 days for mailing before the new standard is effective. It protects miners by ensuring the prompt implementation of the reduced standard when high concentrations of quartz are present and also allows for a uniform application of a new respirable dust standard regardless of the physical location of a mine.

Final paragraph (d) is new. It is similar to proposed § 70.207(d) and existing § 70.207(d) regarding bimonthly sampling in mechanized mining units. It requires that if a normal production shift is not achieved, the DO or ODO sample for that shift may be voided by MSHA. It further provides that any sample that, regardless of production, exceeds the standard by at least 0.1 mg/m^3 will be used in the determination of the equivalent concentration for that occupation.

Proposed § 70.207(d), concerning sampling of MMUs with a CMDPSU, provided that if a normal production shift is not achieved, the DO sample for that shift may be voided by MSHA. It further provided that any sample, regardless of production, that exceeds the standard by at least 0.1 mg/m^3 would be used to determine the equivalent concentration for that MMU. As explained in the preamble for proposed § 70.207(d), voiding samples that indicate miners were exposed to a concentration of respirable dust in excess of the standard does not provide miners the intended health protection. For example, an MMU is on a reduced standard of 0.5 mg/m^3 due to the presence of quartz. A sample taken on the MMU when a normal production shift was not achieved shows the respirable dust concentration is 2.3 mg/m^3. The existing standard provides that any sample, regardless of production, with a concentration greater than 2.5 mg/m^3 will be used to determine the average concentration. Under the existing standard, the 2.3 mg/m^3 sample would not be used to determine the average concentration for the MMU. However, MSHA believes that any sample that exceeds the standard while production is less than normal should be used to determine the respirable dust concentration of the MMU since operating at a higher production would likely increase miners' respirable dust exposure (75 FR 64432, October 19, 2010).

The 2.5 mg/m^3 value in the existing standard was based on: (1) An earlier sampling and processing methodology that was less accurate than the existing program; (2) a 2.0 mg/m^3 standard; and (3) did not take quartz into consideration. However, the accuracy of the CPDM and the improvement in the accuracy of the CMDPSU has allowed MSHA to establish the final 0.1 mg/m^3 value, which also takes into consideration the reduced standard due to quartz.

Under proposed § 70.208 concerning sampling of MMUs with a CPDM, the level of coal production would not have been a concern because the proposal would have required sampling on each production shift, 7 days per week, and 52 weeks per year, regardless of production. Because compliance under the proposed rule would have been based on 24/7 continuous sampling and single sample determinations, there was no reason to have a provision to void a sample or to require the use of a sample that exceeded the standard when production was low for determining compliance based on averaging multiple samples. However, under final paragraph (d), the sampling methodology is modified from the proposal and, therefore, coal production levels and representative sampling are as important for CPDM sampling as for CMDPSU sampling. Under final § 70.208, sampling is required on 15 consecutive shifts on a quarterly basis, which is necessary to ensure that the operator collects samples that are representative of normal mining activity. When a sample exceeds the standard while production is less than normal, it should be used to determine the respirable dust concentration of the MMU since operating at a higher production would likely increase miners' respirable dust exposure. For these reasons, final paragraph (d) includes the same criteria that apply to voiding DO samples collected with a CPDM as that required by final § 70.206(d) when sampling with a CMDPSU.

Therefore, final paragraph (d) includes requirements that, with the exception of conforming changes, are the same as proposed § 70.207(d) and existing § 70.207(d) regarding samples that may be voided by MSHA based on production. The rationale for final paragraph (d) is the same as that for final § 70.206(d) and is discussed elsewhere in this preamble under § 70.206(d).

Final paragraph (e) is similar to proposed § 70.208(f) and (g). It requires that when a valid representative sample taken in accordance with this section meets or exceeds the ECV in Table 70–1 that corresponds to the applicable standard and particular sampling device used, the operator must: (1) Make approved respiratory equipment available; (2) Immediately take corrective action; and (3) Record the corrective actions. The actions required by final paragraph (e) are similar to those in proposed § 70.208(g).

Proposed § 70.208(f)(1)–(5) would have required that when a valid end-of-shift measurement meets or exceeds the applicable ECV or a weekly accumulated exposure exceeds the weekly permissible accumulated exposure, the operator must take the following actions before production begins on the next shift: (1) Make approved respiratory equipment

available; (2) implement corrective actions; (3) submit to the District Manager for approval the corrective actions implemented; (4) review the adequacy of the approved CPDM Performance Plan; and (5) record the corrective actions taken.

Proposed § 70.208(g) would have required that when a valid end-of-shift equivalent concentration exceeds the standard but is less than the applicable ECV in Table 70–2, the operator would have to: (1) Make approved respiratory equipment available to affected miners in accordance with § 72.700; (2) implement corrective actions to ensure compliance with the standard on the next and subsequent production shifts; (3) record the reported excessive dust condition as part of and in the same manner as the records for hazardous conditions required by § 75.363; and (4) review the adequacy of the approved CPDM Performance Plan and submit to the District Manager for approval any plan revisions within 7 calendar days following posting of the end-of-shift equivalent concentration on the mine bulletin board.

As noted previously in the discussion on final § 70.206(e), MSHA clarified, in the March 8, 2011, request for comments (76 FR 12648), that the proposal would require that operators record both excessive dust concentrations and corrective actions in the same manner as conditions are recorded under § 75.363 and that ''MSHA would not consider excessive dust concentrations or corrective actions to be hazardous conditions, since the proposed requirement is not a section 75.363 required record'' (76 FR 12650).

Comments on proposed § 70.208(g) were identical or similar to those on proposed § 70.207(i). The comments are consolidated and discussed elsewhere in this preamble under § 70.206(e).

In response to the comments, final paragraph (e) is changed from the proposal. It does not require action if the dust sample exceeds the standard but is less than the ECV in Table 70–1. Rather, it requires an operator to take certain actions when a respirable dust sample meets or exceeds the ECV in Table 70–1. Unlike the proposal, there would be no violation if one operator full-shift sample meets or exceeds the ECV in Table 70–1 that corresponds to the applicable standard and particular sampling device used. Although the Secretary has determined that a single full-shift measurement of respirable coal mine dust accurately represents atmospheric conditions to which a miner is exposed during each shift, MSHA has concluded that a noncompliance determination based on a single full-shift sample will only be made on MSHA inspector samples. With respect to operator samples, MSHA reevaluated its enforcement strategy under the proposed rule. Under the final rule, MSHA will not issue a citation when one operator sample meets or exceeds the ECV but will require the operator to take corrective action on a single overexposure to lower dust levels. This will protect miners from subsequent overexposures.

In addition, final paragraph (e) results in a change to the existing averaging method so that there is no longer an averaging process where miners are exposed to high levels of respirable coal mine dust and no action is taken to lower dust levels. Under the existing standards, corrective action is required only after the average of five operator samples exceeds the respirable coal mine dust standard and a citation is issued. This permits specific instances of miners' overexposures without requiring any corrective action by the operator to reduce concentrations to meet the standard. For example, currently, five dust samples of miners' exposures are averaged, with some samples indicating that the miner is exposed to unhealthy dust levels above the existing 2.0 mg/m^3 standard. Five samples of: 2.3, 2.5, 2.5, 1.3, and 1.2 mg/m^3 result in an average of 1.96 mg/m^3, which meets the existing 2.0 mg/m^3 standard, but three of the five single samples exceed the existing 2.0 mg/m^3 standard. Under the existing standards, there is no requirement for the operator to take any corrective action, based on those high samples, to lower dust levels and to avoid further overexposures. The final rule requires immediate corrective actions to lower dust concentrations when a single, full-shift operator sample meets or exceeds the ECV for the applicable dust standard. These corrective actions will result in reduced respirable dust concentrations in the mine atmosphere and, therefore, will provide better protection of miners from further high exposures. The Secretary has determined that a single full-shift measurement of respirable coal mine dust accurately represents atmospheric conditions to which a miner is exposed during such shift.

Under final paragraph (e), operators will protect miners from overexposures by making respiratory equipment available and taking and recording corrective actions.

If sampling with a CMDPSU, the actions must be taken upon notification by MSHA that a respirable dust sample taken in accordance with this section meets or exceeds the ECV for the applicable standard. If sampling with a CPDM, the actions must be taken when the sampling measurement shows that a dust sample taken in accordance with this section meets or exceeds the ECV for the applicable standard.

Final paragraph (e)(1), like proposed § 70.208(f)(1) and (g)(1), requires that the operator make approved respiratory equipment available to affected miners in accordance with final § 72.700 of this chapter. Comments on proposed § 70.208(f)(1) and (g)(1) were identical or similar to those on proposed § 70.207(g)(1) and (i)(1). The comments are consolidated and discussed elsewhere in this preamble, together with the rationale for final paragraph (e)(1), under § 70.206(e)(1).

Final paragraph (e)(2) is similar to proposed § 70.208(f)(2) and (g)(2). It requires that the operator immediately take corrective action to lower the concentration of respirable coal mine dust to at or below the standard. Paragraph (e)(2) is consistent with existing § 70.201(d), which requires a mine operator to take corrective action to lower the concentration of respirable dust. The types of corrective actions that could be taken are discussed elsewhere in this preamble under § 70.206(e)(2).

Proposed § 70.208(f)(2) and (g)(2) would have required that corrective action be taken on the next and subsequent production shifts. Final paragraph (e)(2) requires that the corrective action must be taken immediately to protect miners from subsequent overexposures. The rationale for final paragraph (e)(2) is the same as that for final § 70.206(e)(2) and is discussed elsewhere in this preamble under § 70.206(e)(2).

Comments on proposed § 70.208(g)(2) were identical or similar to those on proposed § 70.208(f)(2). One commenter stated that it is not possible to implement corrective actions before production begins on the next shift. Another commenter stated that the proposal would eliminate ''hot-seating'', forcing mine operators to work only 8-hour shifts because the weight of the sample is not known until the production crew arrives on the surface and the data are downloaded.

Immediate corrective actions are necessary to ensure that miners are not subject to subsequent overexposures and to provide improved protection for miners. If sampling with a CMDPSU, the actions must be taken upon notification by MSHA that a respirable dust sample taken in accordance with this section meets or exceeds the ECV for the applicable standard. MSHA has no information that operators will limit shift lengths to 8 hours. Based on MSHA's experience, operators establish

the length of work shifts primarily to accommodate production needs at their mines.

Final paragraph (e)(3) is similar to proposed § 70.208(f)(5)(v) and (g)(3). Final paragraph (e)(3) requires that the mine operator make a record of the corrective actions taken. The record must be certified by the mine foreman or equivalent mine official no later than the end of the mine foreman's or equivalent mine official's next regularly scheduled working shift. It also requires that the record must be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration. It further requires that the records must be retained at a surface location at the mine for at least 1 year and must be made available for inspection by authorized representatives of the Secretary and the representative of miners. Comments on proposed § 70.208(f)(5)(v) and (g)(3) were identical or similar to those on proposed § 70.207(i)(3). The comments are consolidated and discussed, together with the rationale for final paragraph (e)(3), elsewhere in this preamble under § 70.206(e)(3).

Unlike proposed § 70.208(f)(4) and (g)(4), final paragraph (e) does not require the operator to review and revise a CPDM Performance Plan. As discussed elsewhere in this preamble under § 70.206, the final rule does not include the proposed requirements for a CPDM Performance Plan.

In addition, unlike proposed § 70.208(f)(3), final paragraph (e) does not require the submission of corrective actions to the District Manager for approval. Comments on proposed § 70.208(f)(3) were the same as or similar to those on proposed § 70.207(g)(2). The comments are consolidated and discussed elsewhere in this preamble under § 70.206(h)(4).

For consistency between the sampling requirements of the final rule, final paragraphs (e)(1)–(3) are identical to § 70.206(e)(1)–(3) regarding bimonthly sampling of MMUs, § 70.207(d)(1)–(3) regarding bimonthly sampling of designated areas, § 70.209(c)(1)–(3), regarding quarterly sampling of designated areas, § 71.206(h)(1)–(3) regarding quarterly sampling, and except for conforming changes, § 90.207(c)(1)–(3) regarding quarterly sampling.

Final paragraphs (f)(1) and (2) are redesignated and changed from proposed § 70.208(d) and (e). Paragraph (f) provides that noncompliance with the standard is demonstrated during the sampling period when: (1) Three or more valid representative samples meet or exceed the excessive concentration value (ECV) in Table 70–1 that corresponds to the applicable standard and particular sampling device used; or (2) The average for all valid representative samples meets or exceeds the ECV in Table 70–2 that corresponds to the applicable standard and particular sampling device used.

In the March 8, 2011, request for comments (76 FR 12649), MSHA stated that the Agency is interested in commenters' views on what actions should be taken by MSHA and the mine operator when a single shift respirable dust sample meets or exceeds the ECV. MSHA also requested comments on alternative actions, other than those contained in the proposal, for MSHA and the operator to take if operators use a CPDM. MSHA further stated that it is particularly interested in alternatives and how such alternatives would be protective of miners.

Several commenters stated that they supported the use of single, full-shift samples for making noncompliance determinations. Other commenters expressed concern about proposed § 70.208(d), which would have required that no valid end-of-shift equivalent concentration measurement meet or exceed the ECV listed in Table 70–2 that corresponds to the applicable standard.

In response to the comments, the final rule is changed from the proposal. Final paragraph (f), like final §§ 70.206(f), 70.207(e), and 70.209(d), provides that more than one operator sample will be used to determine noncompliance with the standard during the sampling period. Specifically under these final provisions, a violation is established when either two or more valid representative samples (bimonthly MMU and DA sampling, and quarterly DA sampling) or three or more valid representative samples (quarterly MMU sampling) meet or exceed the ECV in Table 70–1 that corresponds to the applicable standard and particular sampling device used; or when the average for all valid representative samples meets or exceeds the ECV in Table 70–2 that corresponds to the applicable standard and particular sampling device used.

The final rule is changed from the proposal. Final paragraph (e), like final §§ 70.206(e), 70.207(d), and 70.209(c), provides greater protection for miners. Under the final rule, when a single full-shift operator sample meets or exceeds the ECV that corresponds to the applicable standard and particular sampling device used, the operator is made aware of a potential problem with the dust controls being used. The final rule requires that an operator must make approved respiratory equipment available; immediately take corrective action; and record the corrective actions. Under the final rule, miners will be afforded protection from overexposures during a single shift. In addition, the final rule, will provide miners with the additional protection afforded by MSHA's single sampling under § 72.800.

Some commenters questioned the accuracy of a single sample used to make compliance determinations. Some commenters were also concerned that making compliance determinations on a single sample does not represent a miner's long term exposures. The rationale for § 72.800 and comments concerning the accuracy and validity of using a single full-shift measurement are discussed elsewhere in this preamble under § 72.800.

Some commenters stated that issuing a citation based on a single full-shift sample when the operator is required to submit multiple samples did not allow for shift-to-shift variability.

There is no shift-to-shift variability that needs to be considered if a violation is based on a single full-shift sample. However, because the final rule provides that a violation of the respirable coal mine dust standard is based on more than one operator single sample, MSHA needed to adjust the number of samples on which a compliance determination would be made. The probability of measurement error in at least one shift increases when several multiple shifts are considered, as under the final rule. Measurement error on multiple shift sampling is due to shift-to-shift variability. Shift-to-shift variation could include differences in sampling location, miners' wearing the sampling device differently, or changes in air velocity. Therefore, MSHA needed to modify the citation criteria in order to maintain 95 percent confidence in every noncompliance determination.

Some commenters suggested that the exposure limit for a miner per week should not be permitted to exceed the dose equivalent to that received as if exposed to 10 mg/m^3 for a scheduled forty-hour week and that under no circumstances could the exposure limit for the week be increased to a dose equivalent to above 2.0 mg/m^3 for eight hours if the work week is less than forty hours. These commenters stated that measuring the dose over a week improves exposure accuracy and is therefore an improvement over the single shift sample methodology.

The final rule does not include a weekly exposure limit.

In the final rule, MSHA changed the existing averaging method so that there

is no longer an averaging process where miners can be exposed to high levels of respirable coal mine dust and no action is taken to lower dust levels. The existing averaging method may conceal high exposures that could have an effect on risk. The accuracy and validity of using a single full-shift measurement is discussed elsewhere in this preamble under § 72.800 and a detailed description of the issue involving sampling bias due to averaging is provided in Appendix A of the 2000 single sample proposed rule (65 FR 42108), available at *http://www.msha.gov/REGS/FEDREG/PROPOSED/2000PROP/00-14075.PDF*].

Accordingly, the final rule is changed from the proposal. Final paragraph (f)(1) provides that noncompliance with the standard is demonstrated during the sampling period when three or more valid representative samples meet or exceed the ECV in Table 70–1. Similarly, final §§ 70.206(f)(1), 70.207(e)(1), and 70.209(d)(1), all provide that noncompliance is demonstrated when either two or more valid representative samples meet or exceed the ECV in Table 70–1. Additional information on the modified citation criteria for multiple shift samples is provided in Appendix C of the July 7, 2000 proposed rule. Appendix C is incorporated as part of this final rule, (*http://www.msha.gov/REGS/FEDREG/PROPOSED/2000PROP/00-14075.PDF*). Additional discussion regarding variability and measurement error on single samples, in response to comments, is in the Section-by-Section Analysis related to final § 72.800 of this preamble.

Final Table 70–1 is renumbered from proposed Table 70–2, which included ECVs based on single-shift CPDM measurements. Table 70–1 includes ECVs based on single-shift measurements taken with either a CMDPSU or a CPDM. Final Table 70–2 includes ECVs based on the average of 5 or 15 full-shift measurements taken with a CMDPSU or a CPDM.

One commenter stated that the ECVs in proposed Table 70–1 were too low. Another commenter stated that the sampling and analytical error used in the calculations for the ECVs in proposed Table 70–2 was based on unverified assumptions and would result in unjustified noncompliance determinations.

The NIOSH Criteria Document recommended that MSHA make no upward adjustment in exposure limits to account for measurement uncertainty for single, full-shift samples used to determine noncompliance. The Dust Advisory Committee made the same recommendation but it was not unanimous.

The Secretary must show to a certain level of confidence that there has been an overexposure before issuing a citation. The final rule is consistent with generally accepted industrial hygiene principles for health standards that include an error factor in determining noncompliance to account for measurement uncertainty. The ECVs were calculated to ensure that, if an ECV is met or exceeded, MSHA can determine noncompliance with the applicable dust standard with at least 95 percent confidence.

Each ECV in final Table 70–1 was calculated to ensure that citations would be issued only when a sample measurement from a single shift demonstrates, with at least 95 percent confidence, that the applicable dust standard has been exceeded. In Table 70–1, the ECV that corresponds to the applicable standard differs depending on the sampling device used. Final Table 70–1 revises two values in proposed Table 70–2 due to rounding inconsistencies; the final ECV is changed from proposed 1.59 mg/m^3 to 1.58 mg/m^3 when the applicable standard is 1.4 mg/m^3, and from proposed 0.80 mg/m^3 to 0.79 mg/m^3 when the applicable standard is 0.7 mg/m^3.

Final Table 70–2 includes ECVs corresponding to the average concentration of either 5 or 15 samples that will provide the Secretary with a 95 percent confidence level that the applicable respirable dust standard has been exceeded. A more detailed discussion on the derivation of the ECVs in both Tables 70–1 and 70–2 is included in Appendix A of the preamble.

Many commenters supported proposed § 70.208(e) that would have required that no weekly accumulated exposure exceed the weekly permissible accumulated exposure. Other commenters stated that this provision would create problems when attempting to calculate the weekly permissible accumulated exposure on a 40-hour week based on samples collected on shifts greater than 8 hours. Commenters also stated that this provision would not benefit miners and was unachievable on a day-to-day basis.

Final paragraph (f)(2) is similar to proposed § 70.208(e). Proposed § 70.208(e) would have provided for a compliance determination based on whether a weekly accumulated exposure (WAE) exceeded the weekly permissible accumulated exposure (WPAE). The WPAE was defined as the maximum amount of accumulated exposure to respirable coal mine dust, expressed in mg-hr per cubic meter of air (mg-hr/m^3), permitted for an occupation during a 40-hr work week (Sunday through Saturday). The WAE was defined as the total exposure to respirable coal mine dust, expressed in milligram-hour (mg-hr) per cubic meter of air (mg-hr/m^3), accumulated by an occupation during a work week (Sunday thru Saturday). Determining the WPAE and the WAE would have required a complex calculation that commenters found to be difficult to understand and apply. Final paragraph (f) provides a simpler method than the proposal for determining compliance.

In the March 8, 2011, request for comments (76 FR 12649), MSHA stated that a commenter at a public hearing requested clarification on whether there would be more than one violation of the respirable dust standard if a single, full-shift sample exceeded the ECV during the same week that the weekly permissible accumulated exposure (WPAE) limit was exceeded. MSHA further stated that under the proposed rule, it would be a violation for each occurrence that the ECV or WPAE is exceeded. MSHA requested comments and alternatives to the proposed rule.

A few commenters stated that it was unfair that a mine operator could be cited for violating the single sample provision under proposed § 70.208(d) and the WAE provision under proposed § 70.208(e). As stated earlier, the final rule does not include the proposed WAE provision. Under final paragraphs (f)(1) and (2), noncompliance is based on 3 or more operator's samples or the average of the samples for a particular DO or ODO.

For consistency between the sampling requirements of the final rule, final paragraphs (f)(1) and (2) are the same as final §§ 70.206(f)(1) and (2), 70.207(e)(1) and (2), 70.209(d)(1) and (2), and, except for conforming changes, 71.206(i)(1) and (2), and 90.207(d)(1) and (2).

Final paragraphs (g)(1) and (2) are new. They are similar to proposed § 70.207(f) and they are included in final § 70.208 because proposed 24/7 sampling of DOs in each MMU is not included in the final rule. Final paragraph (g)(1) requires that unless otherwise directed by the District Manager, upon issuance of a citation for a violation of the standard involving a DO in an MMU, paragraph (a)(1) will not apply to the DO in that MMU until the violation is abated and the citation is terminated in accordance with paragraphs (h) and (i) of this section. Final paragraph (g)(2) requires that unless otherwise directed by the District Manager, upon issuance of a citation for

a violation of the standard involving a type of ODO in an MMU, paragraph (a)(2) will not apply to that ODO type in that MMU until the violation is abated and the citation is terminated in accordance with paragraphs (h) and (i) of this section.

Final paragraphs (g)(1) and (2) include an exception to allow the District Manager flexibility to address extenuating circumstances that would affect sampling. An example of extenuating circumstances would occur when an uncorrected violation would require abatement sampling that continues into the next sampling period.

For consistency between the sampling requirements of the final rule, except for conforming changes, final paragraphs (g)(1) and (2) are the same as final §§ 70.206(g), 70.207(f), 70.209(e), 71.206(j), and 90.207(e).

Final paragraph (h) is similar to proposed § 70.208(f) and (g)(3). It requires that upon issuance of a citation for violation of the standard, the operator must take the following actions sequentially: (1) Make approved respiratory equipment available; (2) immediately take corrective action; (3) record the corrective actions; and (4) conduct additional sampling. The actions required by paragraph (h) are similar to those proposed in § 70.208(f)(1)–(5) and (g)(3) discussed under final paragraph (e). Paragraph (h) includes the term ''sequentially'' to ensure that corrective actions are taken in the order they are listed.

Final paragraph (h)(1), like proposed § 70.208(f)(1), requires that the mine operator make approved respiratory equipment available to affected miners in accordance with § 72.700 of this chapter. Comments on proposed § 70.208(f)(1) are identical or similar to those on proposed § 70.207(g)(1) and (i)(1). The comments are consolidated and discussed, together with the rationale for paragraph (h)(1), elsewhere in this preamble under final § 70.206(e)(1).

Final paragraph (h)(2) is substantially similar to proposed § 70.208(f)(2). It requires that, if a citation is issued, the mine operator must immediately take corrective action to lower the concentration of respirable coal mine dust to at or below the standard. Paragraph (h)(2) is consistent with existing § 70.201(d), which requires a mine operator to take corrective action to lower the concentration of respirable dust. The types of corrective actions that could be taken are discussed elsewhere in this preamble under § 70.206(e)(2).

Proposed § 70.208(f)(2) would have required that corrective action be taken on the next and subsequent production shifts. Final paragraph (h)(2) clarifies that the corrective action must be taken immediately to protect miners from overexposures. Comments on proposed § 70.208(f)(2) were the same as or similar to comments on proposed § 70.208(g)(2). The comments are consolidated and discussed under final paragraph (e)(2). In addition, the rationale for final paragraph (h)(2) is the same as that for final § 70.206(e)(2) and (h)(2) and is discussed elsewhere in this preamble under § 70.206(e)(2) and (h)(2).

Paragraph (h)(3) is similar to proposed § 70.208(f)(5)(v) and (g)(3). It requires that the operator make a record of the corrective actions taken. The record must be certified by the mine foreman or equivalent mine official no later than the end of the mine foreman's or equivalent mine official's next regularly scheduled working shift. It also requires that the record must be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration. It further requires that the records must be retained at a surface location at the mine for at least 1 year and be made available for inspection by authorized representatives of the Secretary and the representative of miners. Comments on proposed § 70.208(f)(5)(v) are similar to those on proposed § 70.208(g)(3). The comments are consolidated and discussed elsewhere in this preamble, together with the rationale for final paragraph (h)(3), under § 70.206(e)(3).

Final paragraph (h)(4) is similar to proposed § 70.207(g)(3). It requires that the mine operator, within 8 calendar days after the date the citation is issued, begin sampling the environment of the affected occupation in the MMU on consecutive normal production shifts until five valid representative samples are taken. Under the proposed rule, there was no reason to propose additional sampling to demonstrate that subsequent respirable dust concentrations were in compliance with the standard; the 24/7 continuous sampling results would have shown whether the corrective actions were effective and compliance was achieved. However, since the final rule does not include the proposed 24/7 sampling requirement, it is necessary to resample to confirm compliance. The five additional representative samples required under this section are less burdensome for operators than the proposed sampling that would have been required every production shift, every day. MSHA believes that the sampling requirements in the final rule are sufficient to demonstrate compliance and protect miners from overexposure. Final paragraph (h)(4) is consistent with existing § 70.201(d), which requires the operator to sample each production shift, after a citation is issued, until five valid respirable dust samples are taken. In addition, paragraph (h)(4) requires that the sampling must begin within 8 calendar days after the date the citation is issued. The rationale for final paragraph (h)(4) is the same as that for final § 70.206(h)(4) and is discussed elsewhere in this preamble under § 70.206(h)(4).

Unlike proposed § 70.208(f)(3), final paragraph (h) does not require the submission of corrective actions to the District Manager for approval. Comments on proposed § 70.208(f)(3) were the same as or similar to those on proposed § 70.207(g)(2). The comments are consolidated and discussed elsewhere in this preamble under § 70.206(h)(4).

Unlike proposed § 70.208(f)(4), final paragraph (h) does not require the operator to review and revise a CPDM Performance Plan. Several commenters stated that the CPDM Performance Plan would not be necessary when sampling with the CPDM and additional plan requirements were too burdensome on mine operators. As discussed elsewhere in this preamble under § 70.206, the final rule does not include the proposed requirements for a CPDM Performance Plan.

For consistency between the sampling requirements of the final rule, except for conforming changes, final paragraph (h) is the same as final § 70.206(h) regarding bimonthly sampling of MMUs, § 70.207(g) regarding bimonthly sampling of designated areas, § 70.209(f) regarding quarterly sampling of designated areas, § 71.206(k) regarding quarterly sampling, and § 90.207(f) regarding quarterly sampling.

Final paragraph (i) is similar to proposed §§ 70.207(h) and 70.208(f)(3). It provides that a citation for a violation of the standard will be terminated when: (1) Each of the five valid representative samples is at or below the standard; and (2) the operator has submitted to the District Manager revised dust control parameters as a part of the mine ventilation plan for the MMU in the citation and these changes have been approved by the District Manager. It further requires that the revised parameters must reflect the control measures used by the operator to abate the violation.

Under proposed § 70.208(f)(3), a mine operator would have had to submit corrective actions to the District Manager for approval in the ventilation

plan, whenever a violation occurred. Unlike proposed § 70.208(f)(3), final paragraph (i)(2) requires only the submission of revised dust control parameters. Paragraph (i) is consistent with MSHA's existing practice of including, in the body of a citation, a requirement to submit revised dust control parameters as a condition for terminating a citation.

Comments on proposed § 70.207(h) and the rationale for paragraphs (i)(1) and (2) are discussed elsewhere in this preamble under § 70.206(i).

For consistency between the sampling requirements of the final rule, except for conforming changes, final paragraphs (i)(1) and (2) are the same as final §§ 70.206(i)(1) and (2), 70.207(h)(1) and (2), and, 70.209(g)(1) and (2).

Proposed § 70.208(h) is not included in the final rule. Proposed paragraph (h) would have provided that, during the 24 months following the effective date of the final rule, if an operator is unable to maintain compliance with the standard for an MMU and has determined that all feasible engineering or environmental controls are being used, the operator may use supplementary controls, including worker rotation, to reduce exposure. These controls had to be used in conjunction with CPDMS for a period of up to 6 months.

In the March 8, 2011, request for comments (76 FR 12650), MSHA stated that the proposed sampling provisions address interim use of supplementary controls when all feasible engineering or environmental controls have been used but the mine operator is unable to maintain compliance with the dust standard. MSHA further stated that with MSHA approval, operators could use supplementary controls, such as rotation of miners, or alteration of mining or of production schedules in conjunction with CPDMs to monitor miners' exposures. MSHA solicited comments on this proposed approach and any suggested alternatives, as well as the types of supplementary controls that would be appropriate to use on a short-term basis.

Many commenters stated that worker rotation was not the answer to controlling respirable dust. They also stated that MSHA, not the operator, should make the determination if all feasible engineering or environmental controls have been exhausted. Other commenters stated that miners should be able to rotate out of a DO and take the sampling device with them, which would minimize respirable dust exposure to individual miners. Some commenters were concerned whether proposed paragraph (h) included the use of respirators such as powered air-purifying respirators (PAPRS), or other suitable protective NIOSH-approved respirators. In addition, these commenters stated that MSHA should allow operators to use a ''hierarchy of controls'' to limit miners' exposure to coal mine dust. This hierarchy of controls consists of first using feasible engineering controls, then administrative controls, and finally respirators including PAPRs.

As specified in Sections 201(b) and 202 of the Mine Act, operators must continuously maintain the average concentration of respirable dust in the mine atmosphere. The Mine Act provides further that respirators must not be substituted for environmental controls.

Engineering controls, also known as environmental controls, are the most protective means of controlling dust generation at the source. MSHA requires engineering or environmental controls as the primary means of controlling respirable dust in the mine environment. This requirement is consistent with the Mine Act and generally accepted industrial hygiene principles. Engineering controls reduce dust generation at the source, or suppress, dilute, divert, or capture the generated dust. Unlike administrative controls and respiratory protection, well-designed engineering controls or environmental controls provide consistent and reliable protection to all workers because the controls are less dependent on individual human performance, supervision, or intervention to function as intended. This is an industrial hygiene principle that is widely supported in publicly available literature.[59] Comments on using a ''hierarchy of controls'' and the use of respirators including PAPRs, are further discussed in the preamble under final § 72.700.

MSHA has determined that proposed paragraph (h) is not necessary and it is not included in the final rule. The proposal would have allowed limited short-term use of measures to supplement engineering or environmental controls to accommodate operators who may have had difficulty meeting the standards by the compliance dates that would have been established by the final rule. However, the final rule includes changes from the proposal on the respirable dust standard in § 70.100, the implementation period for the final standard, and the sampling program. These changes will allow mine operators sufficient time to achieve compliance with the new standard using engineering or environmental controls without the need to use supplementary controls.

12. Section 70.209 Quarterly Sampling; Designated Areas

Final § 70.209, like the proposal, addresses quarterly sampling of designated areas 18 months after the effective date of the final rule.

Under final § 70.201(b), until January 31, 2016, all DAs will be sampled under final § 70.207 regarding bimonthly sampling of designated areas. On February 1, 2016: DAs associated with an MMU will be redesignated as ODOs and will be subject to final § 70.209 regarding quarterly sampling of MMUs; and DAs identified by the operator under § 75.371(t) (e.g., in outby areas) will be subject to the quarterly sampling requirements under this final § 70.209. In addition, final § 70.201(b) addresses the sampling devices required for quarterly sampling of DAs under this final § 70.209.

Final paragraph (a) makes clarifying non-substantive changes to proposed § 70.209(a). It requires that the operator must sample quarterly each DA on consecutive production shifts until five valid representative samples are taken. The quarterly periods are: (1) January 1–March 31; (2) April 1–June 30; (3) July 1–September 30; and (4) October 1–December 31.

On March 8, 2011, MSHA issued in the **Federal Register** a request for comments (76 FR 12648). MSHA requested comments on all aspects of the proposed rule including the areas that operators should sample, the sampling frequency, and which areas could be sampled using CMDPSUs or CPDMs.

One commenter stated that DA sampling should be discontinued because it provides little indication of the miner's exposure.

Sampling DAs, such as belt transfer points, is necessary to evaluate the dust generating sources that are not on an MMU and provides protection from excessive respirable coal mine dust levels to miners that work in outby areas of the mine. The final rule requires mine operators to sample DAs. This provision is consistent with existing § 70.208 regarding sampling of DAs.

[59] For example, see: Alli, B.O., Fundamental Principles of Occupational Health and Safety, the International Labour Organization (2008), page 105, *http://www.ilo.org/wcmsp5/groups/public/@dgreports/@dcomm/@publ/documents/publication/wcms_093550.pdf;* Engineering Controls—NIOSH Workplace Safety and Health Topic, *http://www.cdc.gov/niosh/topics/engcontrols;* Good Practice Guidance on Occupational Health Risk Assessment, the International Council on Mining & Metals, *http://www.icmm.com/search-results?sortField=sort_rank&query=Good+practice+guidance+on+occupational+health+risk+assessment.*

Some commenters stated that they should continue to use the gravimetric sampling devices for DA sampling and not be required to use the CPDM. Final § 70.209(a), like proposed § 70.209, allows the operator to sample DA locations with either a CMDPSU or a CPDM.

One commenter suggested that additional DA sampling be included in the final rule for major projects such as raise bore drilling of mine shafts. MSHA has and will continue to evaluate situations that may require additional DAs to be established for sampling.

Final paragraph (b) is similar to proposed § 70.209(b) and clarifies the time frame for implementation when there is a change in the applicable standard. It requires that when the respirable dust standard is changed in accordance with § 70.101 (Respirable dust standard when quartz is present), the new standard will become effective 7 calendar days after the date of the notification of the change by MSHA. Under proposed § 70.209(b), a new standard would have gone into effect on the first production shift following the operator's receipt of notification after the respirable dust standard is changed in accordance with § 70.101. The rationale for final paragraph (b) is discussed elsewhere in this preamble under § 70.208(c). MSHA received no comments on the proposal.

Final paragraph (b) does not include the requirements in proposed 70.209(b)(1) and (b)(2). Proposed § 70.209(b)(1) would have required that if all samples from the most recent quarterly sampling period do not exceed the new standard, respirable dust sampling of the DA would begin the first production shift during the next quarterly period following receipt of the change from MSHA. Proposed § 70.209(b)(2) would have required that if any sample from the most recent quarterly sampling period exceeded the new standard (reduced due to the presence of quartz), the operator would have had to make necessary adjustments to the dust control parameters in the mine ventilation plan within three days and then collect samples from the affected DA on consecutive shifts until five valid representative samples are collected. It further provided that the samples collected would be treated as normal quarterly samples. MSHA received one comment on the proposal, which was similar to comments received on proposed § 70.207(c)(1) and (2). The comments are consolidated and discussed, together with MSHA's rationale, elsewhere in this preamble under § 70.206(c)(1) and (2).

For consistency between the sampling requirements of the final rule, final paragraph (b) is the same as final § 70.206(c) regarding bimonthly sampling of MMUs, § 70.207(b) regarding bimonthly sampling of designated areas, and § 70.208(c) regarding quarterly sampling of MMUs.

Final paragraph (c) is similar to proposed § 70.209(e) and (g). It requires that when a respirable dust sample taken in accordance with this section meets or exceeds the ECV in Table 70–1 that corresponds to the applicable standard and particular sampling device used, the operator must: (1) Make approved respiratory equipment available; (2) Immediately take corrective action; and (3) Record the corrective actions. The actions required by paragraph (c) are similar to those in proposed § 70.209(e) and (g).

Proposed § 70.209(e) would have required that, during the time for abatement to be fixed in a citation, the operator: (1) Make approved respiratory equipment available to affected miners in accordance with § 72.700; (2) submit to the District Manager for approval proposed corrective actions to lower the concentration of respirable dust to at or below the standard; and (3) upon approval by the District Manager, implement the proposed corrective actions and then sample the affected DA on each production shift until five valid representative samples are taken.

Proposed § 70.209(g) would have required that when using a CPDM and a valid end-of-shift equivalent concentration exceeded the standard but is less than the applicable ECV in Table 70–2, the operator would have had to: (1) Make approved respiratory equipment available to affected miners in accordance with § 72.700; (2) implement corrective actions to ensure compliance with the standard on the next and subsequent production shifts; (3) record the reported excessive dust condition as part of and in the same manner as the records for hazardous conditions required by § 75.363; and (4) review the adequacy of the approved CPDM Performance Plan and submit to the District Manager for approval any plan revisions within 7 calendar days following posting of the end-of-shift equivalent concentration on the mine bulletin board.

As noted previously in the discussion on final § 70.206(e), MSHA clarified, in the March 8, 2011 request for comments (76 FR 12648), that the proposal would require that operators record both excessive dust concentrations and corrective actions in the same manner as conditions are recorded under § 75.363 and that ''MSHA would not consider excessive dust concentrations or corrective actions to be hazardous conditions, since the proposed requirement is not a section 75.363 required record'' (76 FR 12650).

Comments on proposed § 70.209(g) were identical or similar to those on proposed § 70.207(i). The comments are consolidated and discussed elsewhere in this preamble under § 70.206(e). In response to the comments, final paragraph (c) is changed from the proposal. It does not require action if the dust sample exceeds the standard but is less than the ECV in Table 70–1. Rather, it requires an operator to take certain actions when a valid representative sample meets or exceeds the ECV in Table 70–1. If sampling with a CMDPSU, actions must be taken upon notification by MSHA that a respirable dust sample taken in accordance with this section meets or exceeds the ECV for the applicable standard. If sampling with a CPDM, the actions must be taken when the sampling measurement shows that a dust sample taken in accordance with this section meets or exceeds the ECV for the applicable standard. The rationale for final paragraph (c) is the same as that for §§ 70.206(e), 70.207(d), and 70.208(e), and is discussed elsewhere in this preamble under § 70.208(e).

Final paragraph (c)(1), like proposed § 70.209(e)(1) and (g)(1), requires that the operator make approved respiratory equipment available to affected miners in accordance with § 72.700 of this chapter. Comments on proposed § 70.209(e)(1) and (g)(1) were identical or similar to those on proposed §§ 70.207(g)(1) and (i)(1) and 70.208(f)(1) and (g)(1). The comments are consolidated and discussed elsewhere in this preamble, together with the rationale for paragraph (c)(1), under § 70.206(e)(1).

Final paragraph (c)(2), is similar to proposed § 70.209(e)(3) and (g)(2). It requires that the operator immediately take corrective action to lower the concentration of respirable coal mine dust to at or below the standard. Paragraph (c)(2) clarifies that corrective action needs to be taken immediately to protect miners from overexposures. Comments on proposed § 70.209(e)(3) and (g)(2) were identical or similar to those on proposed 70.208(f)(2). The comments are consolidated and discussed elsewhere in this preamble under § 70.208(e)(2). The rationale for final paragraph (c)(2) is the same as that for § 70.206(e)(2) and is discussed under that section.

Final paragraph (c)(3) is similar to proposed § 70.209(g)(3)(v). It requires that the mine operator make a record of

the corrective actions taken. The record must be certified by the mine foreman or equivalent mine official no later than the end of the mine foreman's or equivalent mine official's next regularly scheduled working shift. It also requires that the record must be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration. It further requires that the records must be retained at a surface location at the mine for at least 1 year and be made available for inspection by authorized representatives of the Secretary and the representative of miners. Comments on proposed § 70.209(g)(3) were identical or similar to those on proposed §§ 70.207(i)(3) and 70.208(g)(3). The comments are consolidated and discussed elsewhere in this preamble, together with the rationale for paragraph (c)(3), under § 70.206(e)(3).

Unlike proposed § 70.209(e)(2), final paragraph (c) does not require the operator to submit corrective actions to the District Manager for approval. Comments on proposed § 70.209(e)(2) were the same as or similar to those on proposed § 70.207(g)(2). The comments are consolidated and discussed elsewhere in this preamble under § 70.206(h)(4).

In addition, unlike proposed § 70.209(g)(4), final paragraph (c) does not require operators to review and revise a CPDM Performance Plan. As discussed elsewhere in this preamble under § 70.206, the final rule does not include the proposed requirements for a CPDM Performance Plan. Comments on proposed § 70.209(g)(4) are similar to those on proposed § 70.208(f)(4). The comments are consolidated and discussed elsewhere in this preamble under § 70.208(h).

For consistency between the sampling requirements of the final rule, final paragraphs (c)(1)–(3) are identical to final § 70.206(e)(1)–(3) regarding bimonthly sampling of MMUs, § 70.207(d)(1)–(3) regarding bimonthly sampling of designated areas, § 70.208(e)(1)–(3) regarding quarterly sampling of MMUs, § 71.206(h)(1)–(3) regarding quarterly sampling, and except for conforming changes, § 90.207(c)(1)–(3) regarding quarterly sampling.

Final paragraph (d) is redesignated and changed from proposed § 70.209(c). Paragraph (d)(1) is similar to proposed § 70.209(c) regarding sampling of DAs, and paragraph (d)(2) is similar to proposed § 70.208(e) regarding sampling of MMUs. Paragraph (d) states that noncompliance with the standard is demonstrated during the sampling period when: (1) Two or more valid representative samples meet or exceed the excessive concentration value (ECV) in Table 70–1 that corresponds to the applicable standard and particular sampling device used; or (2) The average for all valid representative samples meets or exceeds the ECV in Table 70–2 that corresponds to the applicable standard and particular sampling device used.

In the March 8, 2011, request for comments (76 FR 12649), MSHA stated that the Agency is interested in commenters' views on what actions should be taken by MSHA and the mine operator when a single shift respirable dust sample meets or exceeds the ECV.

Proposed § 70.209(c) would have required that, if using a CMDPSU, no valid single-shift sample equivalent concentration meet or exceed the ECV that corresponds to the applicable standard in proposed Table 70–1; or if using a CPDM, no valid end-of-shift equivalent concentration meet or exceed the applicable ECV in proposed Table 70–2. Many commenters expressed concern that compliance determinations would be made on the basis of a single-shift measurement.

In response to comments, final paragraph (d) provides two different methods by which compliance determinations can be made. The rationale for paragraphs (d)(1) and (2) is the same as that for §§ 70.206(f)(1) and (2), 70.207(e)(1) and (2), and 70.208(f)(1) and (2), and is discussed elsewhere in this preamble under § 70.208(f)(1) and (2).

For consistency between the sampling requirements of the final rule, final paragraphs (d)(1) and (2) are the same as final §§ 70.206(f)(1) and (2), 70.207(e)(1) and (2), 70.208(f)(1) and (2), and except for conforming changes, § 71.206(i)(1) and (2), and 90.207(d)(1) and (2).

Comments on the ECVs in proposed Table 70–1 are discussed elsewhere in this preamble under § 70.208(f). In addition, a detailed discussion on the derivation of the ECVs in both final Tables 70–1 and 70–2 is included in Appendix A of the preamble. Comments that questioned the accuracy of a single sample in making a compliance determination are addressed elsewhere in this preamble under § 72.800.

Final paragraph (e) is redesignated from proposed § 70.209(d) and makes clarifying and conforming changes. It requires that upon issuance of a citation for a violation of the standard, paragraph (a) of this section will not apply to that DA until the violation is abated and the citation is terminated in accordance with paragraphs (f) and (g) of this section. Paragraph (e) clarifies that a violation must be abated and the citation must be terminated before resuming quarterly sampling. Paragraphs (f) and (g) are discussed below.

Final paragraph (e) includes an exception to allow the District Manager flexibility to address extenuating circumstances that would affect sampling. An example of extenuating circumstances could occur when an uncorrected violation would require abatement sampling that continues into the next sampling period.

Final paragraph (e) is similar to existing § 70.208(d). MSHA did not receive comments on the proposal.

For consistency between the sampling requirements of the final rule, except for conforming changes, final paragraph (e) is the same as final §§ 70.206(g), 70.207(f), 70.208(g), 71.206(j), and 90.207(e).

Final paragraph (f) is similar to proposed § 70.209(e) and (g). It requires that upon issuance of a citation for violation of the standard, the operator must take the following actions sequentially: (1) Make approved respiratory equipment available; (2) immediately take corrective action; (3) record the corrective actions; and (4) conduct additional sampling. The actions required by paragraph (f) are similar to those in proposed § 70.209(e)(1)–(3) discussed in final paragraph (c). In addition, paragraph (f) includes the term ''sequentially'' to ensure that corrective actions are taken in the order they are listed.

Final paragraph (f)(1), like proposed § 70.209(e)(1) and (g)(1), requires that the mine operator make approved respiratory equipment available to affected miners in accordance with § 72.700 of this chapter. Paragraph (f)(1) is consistent with existing § 70.300, which requires the operator to make respiratory equipment available to all persons exposed to excessive concentrations of respirable dust. Comments on proposed § 70.209(e)(1) and (g)(1) are identical or similar to those on proposed §§ 70.207(g)(1) and (i)(1) and 70.208(f)(1) and (g)(1). The comments are consolidated and discussed elsewhere in this preamble, together with the rationale for paragraph (f)(1), under § 70.206(e)(1).

Final paragraph (f)(2) is similar to proposed § 70.209(e)(3). It requires that the operator immediately take corrective action to lower the concentration of respirable coal mine dust to at or below the standard. Paragraph (f)(2) is similar to proposed § 70.209(e)(3) which would have required a mine operator to implement the proposed corrective actions. It is consistent with existing

§ 70.201(d), which requires a mine operator to take corrective action to lower the concentration of respirable dust. Paragraph (f)(2) clarifies that the corrective action must be taken immediately to protect miners from overexposures. The types of corrective actions that could be taken are discussed elsewhere in this preamble under § 70.206(e)(2). Comments on proposed § 70.209(e)(2) are the same as or similar to those on proposed § 70.208(f)(2) and are discussed elsewhere in this preamble under § 70.208(h)(2). The rationale for final paragraph (f)(2) is discussed elsewhere in this preamble under § 70.206(e)(2) and (h)(2).

Final paragraph (f)(3) is similar to proposed § 70.209(g)(3)(v). It requires that the operator make a record of the corrective actions taken. The record must be certified by the mine foreman or equivalent mine official no later than the end of the mine foreman's or equivalent mine official's next regularly scheduled working shift. It also requires that the record must be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration. It further requires that the records must be retained at a surface location at the mine for at least 1 year and be made available for inspection by authorized representatives of the Secretary and the representative of miners. Comments on proposed § 70.209(g)(3)(v) are similar to those on proposed §§ 70.208(g)(3) and 70.207(i)(3). The comments are consolidated and discussed elsewhere in this preamble, together with the rationale for final paragraph (f)(3), under § 70.206(e)(3).

Final paragraph (f)(4) is similar to proposed § 70.209(e)(3). It requires the mine operator, within 8 calendar days after the date the citation is issued, to begin sampling the environment of the affected DA on consecutive normal production shifts until five valid representative samples are taken. Paragraph (f)(4) is consistent with existing § 70.201(d), which requires a mine operator to sample each production shift until five valid respirable dust samples are taken. In addition, it requires that the sampling must begin within 8 calendar days after the date the citation is issued. The rationale for final paragraph (f)(4) is the same as that for final § 70.206(h)(4) and is discussed elsewhere in this preamble under § 70.206(h)(4).

Unlike proposed § 70.209(e)(2), final paragraph (f) does not require operators to submit corrective actions to the District Manager for approval. Comments on proposed § 70.209(e)(2) were the same as or similar to those on proposed § 70.207(g)(2). The comments are consolidated and discussed elsewhere in this preamble under § 70.206(h)(4).

For consistency between the sampling requirements of the final rule, except for conforming changes, paragraph (f) is the same as § 70.206(h) regarding bimonthly sampling of MMUs, § 70.207(g) regarding bimonthly sampling of designated areas, § 70.208(h) regarding quarterly sampling of MMUs, § 71.206(k) regarding quarterly sampling, and § 90.207(f) regarding quarterly sampling.

Final paragraph (g) is similar to proposed § 70.209(f) and contains nonsubstantive and organizational changes from the proposal. It provides that a citation for a violation of the standard will be terminated when: (1) Each of the five valid representative samples is at or below the standard; and (2) the operator has submitted to the District Manager revised dust control parameters as a part of the mine ventilation plan for the DA in the citation and the changes have been approved by the District Manager. It further requires that the revised parameters must reflect the control measures used by the operator to abate the violation. Comments on proposed § 70.209(f) are the same or similar to those on proposed § 70.207(h). The comments and the rationale for final paragraphs (g)(1) and (2) are discussed elsewhere in this preamble under § 70.206(i).

For consistency between the sampling requirements of the final rule, except for conforming changes, final paragraphs (g)(1) and (2) are the same as final §§ 70.206(i)(1) and (2), 70.207(h)(1) and (2), and 70.208(i)(1) and (2).

Proposed § 70.209(h) would have provided that MSHA approval of the operator's ventilation system and methane and dust control plan may be revoked based on samples taken by MSHA or in accordance with this part 70. Proposed § 70.209(h) is moved to final § 70.201(k) because it applies to all underground sampling entities and not just DAs. Comments on proposed § 70.209(h) are discussed under final § 70.201(k) of this preamble.

13. Section 70.210 Respirable Dust Samples; Transmission by Operator

Final § 70.210(a) is substantially similar to the proposal. It requires the operator, if using a CMDPSU, to transmit within 24 hours after the end of the sampling shift all samples collected, including control filters, in containers provided by the manufacturer of the filter cassette to MSHA's Pittsburgh Respirable Dust Processing Laboratory, or to any other address designated by the District Manager. Final paragraph (a) clarifies that operators must include the control filters with the dust sample transmissions to the Respirable Dust Processing Laboratory. As explained in the preamble to the proposed rule, MSHA uses control filters to improve measurement accuracy by eliminating the effect of differences in pre- and post-exposure laboratory conditions, or changes introduced during storage and handling of the filter cassettes. Including control filters with the dust samples ensures that the appropriate control filter is associated with the appropriate sample filter.

One commenter opposed the proposed 24-hour transmission time frame. The commenter stated that the post office might not be open if the end of the sampling shift is on a Saturday or the day before a federal holiday.

The 24-hour transmission time frame is not a new requirement. It has been required under existing § 70.209(a) since 1980. MSHA considers samples to be ''transmitted'' as long as they have been deposited into a secure mail receptacle provided by the U.S. Postal Service or other mail provider, such as FedEx. MSHA received no comments indicating that operators have encountered problems with the 24-hour transmission time frame.

Final § 70.210(b), like the proposal, is the same as existing § 70.209(b).

Final § 70.210(c), is substantially similar to the proposal. It requires that a person certified in sampling must properly complete the dust data card that is provided by the manufacturer for each filter cassette. It further requires that the dust data card must have an identification number identical to that on the filter cassette used to take the sample and be submitted to MSHA with the sample. It also requires that each dust data card must be signed by the certified person who actually performed the examinations during the sampling shift and must include that person's MSHA Individual Identification Number (MIIN).

As an example, the certified person who performs the required examinations during the sampling shift is the individual responsible for signing the dust data card and verifying the proper flowrate, or noting on the back of the card that the proper flowrate was not maintained. Since the certified person who conducted the examination is most knowledgeable of the conditions surrounding the examination, final paragraph (c) requires that certified

person sign the dust data card. In addition, the MIIN number requirement is consistent with MSHA's existing policy. Since July 1, 2008, MSHA has required that the certified person section of the dust data card include the MIIN, a unique identifier for the certified person, instead of the person's social security number. To ensure privacy and to comport with Federal requirements related to safeguarding personally identifiable information, MSHA has eliminated requirements to provide a social security number.

Finally, paragraph (c) provides that respirable dust samples with data cards not properly completed may be voided by MSHA. This is a change from the proposal. The proposal would have required that, regardless of how small the error, an improperly completed dust data card must be voided by MSHA. Final paragraph (c) allows MSHA flexibility in voiding an improperly completed dust data card. MSHA received no comments on this proposed provision.

Final § 70.210(d) and (e) are the same as the proposal, and are the same as existing § 70.209(d) and (e).

Final § 70.210(f) is changed from the proposal. It requires that, if using a CPDM, the person certified in sampling must validate, certify, and transmit electronically to MSHA within 24 hours after the end of the sampling shift all sample data file information collected and stored in the CPDM, including the sampling status conditions encountered when sampling; and, not tamper with the CPDM or its components in any way before, during, or after it is used to fulfill the requirements of 30 CFR part 70, or alter any sample data files. It further requires that all CPDM data files transmitted electronically to MSHA must be maintained by the operator for a minimum of 12 months.

Final paragraph (f) includes the term ''person certified in sampling'' rather than ''designated mine official.'' This change makes paragraph (f) consistent with final paragraph (c). Final paragraph (f) also includes a clarification that CPDM data files are ''electronically'' transmitted to MSHA, unlike the physical transmission of samples collected with the CMDPSU.

MSHA received a number of comments on the data file transmission time frame included in proposed paragraph (f), which would have required the designated mine official to validate, certify and electronically transmit to MSHA, within 12 hours after the end of the last sampling shift of the work week, all daily sample and error data file information collected during the previous calendar week (Sunday through Saturday) and stored in the CPDM. Some commenters stated that validating, certifying, and transmitting sampling data electronically to MSHA, if using a CPDM, within 12 hours after the end of the last shift of the work week was too short a time frame. Another commenter was concerned that the 12-hour time limit after the end of the last shift sampled would impose unnecessary additional work hours on persons responsible for dust sampling activities since weekend work would be required almost every week. This commenter also stated that the 12-hour time frame was inconsistent with the 24-hour time frame allowed for the transmission of samples taken with a CMDPSU and noted that sampling data would still be timely and relevant if it were transmitted within 70 hours of collection.

MSHA evaluated the comments and concludes that a more appropriate transmission time frame would be within 24 hours after the end of each sampling shift. This 24-hour time frame is consistent with the existing sample data transmission requirement in existing § 70.209(a). It is also consistent with the requirement in final § 70.210(a) that operators transmit CMDPSU sampling data within 24-hours of the end of the sampling shift. Regardless of whether dust samples are collected with a CMDPSU or a CPDM, the person certified in sampling must complete the tasks associated with readying the collected samples for transmission to MSHA within the 24-hour time frame after completion of sampling. Transmitting the CPDM data in this time frame allows MSHA to assess compliance with the standard in a timely manner. Additionally, the commenter's suggestion for a 70-hour transmission time frame would be too long because it could hinder timely corrective actions.

As a clarification to the proposal, final paragraph (f) does not require error data file information to be transmitted to MSHA. Rather, final paragraph (f) requires ''the sampling status conditions encountered when sampling'' to be transmitted to MSHA. This terminology clarifies that changes in conditions that may occur during the sampling shift (e.g., flowrate, temperature, humidity, tilt indicator, etc.) that are different from the CPDM's set parameters and that may affect sampling results must be recorded and transmitted to MSHA.

The requirement in final paragraph (f) that the certified person not tamper with the CPDM or alter any CPDM data files is new. It is consistent with the requirements for CMDPSUs, under existing § 70.209(b) and final § 70.210(b), which provide that an operator not open or tamper with the seal of any filter cassette, or alter the weight of any filter cassette before or after it is used to fulfill the requirements of 30 CFR part 70. It is also consistent with the requirement in 30 CFR 74.7(m) that a CPDM be designed to be tamper-resistant or equipped with an indicator that shows whether the measuring or reporting functions of the device have been tampered with or altered. This provision protects miners' health and ensures the integrity of MSHA's dust sampling program. Therefore, a similar requirement is included for samples taken with a CPDM.

14. Section 70.211 Respirable Dust Samples; Report to Operator; Posting

Final § 70.211(a) is substantially similar to the proposal. It states that MSHA must provide the operator, as soon as practicable, a report with the data specified in paragraphs (a)(1)–(a)(6) on respirable dust samples submitted or whose results were transmitted electronically, if using a CPDM. Final paragraph (a) includes the term as soon as practicable to clarify that, although MSHA intends to provide an operator a timely report, there may be instances when unexpected delays occur. Final paragraph (a) also includes language to clarify that an MSHA report will be provided to an operator whose sampling results were transmitted electronically to the Agency, if using a CPDM. The proposal stated that MSHA would provide the operator with a report on respirable dust samples submitted in accordance with this part. Final paragraph (a) clarifies that samples submitted in accordance with this part not only include samples collected by the CMDPSU, but also include sampling results collected by the CPDM and transmitted electronically to MSHA. MSHA received no comments on the proposed provision.

Final paragraphs (a)(1), (2), (5) and (6) are the same as the proposal: (a)(1) The mine identification number; (a)(2) the locations within the mine from which the samples were taken; (a)(5) the occupation code, where applicable; and (a)(6) the reason for voiding any sample.

Final paragraphs (a)(3) and (4) include a clarifying change from the proposal: (a)(3) The concentration of respirable dust expressed as an equivalent concentration for each valid sample; and (a)(4) the average equivalent concentration of respirable dust for all valid samples. Paragraphs (a)(3) and (a)(4) clarify the proposal by not using the term in milligrams per cubic meter of air (mg/m^3). This clarification conforms to the definition of *equivalent*

concentration, which is discussed elsewhere in the preamble under final § 70.2. MSHA received no comments on proposed paragraphs (a)(1)–(a)(6).

Final § 70.211(b), like the proposal, requires the operator, upon receipt of the MSHA report, to post the data contained in the report on the mine bulletin board for at least 31 days. Final paragraph (b) is the same as existing § 70.210(b). Under the existing requirement, operators have historically posted the entire MSHA report. MSHA anticipates that operators will continue this practice.

One commenter indicated that the 31-day posting requirement allows interested parties sufficient opportunity to review the data. The commenter suggested that data on the DOs that are sampled, as well as the associated sampling results, should also be required to be posted. The commenter stated that such information would reveal which DOs are exposed to the most dust, and the mine's compliance record, and allow interested parties to use the information for such purposes as bidding on jobs.

Final paragraph (b) requires posting of the occupation code and the dust concentration for each valid sample as suggested by the commenter because these data are included in the report that MSHA provides to the operator. Accordingly, final paragraph (b) is the same as the proposal.

Final paragraph (c) is similar to the proposal. It provides that if using a CPDM, the person certified in sampling must, within 12 hours after the end of each sampling shift, print, sign, and post on the mine bulletin board a paper record (Dust Data Card) of the sample run. It further requires that this hard-copy record must include the data entered when the sample run was first programmed, and the following information: (1) The mine identification number; (2) the locations within the mine from which the samples were taken; (3) the concentration of respirable dust, expressed as an equivalent concentration reported and stored for each sample; (4) the sampling status conditions encountered for each sample; and (5) the shift length.

Final paragraph (c) does not include the term designated mine official because the final rule does not include the proposed CPDM Performance Plan section that would have required operators to designate a mine official to perform CPDM-related activities. Instead, the final rule requires that the CPDM-related duties under this section be performed by persons certified in sampling. Persons certified in sampling using a CPDM will be familiar with the operation of the CPDM and thus, require the least amount of time to perform these tasks. The certified person will need to perform the tasks for the mine's records of sampling performed. This, in conjunction with the revised sampling frequency contained in this final rule, makes it unnecessary to have a mine official perform these activities. The certified person can ensure the proper officials are aware of specific monitoring results that may require attention.

Final paragraph (c) also does not include the proposed requirement that would have required posting end-of-shift sampling results within 1 hour of the end of the shift. During the comment period, MSHA specifically requested comment on the proposed requirement for posting information on sampling results and miners' exposures on the mine bulletin board. Several commenters expressed concern that it was unrealistic to post end-of-shift sampling results within 1 hour of the end of the shift. One commenter pointed out that up to two hours may elapse between an oncoming crew's entrance into the mine and the ending shift's exit from the mine if the operator hot-seats the shift change. This commenter stated that this two-hour time span would require the hiring of additional health technicians to be able to post the samples within 1 hour. Another commenter stated it was too burdensome to require posting within 1 hour. Another commenter saw no value in requiring sampling results to be posted within an hour of the end of the shift because the CPDM-wearer would have left the mine by the time the results were posted, and therefore would not know the results until the next scheduled shift; also miners on the oncoming shift would already be in the mine before the data were posted.

After reviewing the comments, MSHA determined that posting within 1 hour of the end of the shift was not necessary and requiring an operator to post the results from each sampling shift within 12 hours after the end of the sampling shift adequately protects miners. Posting the results from each sampling shift within 12 hours ensures that miners and their representatives are informed of the results in a timely manner. The 12-hour time frame is sufficient to have the results from the monitored shifts available for review prior to the miners returning to the same shift worked the next calendar day.

Final paragraph (c) clarifies that a paper record (Dust Data Card that is programmed in the CPDM) of the sample run must be printed, signed, and posted. The paper record provides information for miners to review until the operator receives and posts the MSHA report referenced in final paragraph (a).

Proposed § 70.211(c) would have required certain sampling information to be posted. However, it did not provide the means by which the information was to be posted.

One commenter recommended that sampling results be offered personally, including the option of having the results mailed to the miner who wore the CPDM during the sampling shift. In response to this comment, MSHA emphasizes that the final rule continues the Agency's occupational and area sampling program. Because sampling under the final rule is not personal, the data collected is intended to benefit all miners who work in the area of the sample location, not just the miner who wore the CPDM. Accordingly, the final rule does not adopt this recommendation.

Final paragraph (c) does not include provisions that were in: Proposed (c)(1)(iv), which would have required posting the total amount of exposure accumulated by the sampled occupation during the shift; proposed (c)(1)(v), which would have required posting the monitored occupation code, where applicable; and proposed (c)(1)(vi), which would have required posting the reasons for voiding any sample. These proposed provisions are not included in the final rule because the information will be included on the paper record (Dust Data Card) which is posted for each sample run when samples are collected using a CPDM. MSHA did not receive comments on proposed (c)(1)(i)–(c)(1)(vii).

Proposed paragraph (c)(1)(viii), which would have required posting any other information required by the District Manager, is not included in the final rule. One commenter did not support proposed (c)(1)(viii) which would have allowed the District Manager to require posting of additional information. MSHA determined that allowing the District Manager to require posting of additional information is unnecessary since all relevant information will be available on the paper record (Dust Data Card).

Final paragraph (c)(3) uses the term equivalent concentration instead of equivalent concentration in milligrams per cubic meter of air. This clarification conforms to the definition in § 70.2 and its use in other sections of the final rule. Final paragraph (c)(3) also includes a clarification that, when using a CPDM, the concentration of respirable dust that must be documented in the record is the concentration which is ''reported and

stored for'' each sample. The addition of the phrase ''reported and stored for'' emphasizes that the dust concentration is reported by and stored in the CPDM's memory, allowing the paper record (Dust Data Card) which is part of the CPDM's internal programming, to be printed and posted, as required.

Final paragraph (c)(4) is new and requires the paper record to include the sampling status conditions encountered for each sample. The proposal would have required the reason for voiding any sample to be posted. The proposed posting requirement corresponded to the sampling information that the operator would have been required to submit to MSHA under proposed § 70.210(f). Proposed § 70.210(f) would have required an operator to transmit error data file information to MSHA. Error data file information referred to the information that was provided by the CPDM as error codes. Essentially, the error codes were an indication that the sampling conditions changed from the CPDM's set parameters. For example, changes in the degree of tilt, heater temperature, pump flowrate, mine temperature, or pump back pressure, that were outside of the unit's set parameters, resulted in error codes. While some of these error codes or changes in sampling conditions could have resulted in a sample being voided by MSHA, it was not necessarily an indication of a void sample. Technically, under the proposal, an operator would not have been able to post the reason for voiding any sample since only MSHA may void samples. However, commenters had the misunderstanding that error codes always indicated a void or unusable sample. Essentially, the commenters understood that MSHA was referring to the error codes as the reason for voiding any sample and noted as such in their comments that many CPDM samples would be voided due to the presence of error codes.

During the rulemaking, the CPDM manufacturer, after discussion with NIOSH, changed the reference in the approved CPDM product literature from error codes to status conditions. The status conditions that occur during sampling, like the error codes, are only indicated by the CPDM when the sampling conditions changed from the CPDM's set parameters. This terminology change by the CPDM manufacturer addressed mine operators' misunderstanding that the error codes were always an indication of a void or unusable sample. Consistent with this change by the CPDM manufacturer, and as discussed previously under final § 70.210(f), operators must transmit to MSHA the sampling status conditions rather than the proposed error codes. In addition, to correspond with the sampling status conditions that are transmitted in accordance with final § 70.210(f), final paragraph (c)(4) requires an operator to post the sampling status conditions rather than post the reason for voiding any sample. MSHA's evaluation of the sample record, including the sampling status conditions, will determine which samples, if any, may be voided. Final paragraph (c)(4) accurately reflects MSHA's intent that posting of the sampling information was designed to provide miners with timely sampling and exposure information. Providing miners the sampling status conditions allows miners to determine if the sample reported accurately represents the conditions under which that particular sample was collected, thereby increasing their confidence in the operators' monitoring program.

Proposed paragraph (c)(2) is not included in the final rule. It would have required posting the weekly accumulated exposure (WAE) and the weekly permissible accumulated exposure (WPAE) for each occupation sampled in an MMU at the end of the last sampling shift of the work week, within 2 hours. Posting the WAE and WPAE would have provided miners with the total amount of coal mine dust accumulated during the work week, as well as the maximum amount of accumulated exposure to coal mine dust permitted to be received during a normal work week. One commenter stated that posting within 2 hours is too restrictive and recommended posting at least 1 hour before the start of the next sampling shift. As noted elsewhere in this preamble under final § 70.2, the final rule does not contain any requirements associated with the WAE and WPAE.

Final § 70.211(d) is redesignated and changed from proposed § 70.211(c)(3). It provides that the information required by paragraph (c) of this section must remain posted until receipt of the MSHA report covering the respirable dust samples. Under the proposal, the information required by paragraph (c) would have been required to be posted for at least 15 calendar days. The final rule's requirement to post the information until the MSHA report is received ensures that sampling information is available for the entire interim period between the time the CPDM sampling results are electronically transmitted to MSHA and the time that the operator receives the MSHA report, which could exceed the proposed 15 calendar days. As discussed earlier, MSHA anticipates that most reports will be received by the operator in a timely manner, however, there may be occurrences where the MSHA report is unexpectedly delayed. If there were a delay in providing the report to the operator, the Agency wants to ensure that miners and their representatives continue to have relevant, timely sampling data until MSHA's consolidated report is available and posted. MSHA did not receive any comments on this provision.

15. Section 70.212 Status Change Reports

Final § 70.212 is derived from existing § 70.220. Like proposed § 70.212, it addresses status change reports. One commenter expressed general support for the proposal. Other commenters stated that the proposal was unnecessary because operators are required to notify MSHA of mine status changes under existing § 41.12.

Sections 70.212 and 41.12 are not duplicative. Section 41.12 requires only that operators notify the Agency of changes to the legal identity of the operator, but contains no requirement that operators report changes that affect their respirable dust sampling obligations. Section 70.212 serves a different purpose than § 41.12 and is included in the final rule.

Final § 70.212, like the proposal, requires an operator to report any change in operational status of the mine, mechanized mining unit, or designated area that affects the respirable dust sampling requirements of part 70 to the MSHA District Office or to any other MSHA office designated by the District Manager. It further requires that an operator must report the status changes in writing or electronically within 3 working days after the status change has occurred.

One commenter objected to the provision in proposed paragraph (a) that permits the District Manager to designate an MSHA office other than the District Office to which status change reports must be made. The commenter stated that allowing District Managers to designate an alternate office could lead to miscommunications that result in reporting errors. In response, MSHA notes that proposed and final paragraphs (a) are consistent with existing § 70.220(a), which contains an same requirement. MSHA received no information from commenters that reporting errors have occurred and the Agency is otherwise unaware of any reporting errors due to the provision. Also, MSHA received no comment on the proposal to permit electronic submissions of status change reports.

Final § 70.212(b), like the proposal, defines each specific operational status. MSHA received no comments on proposed paragraph (b) and it is finalized as proposed.

Proposed § 70.212(c) is not included in the final rule. It would have required the designated mine official to report status changes that affect the operational readiness of any CPDM within 24 hours after the status change had occurred. One commenter was concerned with the recordkeeping burden associated with proposed § 70.212(c). Under the proposed rule, because operators were required to sample DOs in each MMU during every production shift, it was particularly important for MSHA to remain informed of circumstances affecting the operational readiness or availability of an operator's CPDMs needed for sampling. Examples of status changes affecting operational readiness of a CPDM included a malfunction or breakdown of a CPDM or failure to have a spare CPDM available for required sampling. However, the sampling requirement for each DO in each MMU in final § 70.208 requires sampling each calendar quarter on consecutive normal production shifts until 15 valid representative samples are taken, rather than the proposed requirement to sample every shift. Given that the operator is permitted to collect the required 15 consecutive samples at any time during the calendar quarter, the rationale for the proposal, to inform MSHA of circumstances that affect the operational readiness of the CPDM, no longer applies. Under final § 70.204, the certified person will perform the necessary examination, testing and set-up procedures, and external maintenance to ensure the operational readiness of the CPDM before the sampling shift on which it will be used.

B. 30 CFR Part 71—Mandatory Health Standards—Surface Coal Mines and Surface Work Areas of Underground Coal Mines

1. Section 71.1 Scope

Final § 71.1, like the proposal, states that part 71 sets forth mandatory health standards for each surface coal mine and for the surface work areas of each underground coal mine subject to the Federal Mine Safety and Health Act of 1977, as amended.

2. Section 71.2 Definitions

Act

The final rule, like the proposal, defines Act as the Federal Mine Safety and Health Act of 1977, Public Law 91–173, as amended by Public Law 95–164 and Public Law 109–236.

Active Workings

Final § 71.2, like the proposal, makes no change to the existing definition of active workings.

Approved Sampling Device

The final rule, like the proposal, is the same as the final part 70 definition discussed elsewhere in the preamble related to final § 70.2.

Certified Person

Final § 71.2 makes nonsubstantive changes to the existing definition of certified person. It does not include the parenthetical text following the references to §§ 71.202 and 71.203.

Coal Mine Dust Personal Sampler Unit (CMDPSU)

The final rule, like the proposal, is the same as the final part 70 definition discussed elsewhere in the preamble related to final § 70.2.

Concentration

Final § 71.2, like the proposal, makes no change to the existing definition of concentration.

Continuous Personal Dust Monitor (CPDM)

The final rule, like the proposal, is the same as the final part 70 definition discussed elsewhere in the preamble related to final § 70.2.

Designated Work Position (DWP)

Final § 71.2 is similar to the proposal. It defines *designated work position* (DWP) as a work position in a surface coal mine or surface work area of an underground mine designated for sampling to measure respirable dust generation sources in the active workings. Each DWP will be assigned a four-digit number assigned by MSHA identifying the specific physical portion of the mine that is affected, followed by a three-digit MSHA coal mining occupation code describing the location to which a miner is assigned in the performance of his or her regular duties.

The final definition includes nonsubstantive changes to the proposed definition and adds language in the first sentence to clarify the purpose of DWP sampling, i.e., to measure respirable dust generation sources in the active workings. MSHA received no comments on the proposed definition.

District Manager

Final § 71.2, like the proposal, makes no change to the existing definition of District Manager.

Equivalent Concentration

The final rule is changed from the proposal. It is changed consistent with changes made to the final part 70 definition as discussed elsewhere in the preamble related to final § 70.2.

MRE Instrument

Final § 71.2, like the proposal, makes no change to the existing definition of MRE instrument.

MSHA

Final § 71.2, like the proposal, makes no change to the existing definition of MSHA.

Normal Work Shift

Final § 71.2, like the proposal, makes no change to the existing definition of normal work shift.

Quartz

The final rule is changed from the proposal. It is changed consistent with changes made to the final part 70 definition as discussed elsewhere in the preamble related to final § 70.2.

Representative Sample

The final rule is substantially similar to the proposal. It defines *representative sample* as a respirable dust sample, expressed as an equivalent concentration, that reflects typical dust concentration levels in the working environment of the DWP performing normal duties. The final definition is identical to the proposed definition except that the language, ''expressed as an equivalent concentration'' is added. The added text clarifies that each respirable dust sample measurement must be converted to an equivalent concentration as defined under this final § 71.2.

MSHA received one comment on the proposed definition. The commenter stated that there was no need to define representative samples and that MSHA should modify its sampling methodology such that personal samples, rather than occupational samples, are taken.

With respect to the commenter's recommendation that MSHA replace the occupational sampling methodology with personal sampling, MSHA addresses this comment elsewhere in the preamble under final § 70.201. In addition, a definition for representative sample ensures that respirable dust samples accurately reflect the amount of dust to which miners are exposed, i.e., the dust concentration levels in the working environment of the DWP performing normal work duties. Without a definition, operators could sample miners at times when they

perform work duties that under-represent, or bias, miners' dust exposures. Thus, samples could under-represent, or bias, miners' dust exposure. Therefore, under the final rule, respirable dust samples must be taken while the DWP is engaged in normal work duties. The final definition of representative samples will provide protection for miners' health by allowing MSHA to objectively evaluate the functioning of operators' dust controls and the adequacy of operators' approved plans.

Respirable Dust

Final § 71.2 makes nonsubstantive changes to the existing definition of respirable dust. It is the same as the final part 70 definition discussed elsewhere in the preamble related to final § 70.2.

Secretary

Final § 71.2 makes nonsubstantive changes to the existing definition of Secretary. It is the same as the final part 70 definition discussed elsewhere in the preamble related to final § 70.2.

Surface Area

Final § 71.2, like the proposal, makes no change to the existing definition of surface area.

Surface Coal Mine

Final § 71.2, like the proposal, makes no change to the existing definition of surface coal mine.

Surface Installation

Final § 71.2, like the proposal, makes no change to the existing definition of surface installation.

Surface Work Area of an Underground Coal Mine

Final § 71.2, like the proposal, makes no change to the existing definition of surface work area of an underground coal mine.

Surface Worksite

Final § 71.2, like the proposal, makes no change to the existing definition of surface worksite.

Valid Respirable Dust Sample

For clarification, the final rule revises the definition under existing § 71.2 for a *valid respirable dust sample* to mean a respirable dust sample collected and submitted as required by this part, including any sample for which the data were electronically transmitted to MSHA, and not voided by MSHA.

The final definition adds language to clarify that for CPDM samples, the data files are ''electronically'' transmitted to MSHA, and not physically transmitted like samples collected with the CMDPSU. The proposed rule did not include this clarification.

Work Position

Final § 71.2, like the proposal, defines work position as an occupation identified by an MSHA three-digit code describing a location to which a miner is assigned in the performance of his or her normal duties. The final definition ensures that MSHA can properly correlate each dust sample with the work location, position, and shift from which it was obtained. The definition is consistent with the Agency's practice of identifying the specific position being sampled. MSHA did not receive comments on the proposal.

3. Section 71.100 Respirable Dust Standard

Final § 71.100(a) is changed from the proposal. It requires that each operator continuously maintain the average concentration of respirable dust in the mine atmosphere during each shift to which each miner in the active workings of each mine is exposed, as measured with an approved sampling device and expressed in terms of an equivalent concentration, at or below: (1) 2.0 milligrams of respirable dust per cubic meter of air (mg/m^3) and (2) 1.5 mg/m^3 as of August 1, 2016.

Final paragraph (a)(1) is the same as proposed paragraph (a)(1). It retains the existing standard of 2.0 mg/m^3 on the effective date of this final rule. Final paragraph (a)(2) is renumbered from proposed paragraph (a)(3) and changes the date on which the 1.5 mg/m^3 standard is effective from the proposed 12 months to 24 months after the effective date of the final rule.

Unlike proposed paragraph (a)(2), the final rule does not the final rule does not require that the standard be lowered to 1.7 mg/m^3 6 months after the effective date of the final rule, or to 1.0 mg/m^3 24 months after the effective date of the final rule.

MSHA received several comments on the proposed 1.0 mg/m^3 standard. The comments were the same or similar to those on proposed § 70.100. Those comments, along with MSHA's rationale for final paragraphs (a) and (b) are discussed elsewhere in this preamble under § 70.100.

4. Section 71.101 Respirable Dust Standard When Quartz Is Present

Final § 71.101(a), like proposed § 71.101(a), requires that each operator must continuously maintain the average concentration of respirable quartz dust in the mine atmosphere during each shift to which each miner in the active working of each mine is exposed at or below 0.1 mg/m^3 (100 micrograms per cubic meter of air or μg/m^3) as measured with an approved sampling device and expressed in terms of an equivalent concentration.

Final § 71.101(b), like proposed § 71.101(b), requires that when the equivalent concentration of respirable quartz dust exceeds 100 μg/m^3, the operator must continuously maintain the average concentration of respirable dust in the mine atmosphere during each shift to which each miner in the active workings is exposed as measured with an approved sampling device and in terms of an equivalent concentration at or below the applicable respirable dust standard. It also states that the applicable dust standard is computed by dividing the percent of quartz into the number 10. It further requires that the application of this formula must not result in an applicable dust standard that exceeds the standard established by § 71.100(a).

Final paragraphs (a) and (b) are consistent with existing § 71.101. The existing standard protects miners from exposure to respirable quartz by requiring a reduced respirable dust standard when the respirable dust in the mine atmosphere of the active workings contains more than 5 percent quartz. The existing standard is based on a formula that was prescribed by the Department of Health, Education and Welfare (now DHHS). The formula, which applies when a respirable coal mine dust sample contains more than 5.0 percent quartz, is computed by dividing 10 by the concentration of quartz, expressed as a percentage. The formula results in a continuous reduction in the respirable dust standard as the quartz content of the respirable dust increases over 5 percent (i.e., the higher the percentage of quartz, the lower the reduced respirable dust standard). The standard in final paragraph (a) is derived from the existing formula which was designed to limit a miner's exposure to respirable quartz to 0.1 mg/m^3 (100 μg/m^3-MRE), based on the existing 2.0 mg/m^3 respirable dust standard.

MSHA received several comments on the proposed § 71.101. The comments were the same or similar to those on proposed § 70.101. Those comments, along with MSHA's rationale for final paragraphs (a) and (b) are discussed elsewhere in this preamble under § 70.101. The feasibility of § 71.101 is discussed elsewhere in this preamble under Section III.C.

5. Section 71.201 Sampling; General And Technical Requirements

Final § 71.201, like the proposal, addresses general and technical sampling requirements concerning operator sampling. One commenter stated that operator sampling is not credible and that MSHA should be responsible for all compliance sampling. This comment is addressed elsewhere in this preamble under § 70.201.

Final paragraph (a) is changed from the proposal. It requires that each operator take representative samples of the concentration of respirable dust in the active workings of the mine as required by this part with an approved CMDPSU. On February 1, 2016, the operator may use an approved CPDM if the operator notifies the District Manager in writing that an approved CPDM will be used for all DWP sampling at the mine. The notification must be received at least 90 days before the beginning of the quarter in which CPDMs will be used to collect the DWP samples. The term representative samples is defined in final § 71.2. The proposal would have required that each operator take representative samples of the concentration of respirable dust in the active workings of the mine as required by this part.

The final rule clarifies that the operator may use one type of approved sampling device while conducting DWP sampling. If operators will be conducting DWP sampling using the CPDM rather than the CMDPSU, the operators must notify MSHA of their intent to do so. This clarification ensures that operators do not switch between sampling devices on successive quarterly sampling periods, or use both sampling devices during the same sampling period. The 90-day notification period allows MSHA sufficient time to modify MSHA's health computer system to accept CPDM electronic records for all DWPs located at the mine.

Some commenters stated that only the miner needs to be sampled to get a miner's exposure. This comment is addressed elsewhere in this preamble under § 70.201(c).

Final paragraph (b), like the proposal, requires that sampling devices be worn or carried directly to and from the DWP to be sampled. Paragraph (b) also requires that sampling devices remain with the DWP and be operational during the entire shift, which includes the total time spent in the DWP and while traveling to and from the DWP being sampled. It further requires that if the work shift to be sampled is longer than 12 hours and the sampling device is a CMDPSU, the operator must switch-out the unit's sampling pump prior to the 13th-hour of operation; and, if the sampling device is a CPDM, the operator must switch-out the CPDM with a fully charged device prior to the 13th-hour of operation. Paragraph (b), which applies to DWPs, is consistent with final § 70.201(c), which applies to MMUs and DAs. The rationale for paragraph (b) is the same as that for, and is discussed under, final § 70.201(c) of this preamble. Paragraph (b) is unchanged from the proposal.

Final paragraph (c), like the proposal, requires that if using a CMDPSU, one control filter must be used for each shift of sampling. It further requires that each control filter must: (1) Have the same pre-weight data (noted on the dust data card) as the filters used for sampling; (2) remain plugged at all times; (3) be used for the same amount of time, and exposed to the same temperature and handling conditions as the filters used for sampling; and, (4) be kept with the exposed samples after sampling and in the same mailing container when transmitted to MSHA. MSHA received no comments on the proposal.

Final paragraph (c)(4) is changed from the proposal to clarify that the control filter must be in the same mailing container as the exposed samples when transmitted to MSHA. Paragraphs (c)(1)–(4) are identical to final § 70.201(d)(1)–(4). The rationale for paragraphs (c)(1)–(4) is discussed under final § 70.201(d)(1)–(4) of this preamble.

Final paragraph (d), like the proposal, requires that records showing the length of each normal work shift for each DWP be made and retained for at least six months and be made available for inspection by authorized representatives of the Secretary and the representative of miners and submitted to the District Manager when requested in writing. Paragraph (d) is similar to final § 70.201(e).

One commenter stated that production shift records are unnecessary and excessively burdensome. This comment and the rationale for paragraph (d) are discussed under final § 70.201(e) of this preamble. Paragraph (d) is unchanged from the proposal.

Final paragraph (e), like the proposal, requires that upon request from the District Manager, the operator must submit the date and time any respirable dust sampling required by this part will begin. It further requires that this information must be submitted at least 48 hours prior to scheduled sampling. Paragraph (e) is identical to final § 70.201(f).

One commenter stated that the requirement creates an excessive burden on MSHA. This comment and the rationale for paragraph (e) are discussed under final § 70.201(f) of this preamble. Paragraph (e) is unchanged from the proposal.

Final paragraph (f), like the proposal, requires that upon written request by the operator, the District Manager may waive the rain restriction for a normal work shift as defined in § 71.2 for a period not to exceed two months, if the District Manager determines that: (1) The operator will not have reasonable opportunity to complete the respirable dust sampling required by this part without the waiver because of the frequency of rain; and, (2) the operator did not have reasonable opportunity to complete the respirable dust sampling required by this part prior to requesting the waiver. Paragraph (f) is identical to the existing requirements. MSHA received no comments on the proposal. Paragraph (f) is unchanged from the proposal.

Final paragraph (g) is substantially the same as the proposal. It requires that operators using CPDMs must provide training to all miners expected to wear the CPDM. It makes a nonsubstantive change that the training must be completed prior to a miner wearing the CPDM, as opposed to prior to a miner ''being required to wear the CPDM,'' and then every 12 months thereafter.

Final paragraphs (g)(1)–(4) are similar to proposed paragraphs (g)(1)–(5). Proposed paragraph (g)(2) would have required miners to be instructed on how to set up the CPDM for compliance sampling. One commenter stated this was unnecessary and was concerned that it could lead to persons who are not certified performing functions that require certification to perform. In response, the final rule requires mine operators to have certified persons set up the CPDM for compliance. Therefore, training all miners on how to set up the CPDM for compliance sampling is not necessary. Accordingly, the final rule does not include this proposed provision.

Paragraph (g)(1) is similar to proposed (g)(5). Like the proposal, it requires that the training include the importance of monitoring dust concentrations and properly wearing the CPDM. Paragraph (g)(1) makes a conforming change. The proposal would have required training on the importance of ''continuously'' monitoring dust concentrations. Since continuous monitoring is not required by the final rule, the term ''continuously'' is not included in paragraph (g)(1).

Final paragraph (g)(2) is the same as proposed (g)(1). It requires that the training include explaining the basic features and capabilities of the CPDM.

Final paragraph (g)(3), like the proposal, requires that the training include discussing the various types of information displayed by the CPDM and how to access that information.

Final paragraph (g)(4), like the proposal, requires that the training include how to start and stop a short-term sample run during compliance sampling.

The training requirements of paragraphs (g)(1)(4) are identical to the training requirements of final § 70.201(h)(1)(4). One commenter stated that the training requirements create an excessive burden on mine operators. This comment and the rationale for paragraphs (g)(1)–(4) are discussed under final § 70.201(h)(1)–(4) of this preamble.

Final paragraph (h), like the proposal, requires that an operator keep a record of the CPDM training at the mine site for 24 months after completion of the training. It also provides that an operator may keep the record elsewhere if the record is immediately accessible from the mine site by electronic transmission. It further requires that upon request from an authorized representative of the Secretary, Secretary of HHS, or representative of miners, the operator must promptly provide access to any such training records. Final paragraphs (h)(1)–(3) require the record to include the date of training, the names of miners trained, and the subjects included in the training.

Paragraph (h) makes a non-substantive change by replacing the proposed term ''2 years'' with ''24 months.''

Final paragraphs (h)(1)–(3) are new and clarify that the record must contain sufficient information for an authorized representative of the Secretary, Secretary of HHS, or miners' representative to determine that the operator has provided CPDM training in accordance with requirements in paragraph (g). Like final § 70.201(i), this is the type of information that is generally required for all training records to establish that the training has occurred.

The record requirements of paragraph (h) are identical to final § 70.201(i). One commenter stated that the proposed recordkeeping requirement is too burdensome. This comment and the rationale for paragraph (h) are discussed elsewhere in this preamble under final § 70.201(i).

6. Sections 71.202 Certified Person; Sampling and 71.203 Certified Person; Maintenance and Calibration

Final §§ 71.202 and 71.203 are identical to final §§ 70.202 and 70.203. Comments on proposed §§ 71.202 and 71.203 were the same as comments on proposed §§ 70.202 and 70.203. The comments and MSHA's rationale are discussed elsewhere in this preamble under §§ 70.202 and 70.203.

7. Section 71.204 Approved Sampling Devices; Maintenance and Calibration

Final § 71.204 is identical to final § 70.204. Comments on proposed § 71.204 were similar to comments on proposed § 70.204. Comments on proposed § 71.204 and MSHA's rationale are discussed elsewhere in this preamble under final § 70.204.

8. Section 71.205 Approved Sampling Devices; Maintenance and Calibration

Final § 71.205 is identical to final § 70.205, except that it does not exclude operators of certain anthracite mining operations from performing the on-shift examination required by § 71.205(b)(1). The rationale for not requiring the examination in underground anthracite mines does not apply to surface coal mines and surface work areas of underground coal mines subject to part 71 requirements. Comments on proposed § 71.205 were similar to comments on proposed § 70.205. Comments and MSHA's rationale for § 71.205 are discussed elsewhere in this preamble under final § 70.205.

9. Section 71.206 Quarterly Sampling

Final § 71.206 is similar to proposed § 71.207. The final rule does not include requirements for a CPDM Performance Plan that were proposed in § 71.206. The proposed Plan was substantially similar to the CPDM Performance Plan in proposed § 70.206. Comments on proposed § 71.206 were the same or similar to those on proposed § 70.206. Comments and MSHA's rationale for not including the proposal in the final rule are discussed elsewhere in this preamble under § 70.206.

Final § 71.206 revises the existing requirements on bimonthly sampling of designated work positions (DWP) under existing § 71.208. The title of § 71.206, ''Quarterly sampling,'' is changed from the proposal's title, ''Sampling of designated work positions,'' to be consistent with the required quarterly sampling frequency.

Final paragraph (a) is like proposed § 71.207(a) but contains conforming changes. It requires that each operator must take one valid representative sample from the DWP during each quarterly period. The term ''valid representative sample'' is discussed elsewhere in this preamble under § 70.206. Paragraph (a) further provides that the quarterly periods are: January 1–March 31; April 1–June 30; July 1–September 30; and October 1–December 31.

One commenter stated that because strip mining is very dusty, the proposal should not reduce sampling from bimonthly to quarterly. Rather, oversight and sampling should increase.

The final rule, like the proposal, reduces the existing DWP sampling frequency from bimonthly to quarterly. As discussed below in final paragraph (c), the final rule requires operators to sample an increased number of specific work positions as DWPs, which have historically been associated with higher dust concentrations, at a frequency to ensure that all miners in those positions are protected.

Final paragraph (b) is redesignated from and is similar to proposed § 71.207(h). Paragraph (b) clarifies the time frame for implementation when there is a change in the standard. It requires that when the respirable dust standard is changed in accordance with § 71.101, the new standard will become effective 7 calendar days after the date of the notification of the change by MSHA. Under proposed § 71.207(h), a new standard would have gone into effect on the first normal work shift following the operator's receipt of notification after the respirable dust standard is changed in accordance with § 71.101. MSHA received no comments on the proposal.

Paragraph (b) is substantially similar to §§ 70.206(c), 70.207(b), 70.208(c), 70.209(b), and 90.207(b), except for conforming changes. The rationale for paragraph (b) is discussed elsewhere in this preamble under § 70.208(c). Final paragraph (b) does not include the requirements in proposed § 71.207(h)(1) and (2). Proposed § 71.207(h)(1) would have required that if all samples for the DWP from the most recent quarterly sampling period do not exceed the new standard (reduced due to the presence of quartz), the operator would begin sampling of the DWP on the first normal work shift during the next quarterly period following notification from MSHA of the change in the standard. Proposed § 71.207(h)(2) would have required that if any sample from the most recent quarterly sampling period exceeds the new standard (reduced due to the presence of quartz), the operator must make necessary adjustments to the dust control parameters within three days, and then collect a sample from the affected DWP on a normal work shift. It

further provided that the sample would be treated as a normal quarterly sample. MSHA did not receive comments on the proposal.

Proposed § 71.207(h)(1) and (2) is similar to proposed §§ 70.207(c)(1) and (2), and 70.209(b)(1) and (2). The rationale for not including proposed § 71.207(h)(1) and (2) in the final rule is discussed elsewhere in this preamble under § 70.206(c)(1) and (2).

Final paragraph (c) is redesignated from and is substantially similar to proposed § 71.207(b). Paragraph (c) requires that DWP samples must be collected at locations to measure respirable dust generation sources in the active workings. In addition, paragraph (c) clarifies that the ''specific'' work positions at each mine where DWP samples must be collected include: (1) Each highwall drill operator (MSHA occupation code 384); (2) bulldozer operators (MSHA occupation code 368); and (3) other work positions designated by the District Manager for sampling in accordance with § 71.206(m). Like the proposal, the final rule requires each highwall drill operator to be sampled since historical sampling data and MSHA experience indicate that these positions have the greatest potential of being overexposed to respirable quartz and respirable coal mine dust. Bulldozer operators are DWPs since they have similar risks and need additional protection. Under circumstances specified in final paragraph (d) concerning multiple work positions, discussed below, some bulldozer operators could be exempt from sampling requirements. Also, the District Manager could designate other work positions for sampling in accordance with final paragraph (c)(3), which is discussed below. Final paragraph (c) will provide improved health protection for miners in work positions that have increased risks of overexposure to respirable dust and quartz.

MSHA received several comments on the proposal. One commenter stated that the front end loader operator should be included as a DWP. Another commenter stated that the proposal was too aggressive because designating all high wall drill operators and bulldozer operators as DWPs attempts to correct an overexposure problem that does not exist.

According to MSHA's historical sampling data and experience, high wall drill operators and bulldozer operators, but not the front end loader operator, are the work positions with the greatest potential for overexposure to respirable dust and respirable dust when quartz is present. However, the District Manager may designate the front end loader operator for sampling in accordance with paragraph (m) of this section discussed later in this section.

Final paragraph (d) is redesignated from and is the same as proposed § 71.207(c) except for conforming changes. It requires that operators with multiple work positions specified in paragraphs (c)(2) (bulldozer operators) and (c)(3) (other work positions) of this section must sample the DWP exposed to the greatest respirable dust concentration in each work position performing the same activity or task at the same location at the mine and exposed to the same dust generation source. It also requires each operator to provide the District Manager with a list identifying the specific work positions where DWP samples will be collected for: (1) Active mines—by October 1, 2014; (2) new mines—within 30 calendar days of mine opening; (3) DWPs with a change in operational status that increases or reduces the number of active DWPs—within 7 calendar days of the change in status.

The final rule takes into consideration the fact that some bulldozer operator positions, or other work positions designated by the District Manager, may have variable respirable dust exposure. Under those circumstances, assuming the positions perform similar work, the mine operator must sample only the DWP exposed to the greatest respirable dust concentration. For example, if two bulldozer operators push overburden at the same location, the operator must sample the bulldozer operator exposed to the greatest concentration of respirable dust to ensure that other miners performing similar tasks at the same location are protected from excessive dust exposure. However, as another example, if some bulldozer operators push overburden and others perform reclamation work, the mine operator must sample one bulldozer operator exposed to the greatest concentration of respirable dust pushing overburden and one bulldozer operator exposed to the greatest concentration of respirable dust performing reclamation work. A respirable dust sample for the designated bulldozer operator performing reclamation work does not constitute a representative sample of the working environment for the bulldozer operators pushing overburden.

One commenter stated that the miner assigned to the DWP needed to be sampled, not just the work position, to get the miner's dust exposure. The final rule maintains the historical practice of sampling the occupation of the DWP. This comment is addressed further elsewhere in this preamble under § 70.201(c).

Some commenters stated that requiring an operator to submit a list identifying the specific work locations to the District Manager is too burdensome.

Paragraph (d) ensures that the appropriate DWPs are identified for sampling. In addition, the time given to operators to identify and submit the list should reduce or eliminate any perceived burden. With the addition of new DWP designations in this final rule, the quarterly sampling requirements of DWPs provide significantly more sampling than is required under the existing standards.

Final paragraph (e) is redesignated from and is substantially similar to proposed § 71.207(d). It states that each DWP sample must be taken on a normal work shift. Final paragraph (e) requires that if a normal work shift is not achieved, the respirable dust sample must be transmitted to MSHA with a notation by the person certified in sampling on the back of the dust data card stating that the sample was not taken on a normal work shift. The term ''person certified in sampling'' replaces the term ''certified person'' in the proposal. Paragraph (e) further provides that when a normal work shift is not achieved, the sample for that shift may be voided by MSHA. It also specifies that MSHA will use any sample, regardless of whether a normal work shift was achieved, that exceeds the standard by at least 0.1 mg/m^3, to determine the equivalent concentration for that occupation. The text ''in the determination of the equivalent concentration for that occupation'' replaces the term ''to determine compliance with this part'' in the proposal.

Comments on proposed § 71.207(d) are the same as comments on proposed § 70.207(d). The comments and MSHA's rationale are discussed elsewhere in this preamble under § 70.206(d).

Final paragraph (f) is redesignated from and is the same as proposed § 71.207(e). It requires that unless otherwise directed by the District Manager, DWP samples must be taken by placing the sampling device as follows: (1) Regarding an equipment operator, on the equipment operator or on the equipment within 36 inches of the operator's normal working position; (2) regarding a non-equipment operator, on the miner assigned to the DWP or at a location that represents the maximum concentration of dust to which the miner is exposed.

Final paragraph (f) is the same as the existing standard except for a

nonsubstantive change to replace ''designated work position'' with ''DWP.'' MSHA did not receive any comments on the proposal.

Final paragraph (g) is similar to proposed § 71.207(m) and (n). Like the proposal, it requires that upon notification from MSHA that any valid representative sample taken from a DWP to meet the requirements of paragraph (a) of this section exceeds the standard, the operator must, within 15 calendar days of notification, sample that DWP each normal work shift until five valid representative samples are collected. It further requires that the operator must begin sampling on the first normal work shift following receipt of notification.

Proposed § 71.207(m) would have required five valid samples if any sample taken with a CMDPSU exceeded the standard but was below the applicable ECV in proposed Table 71–1. Proposed § 71.207(n) would have required five valid samples if any sample taken with a CPDM exceeded the standard but was below the applicable ECV in proposed Table 71–2. It would also have required the operator to review the adequacy of the approved CPDM Performance Plan and submit any plan revisions to the District Manager for approval within 7 calendar days following posting of the end-of-shift equivalent concentration on the mine bulletin board.

One commenter stated that any plan revisions should be provided to the miners' representative.

Respirable dust control plans for DWPs that are submitted by the operator for approval are required to include the corrective actions taken to reduce the respirable dust concentrations to at or below the standard. The requirements for the operator to submit these respirable dust control plans is contained in § 71.300. Section 71.300 also includes a requirement that an operator must notify a representative of the miners at least 5 days prior to submitting the plan for approval.

Final paragraph (g) is essentially the same as existing § 71.208(d) except for nonsubstantive changes. The existing standard requires that upon notification from MSHA that any respirable dust sample taken from a DWP exceeds the dust standard, the operator must take five samples from that DWP within 15 calendar days beginning on the first normal work shift following notification.

Final paragraph (g), unlike proposed § 71.207(m) and (n), does not include a specific reference to either the CMDPSU or CPDM. Rather, final paragraph (g) includes requirements for samples taken with any approved sampling device. It also does not include the unnecessary references in proposed (m) and (n) regarding a sample being below the applicable ECV in proposed Tables 71–1 or 71–2. In addition, it does not include the requirements in proposed § 71.207(n) to review and revise the CPDM Performance Plan. As discussed in this section and elsewhere in this preamble under § 70.206, the CPDM Performance Plan is not included in the final rule.

Final paragraph (h) is similar to proposed § 71.207(k). It requires that when a valid representative sample taken in accordance with this section meets or exceeds the ECV in Table 71–1 that corresponds to the applicable standard and particular sampling device used, the operator must take the actions listed in paragraphs (h)(1) through (3). Unlike proposed § 71.207(i), there is no violation under final paragraph (i) if one operator full-shift sample exceeds the ECV in Tables 71–1 or 71–2 that corresponds to the applicable standard and particular sampling device used. Although the Secretary has determined that a single full-shift measurement of respirable coal mine dust accurately represents atmospheric conditions to which a miner is exposed during such shift, MSHA has concluded that a noncompliance determination based on a single full-shift sample will only be made on MSHA inspector samples. With respect to operator samples, MSHA reevaluated its enforcement strategy under the proposed rule. MSHA determined that the proposal would have resulted in little time for an operator to correct noncompliance determinations based on an operator's single sample. The final rule ensures that an operator takes corrective actions on a single sample overexposure. This will protect miners from subsequent overexposures.

Proposed § 71.207(k) would have required that during the time for abatement fixed in a citation for violation of the standard, the operator would have to: (1) Make approved respiratory equipment available to affected miners in accordance with § 72.700 of this chapter; (2) submit to the District Manager for approval proposed corrective actions to lower the concentration of respirable dust to at or below the standard; (3) upon approval by the District Manager, implement the proposed corrective actions and then sample the affected DWP on each normal work shift until five valid representative samples are taken; and (4) if using a CPDM to meet the requirements of paragraph (a) of this section, review the adequacy of the approved CPDM Performance Plan and submit any plan revisions to the District Manager for approval within 7 calendar days following posting of the end-of-shift equivalent concentration on the mine bulletin board.

Final paragraph (h)(1), like proposed § 71.207(k)(1), requires that the mine operator make approved respiratory equipment available to affected miners in accordance with § 72.700 of this chapter. Comments on proposed § 71.207(k)(1) were identical or similar to those on proposed § 70.207(g)(1) and (i)(1). The comments are consolidated and discussed elsewhere in this preamble, together with the rationale for final paragraph (h)(1), under § 70.206(e)(1) and (h)(1).

Paragraph (h)(2) is substantially similar to proposed § 71.207(k)(3). It requires that the mine operator immediately take corrective action to lower the concentration of respirable coal mine dust to at or below the standard. Paragraph (h)(2) is consistent with existing § 71.201(d), which requires a mine operator to take corrective action to lower the concentration of respirable dust. Paragraph (h)(2) clarifies that corrective action needs to be taken immediately to protect miners from overexposures. Comments on proposed § 71.207(k)(3) were similar to those on proposed § 70.207(g)(3) and (i)(2). The comments are consolidated and discussed elsewhere in this preamble, together with the rationale for final paragraph (h)(2), under § 70.206(e)(2).

Paragraph (h)(3) is new and is similar to proposed § 70.207(i)(3). Final paragraph (h)(3) requires that the mine operator make a record of the corrective actions taken. The record must be certified by the mine foreman or equivalent mine official no later than the end of the mine foreman's or equivalent mine official's next regularly scheduled working shift. It also requires that the record must be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration. It further requires that the records must be retained at a surface location at the mine for at least 1 year and be made available for inspection by authorized representatives of the Secretary and the representative of miners.

Final paragraph (h)(3) significantly simplifies the proposal. For example, final paragraph (h)(3) only requires a record of the corrective action taken. Proposed § 71.206(k)(2) and (3) would have required more corrective action submissions to the District Manager, and dust control plan submissions and plan revisions to the District Manager

regarding the DWP identified in the citation. Under proposed § 71.207(k)(2) and (3), each time a citation would have been issued, the operator would have been required to submit proposed corrective actions to the District Manager and obtain approval before corrective actions could be implemented. As one of the conditions to terminate the citation under proposed § 71.207(l), the operator would have had to submit, for District Manager approval, a proposed dust control plan or changes to an approved plan for that DWP. Under final paragraph (h), operators are only required to take immediate corrective action and make a record of the action taken. Like the existing rule, a respirable dust control plan for the DWP is required under § 71.300 only after a citation is issued and terminated.

The rationale for final paragraph (h)(3) is the same as that for final § 70.206(e)(3). The requirement to make and retain a record of corrective actions ensures that miners are not subject to subsequent overexposures and that the corrective actions taken are effective. When a dust control plan or changes to an approved plan are submitted to the District Manager for approval, the operators and MSHA are able to check the required records to ensure that the control measures used to abate the violation are entered in the dust control plan for the DWP identified in the citation.

In addition, final paragraph (h)(3) provides useful information to a mine operator, miners, and MSHA regarding the corrective actions taken and whether the dust control parameters in the approved ventilation plan are adequate. The record of the corrective actions taken should be made by a responsible mine official, such as the mine foreman or equivalent mine official. Records and certification of corrective action taken help identify excessive dust concentrations so they can be addressed appropriately to better ensure miners' health. In addition, retaining records at the mine for at least one year is consistent with many existing MSHA record retention standards, particularly the proposal's incorporation of existing § 75.363(d). Record retention is necessary to help MSHA, the mine operator, and the miners' representative identify problems with dust controls and ensure that excessive dust concentrations are corrected. The cost associated with the record requirement is shown in Chapter IV of the Regulatory Economic Analysis (REA).

Unlike proposed § 71.207(k)(2), final paragraph (h) does not include operators to submit corrective actions to the District Manager for approval. Comments on proposed § 71.207(k)(2) were the same as or similar to those on proposed § 70.207(g)(2). The comments are consolidated and discussed elsewhere in this preamble under § 70.206(h)(4).

In addition, unlike proposed § 71.207(k)(4), final paragraph (h) does not require operators to review and revise a CPDM Performance Plan. As discussed in this section and elsewhere in this preamble under § 70.206, the final rule does not include the proposed requirements for a CPDM Performance Plan.

For consistency between the sampling requirements of the final rule, final paragraphs (h)(1)–(3) are identical to final § 70.206(e)(1)–(3) regarding bimonthly sampling of MMUs, § 70.207(d)(1)–(3) regarding bimonthly sampling of designated areas, § 70.208(e)(1)–(3) regarding quarterly sampling of MMUs, § 70.209(c)(1)–(3), regarding quarterly sampling of designated areas, and except for conforming changes, § 90.207(c)(1)–(3) regarding quarterly sampling.

Final paragraph (i) is changed from proposed § 71.207(i). It states that noncompliance with the standard is demonstrated during the sampling period when: (1) Two or more valid representative samples meet or exceed the ECV in Table 71–1 (Excessive Concentration Values (ECV) Based on Single, Full–Shift CMDPSU/CPDM Concentration Measurements) that corresponds to the applicable standard and the particular sampling device used; or (2) The average for all valid representative samples meets or exceeds the ECV in Table 71–2 (Excessive Concentration Values (ECV) Based on the Average of Five Full-Shift CMDPSU/CPDM Concentration Measurements) that corresponds to the applicable standard and the particular sampling device used.

In the March 8, 2011, request for comments (76 FR 12649), MSHA stated that the Agency was interested in commenters' views on what actions should be taken by MSHA and the mine operator when a single shift respirable dust sample meets or exceeds the ECV.

Commenters expressed concern that compliance determinations would be made on the basis of a single-shift measurement. Proposed § 71.207(i) would have required that if using a CMDPSU, no valid single-shift sample equivalent concentration meet or exceed the ECV that corresponds to the standard in proposed Table 71–1; or, if using a CPDM, no valid end-of-shift equivalent concentration meet or exceed the applicable ECV in proposed Table 71–2.

In response to comments, final paragraph (i) provides two different methods by which compliance determinations can be made. The rationale for final paragraphs (i)(1) and (2) is the same as that for final §§ 70.206(f)(1) and (2), 70.207(e)(1) and (2), 70.208(f)(1) and (2), 70.209(d)(1) and (2), and 90.207(d)(1) and (2), and is discussed elsewhere in this preamble under § 70.208(f)(1) and (2).

For consistency between the sampling requirements of the final rule, final paragraphs (i)(1) and (2) are the same as, except for conforming changes, final §§ 70.206(f)(1) and (2), 70.207(e)(1) and (2), 70.208(f)(1) and (2), 70.209(d)(1) and (2), and 90.207(d)(1) and (2).

Comments on the ECVs in proposed Table 71–1 are discussed elsewhere in this preamble under § 70.208(f). In addition, a detailed discussion on the derivation of the ECVs in both final Tables 71–1 and 71–2 is included in Appendix A of the preamble. Comments that questioned the accuracy of a single sample in making a compliance determination are addressed elsewhere in this preamble under § 72.800.

Final paragraph (j) is redesignated from proposed § 71.207(j) and makes clarifying and conforming changes. It provides that upon issuance of a citation for a violation of the standard, paragraph (a) of this section will not apply to that DWP until the violation is abated and the citation is terminated in accordance with final paragraphs (k) and (l) of this section. Paragraph (j) clarifies that a violation must be abated and the citation must be terminated before resuming quarterly sampling. Final paragraphs (k) and (l) are discussed below.

Final paragraph (j) includes an exception to allow the District Manager flexibility to address extenuating circumstances that would affect sampling. An example of extenuating circumstances would occur when an uncorrected violation would require abatement sampling that continues into the next sampling period.

Final paragraph (j) is similar to existing § 71.208(d). MSHA did not receive comments on the proposal.

For consistency between the sampling requirements of the final rule, except for conforming changes, final paragraph (j) is the same as final §§ 70.206(g), 70.207(f), 70.208(g), 70.209(e), and 90.207(e).

Final paragraph (k) is similar to proposed § 71.207(k). It requires that upon issuance of a citation for violation of the standard, the operator must take the following actions sequentially: (1) Make approved respiratory equipment available; (2) immediately take

corrective action; (3) record the corrective actions; and (4) conduct additional sampling. The actions required by paragraph (k) are similar to those in proposed § 71.207(k)(1)–(4) discussed under paragraph (h). In addition, paragraph (k) includes the term ''sequentially'' to ensure that corrective actions are taken in the order they are listed.

Final paragraph (k)(1), like proposed § 71.207(k)(1), requires that the mine operator make approved respiratory equipment available to affected miners in accordance with § 72.700 of this chapter. Comments on proposed § 71.207(k)(1) were identical or similar to those on proposed § 70.207(g)(1) and (i)(1). The comments are consolidated and discussed elsewhere in this preamble, together with the rationale for final paragraph (h)(1), under § 70.206(e)(1) and (h)(1).

Paragraph (k)(2) is substantially similar to proposed § 71.207(k)(3). It requires that the mine operator immediately take corrective action to lower the concentration of respirable coal mine dust to at or below the standard. Paragraph (k)(2) clarifies that corrective action needs to be taken immediately to protect miners from overexposures. Comments on proposed § 71.207(k)(3) were similar to those on proposed § 70.207(g)(3) and (i)(2). The comments are consolidated and discussed elsewhere in this preamble, together with the rationale for final paragraph (k)(2), under § 70.206(e)(2) and (h)(2).

Paragraph (k)(3) is new. It requires that the mine operator make a record of the corrective actions taken. The record must be certified by the mine foreman or equivalent mine official no later than the end of the mine foreman's or equivalent mine official's next regularly scheduled working shift. It also requires that the record must be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration. It further requires that the records must be retained at a surface location at the mine for at least 1 year and be made available for inspection by authorized representatives of the Secretary and the representative of miners. Like final paragraph (h)(3), final paragraph (k)(3) significantly simplifies the proposal. Proposed § 71.206(k)(2) and (3) would have required more corrective action submissions to the District Manager, and dust control plan submissions and plan revisions to the District Manager regarding the DWP identified in the citation. Under proposed § 71.207(k)(2) and (3), each time a citation would have been issued, the operator would have been required to submit proposed corrective actions to the District Manager and obtain approval before corrective actions could be implemented. As one of the conditions to terminate the citation under proposed § 71.207(l), the operator would have had to submit, for District Manager approval, a proposed dust control plan or changes to an approved plan for that DWP. Under final paragraph (k), operators are only required to take immediate corrective action and make a record of the action taken. Like the existing rule, a respirable dust control plan for the DWP is required under § 71.300 only after a citation is issued and terminated.

The rationale for final paragraph (k)(3) is the same as that for final § 70.206(h)(3). The requirement to make and retain a record of corrective actions ensures that miners are not subject to subsequent overexposures and that the corrective actions taken are effective. When a dust control plan or changes to an approved plan are submitted to the District Manager for approval, the operators and MSHA are able to check the required records to ensure that the control measures used to abate the violation are entered in the dust control plan for the DWP identified in the citation.

It provides useful information to a mine operator, miners, and MSHA regarding the corrective actions taken and whether the dust control parameters in the approved ventilation plan are adequate. The record of the corrective actions taken should be made by a responsible mine official, such as the mine foreman or equivalent mine official. Records and certification of corrective action taken help identify excessive dust concentrations so they can be addressed appropriately to better ensure miners' health. In addition, retaining records at the mine for at least one year is consistent with many existing MSHA record retention standards, particularly the proposal's incorporation of existing § 75.363(d). Record retention is necessary to help MSHA, the mine operator, and the miners' representative identify problems with dust controls and ensure that excessive dust concentrations are corrected. The cost associated with the record requirement is shown in Chapter IV of the Regulatory Economic Analysis (REA).

The rationale for final paragraph (k)(3) is the same as that discussed in final paragraph (h) and in final § 70.206(e)(3).

Final paragraph (k)(4) is similar to proposed § 71.207(k)(3). It requires that the mine operator begin sampling, within 8 calendar days after the date the citation is issued, the environment of the affected DWP on consecutive normal production shifts until five valid representative samples are taken. Paragraph (k)(4) is consistent with existing § 71.201(d), which requires a mine operator to sample each normal work shift until five valid respirable dust samples are taken. In addition, it requires that the sampling must begin within 8 calendar days after the date the citation is issued. Under proposed § 71.207(k)(2) and (3), sampling would have begun after submission to and approval by the District Manager of the corrective actions taken. The rationale for final paragraph (k)(4) is the same as that for final § 70.206(h)(4) and is discussed elsewhere in this preamble under § 70.206(h)(4).

Unlike proposed § 71.207(k)(4), final paragraph (k) does not require operators to review and revise a CPDM Performance Plan. As discussed in this section and elsewhere in this preamble under § 70.206, the final rule does not include the proposed requirements for a CPDM Performance Plan.

In addition, unlike proposed § 71.207(k)(2), final paragraph (k) does not require operators to submit corrective actions to the District Manager for approval. Comments on proposed § 71.207(k)(2) were the same as or similar to those on proposed § 70.207(g)(2). The comments are consolidated and discussed elsewhere in this preamble under § 70.206(h)(4).

For consistency between the sampling requirements of the final rule, except for conforming changes, final paragraph (k) is the same as final §§ 70.206(h), 70.207(g), 70.208(h), 70.209(f), and 90.207(f).

Final paragraph (l) is changed from proposed § 71.207(l). It provides that a citation for a violation of the standard will be terminated by MSHA when the equivalent concentration of each of the five valid representative samples is at or below the standard. It does not include the proposed requirement that within 15 calendar days after receipt of the sampling results from MSHA, the operator must submit to the District Manager for approval a proposed dust control plan for the DWP in the citation or notice or proposed changes to the approved dust control plan as prescribed in § 71.300. It also does not include the requirement that the proposed plan parameters or proposed changes reflect the control measures used to abate the violation. The proposed requirement to submit a dust control plan for the DWP with proposed plan parameters or revisions is included in final § 71.300, which also requires a description of the specific control

measures used to abate the dust violation. Therefore, the same requirements did not need to be included in final paragraph (l). MSHA did not receive any comments on the proposal.

Final paragraph (m) is similar to proposed § 71.207(f). It allows the District Manager to designate for sampling under this section additional work positions at a surface coal mine and at a surface work area of an underground coal mine where a concentration of respirable dust exceeding 50 percent of the standard in effect at the time the sample is taken, or a concentration of respirable dust exceeding 50 percent of the standard established in accordance with § 71.101 has been measured by one or more MSHA valid representative samples.

One commenter stated that other work positions designated by the District Manager should include any work sites where miners are exposed to dust, such as preparation plants, load out facilities, stockpiles, barges, and other areas at surface coal mines and surface areas of underground coal mines.

According to MSHA's historical sampling data and experience, highwall drill operators and bulldozer operators are the work positions with the greatest potential of overexposure to respirable dust and respirable dust when quartz is present. However, under the final rule, the District Manager may designate additional work positions for DWP sampling provided that either criteria in paragraph (m) are met.

One commenter expressed concern that the proposal permits the District Manager to greatly expand the sampling requirements. The final rule, like the proposal, is derived from existing § 71.208(e). Under the existing standard, the District Manager has the discretion to designate the work positions at each surface coal mine and surface work area of an underground coal mine for respirable dust sampling. That discretion continues under the final rule. Final paragraph (m) is consistent with the existing standard and does not expand the existing District Manager's authority.

Final paragraph (n) is redesignated from and is essentially the same as proposed § 71.207(g) except for nonsubstantive and conforming changes. It provides that the District Manager may withdraw from sampling any DWP designated for sampling under paragraph (m) of this section upon finding that the operator is able to maintain continuing compliance with the standard. It further provides that this finding will be based on the results of MSHA and operator valid representative samples taken during at least a 12-month period. MSHA did not receive comments on the proposal.

10. Section 71.207 Respirable Dust Samples; Transmission by Operator

Final § 71.207 is similar to proposed § 71.208. Like the proposal, final § 71.207 revises existing § 71.208(a) and (c), and adds a new paragraph (f). It also redesignates, without change, existing § 71.208(b), (d) and (e).

Final § 71.207(a) is substantially similar to the proposal. It requires the operator, if using a CMDPSU, to transmit within 24 hours after the end of the sampling shift all samples collected, including control filters, in containers provided by the manufacturer of the filter cassette to MSHA's Pittsburgh Respirable Dust Processing Laboratory, or to any other address designated by the District Manager. Final paragraph (a) clarifies that operators must include the control filters with the dust sample transmissions to the Respirable Dust Processing Laboratory. As explained in the preamble to the proposed rule, MSHA uses control filters to improve measurement accuracy by eliminating the effect of differences in pre- and post-exposure laboratory conditions, or changes introduced during storage and handling of the filter cassettes. Including control filters with the dust samples ensures that the appropriate control filter is associated with the appropriate sample filter.

Final § 71.207(b), like proposed § 71.208(b), is the same as existing § 71.209(b).

Final § 71.207(c) is substantially the same as proposed § 71.208(c). It requires that a person certified in sampling must properly complete the dust data card that is provided by the manufacturer for each filter cassette. It further requires that the dust data card must have an identification number identical to that on the filter cassette used to take the sample and be submitted to MSHA with the sample. It also requires that each dust data card must be signed by the certified person who actually performed the examinations during the sampling shift and must include that person's MSHA Individual Identification Number (MIIN).

As an example, the certified person who performs the required examinations during the sampling shift is the individual responsible for signing the dust data card and verifying the proper flowrate, or noting on the back of the card that the proper flowrate was not maintained. Since the certified person who conducted the examination is most knowledgeable of the conditions surrounding the examination, final paragraph (c) requires that certified person sign the dust data card. In addition, the MIIN number requirement is consistent with MSHA's existing policy. Since July 1, 2008, MSHA has required that the certified person section of the dust data card include the MIIN, a unique identifier for the certified person, instead of the person's social security number. To ensure privacy and to comport with Federal requirements related to safeguarding personally identifiable information, MSHA has eliminated requirements to provide a social security number.

Finally, paragraph (c) provides that respirable dust samples with data cards not properly completed may be voided by MSHA. This is a change from the proposal. The proposal would have required that, regardless of how small the error, an improperly completed dust data card must be voided by MSHA. Final paragraph (c) allows MSHA flexibility in voiding an improperly completed dust data card. MSHA received no comments on this proposed provision.

Final § 71.207(d) and (e) are the same as proposed § 71.208(d) and (e) and are the same as existing § 71.209(d) and (e).

Final § 71.207(f) is changed from the proposal. It requires that, if using a CPDM, the person certified in sampling must validate, certify, and transmit electronically to MSHA within 24 hours after the end of the sampling shift all sample data file information collected and stored in the CPDM, including the sampling status conditions encountered when sampling each DWP; and, not tamper with the CPDM or its components in any way before, during, or after it is used to fulfill the requirements of 30 CFR part 71, or alter any sample data files. It further requires that all CPDM data files transmitted electronically to MSHA must be maintained by the operator for a minimum of 12 months.

Final paragraph (f) includes the term ''person certified in sampling'' rather than ''designated mine official.'' This change makes paragraph (f) consistent with final paragraph (c). Final paragraph (f) also includes a clarification that CPDM data files are ''electronically'' transmitted to MSHA, unlike the physical transmission of samples collected with the CMDPSU. As a clarification to the proposal, final paragraph (f) does not require ''error data file information'' to be transmitted to MSHA. Rather, final paragraph (f) requires ''the sampling status conditions encountered when sampling'' to be transmitted to MSHA. This terminology is consistent with that used in the

approved CPDM manufacturer's literature. The clarification ensures that conditions that may occur during the sampling shift (e.g., flowrate, temperature, humidity, tilt indicator, etc.) and that may affect sampling results are recorded and transmitted to MSHA.

The requirement in final paragraph (f) that the certified person not tamper with the CPDM or alter any CPDM data files is new. It is consistent with the requirements for CMDPSUs, under existing § 71.209(b) and final § 71.207(b), which provide that an operator not open or tamper with the seal of any filter cassette or alter the weight of any filter cassette before or after it is used to fulfill the requirements of 30 CFR part 71. It is also consistent with the requirement in 30 CFR 74.7(m) that a CPDM be designed to be tamper-resistant or equipped with an indicator that shows whether the measuring or reporting functions of the device have been tampered with or altered. MSHA has a long history of taking action against persons who have tampered with CMDPSUs or altered the sampling results obtained from such devices in order to protect miners' health and ensure the integrity of MSHA's dust program. Therefore, a similar requirement is included for samples taken with a CPDM.

Final § 71.207 and its rationale are identical to final § 70.210, discussed elsewhere in this preamble under § 70.210. One commenter expressed general support for the proposal.

11. Section 71.208 Respirable Dust Samples; Report to Operator; Posting

Final § 71.208 is similar to proposed § 71.209. It is substantially the same as final § 70.211, and the rationale is discussed elsewhere in this preamble related to final § 70.211. Additional rationale, as appropriate, is discussed below.

Final paragraph (a)(4) is new and provides that the MSHA report will include the average equivalent concentration of respirable dust for all valid samples. This provision is included to ensure that operators, as well as miners and their representatives, are informed as to the average concentration of respirable dust for all valid samples.

Final § 71.208(b) is changed from proposed § 71.209(b). It requires that, upon receipt, the operator must post on the mine bulletin board the data contained in the MSHA report for at least 31 days.

The proposal would have required posting for 46 days. As explained in the preamble to the proposed rule, existing standards under parts 70 and 71 require operators to post sampling data for 50 percent of the specified sampling period (e.g., 31 days is 50 percent of the bimonthly sampling period specified in existing § 71.208(a)). Since proposed § 71.207 would have required operators to take DWP samples every calendar quarter, posting the sampling data for 46 days, which is approximately 50 percent of a quarterly sampling period, would have been consistent with existing posting requirements.

One commenter stated that the purpose and benefit of posting sampling data for 46 days was not apparent. In response to this comment, MSHA concludes that posting for the existing 31 days is adequate time for interested parties to review the data. The 31-day time period is consistent with the posting requirement under final § 70.211(b). Another commenter expressed general support for the proposed posting, stating that the specified data should be available to all interested parties at any time. In response, MSHA agrees that the data required to be posted under final paragraph (b) provides valuable sampling data. However, the final rule does not include the commenter's suggestion that the data should be permanently available to interested parties. The Agency believes that the 31-day posting period provides adequate opportunity for interested persons to review the information.

Final § 71.208(c)(1), (c)(2), (c)(3), and (c)(5) are redesignated from proposed § 71.209(c)(1)(i), (c)(1)(ii), (c)(1)(iii), and (c)(1)(v), respectively. Final paragraph (c) does not include provisions that were in proposed § 71.209(c)(1)(iv) and (c)(1)(vi) for the same reasons that identical provisions in proposed § 70.211(c)(1)(vi) and (c)(1)(viii) are not included in final § 70.211(c), i.e., the information that would have been required will already be included on the paper record (Dust Data Card) for each sample run when samples are collected using a CPDM.

Final paragraph (c)(2), like the proposal and existing § 71.210(a)(2), requires that the paper record include the DWP at the mine from which the samples were taken. MSHA received no comment on the proposed provision.

Final paragraph (c)(3) is the same as final § 70.211(c)(3) and its rationale is the same as that stated in the preamble discussion for final § 70.211(c)(3).

Final paragraph (c)(4) is new and requires that the paper record include the ''sampling status conditions encountered for each sample.'' The rationale for this provision is the same as that stated in the preamble discussion for final § 70.211(c)(4).

Final § 71.208(d) is changed from proposed § 71.209(c)(2). It requires the information required by paragraph (c) to remain posted until receipt of the MSHA report covering the respirable dust samples collected using a CPDM. Proposed § 71.209(c)(2) would have required the information under proposed § 71.209(c)(1)(i)–(c)(1)(vi) to be posted for at least 46 calendar days. The rationale for paragraph (d) is the same as that stated in the preamble discussion of final § 70.211(d). MSHA received no comments on this provision.

12. Section 71.209 Status Change Reports

Final § 71.209 is similar to proposed § 71.210 and existing § 71.220. One commenter expressed general support for the proposal.

Final § 71.209(a), like the proposal, provides an operator the option of reporting changes electronically, as an alternative to reporting the changes in writing. MSHA received no comment on this provision. Final paragraph (a) is similar to final § 70.212(a). The rationale for paragraph (a) is discussed elsewhere in this preamble under final § 70.212(a).

Final § 71.209(b) is the same as the proposal and existing § 71.220(b). MSHA received no comment on this provision and it is finalized as proposed.

Unlike proposed § 71.210(c), final § 71.209 does not require the designated mine official to report status changes affecting the operational readiness of any CPDM within 24 hours after the status change occurred. One commenter was concerned with the recordkeeping burden associated with proposed § 71.210(c). After reviewing the commenter's concern, MSHA has determined that proposed requirement is not necessary and, therefore, it is not included in the final rule.

13. Section 71.300 Respirable Dust Control Plan; Filing Requirements

Final § 71.300 contains requirements for operators who must file a dust control plan when they receive a citation for a DWP sample. It requires that, within 15 calendar days after the termination date of a citation for a violation of the standard, the operator must submit to the District Manager for approval a written respirable dust control plan for the DWP identified in the citation. It further requires that the respirable dust control plan and any revisions must be suitable to the conditions and the mining system of the coal mine and be adequate to

continuously maintain respirable dust to at or below the standard at the DWP identified in the citation.

Final § 71.300(a) is changed from proposed § 71.300(a). Under the proposal, in order to terminate a citation for a violation of the respirable dust standard, the operator would have had to first submit, to the District Manager for approval, a dust control plan or revisions to the dust control plan after abatement sampling results showed compliance. MSHA has reevaluated the requirements of proposed § 71.300(a). MSHA has concluded that final paragraph (a) will allow for faster abatement of a citation because, under final § 71.207(g)(2), immediate action must be taken to correct the violation and the citation may be terminated before submitting a plan or revisions to the District Manager for approval. Final paragraph (a) is consistent with existing § 71.300(a) which does not require a plan submission as a requirement to terminate a citation.

Also, final paragraph (a) replaces the reference to § 71.207(l) with ''Within 15 calendar days after the termination date of a citation for violation of the applicable standard.'' This is consistent with similar wording in existing § 71.300. It simplifies the wording to specify the time frame and circumstance that initiate the requirement for the operator to submit the plan for District Manager approval, rather than reference to another regulatory section. Final paragraph (a), like the proposal, provides that the plan requirements are specific to the DWP identified in the citation. In addition, the 15-day requirement to submit the plan for MSHA approval is the same as the proposed and existing rules.

One commenter expressed concern that proposed § 71.300 was requiring another plan.

MSHA is not requiring a new plan. The requirement to submit a respirable dust control plan after termination of a citation for violation of the dust standard has been in existence since 1980. No other comment was received on proposed paragraph (a) and the final rule includes only the above nonsubstantive revisions.

Final paragraph (a)(1), like the proposal, requires that the mine operator notify the representative of miners at least 5 days prior to submitting a proposed respirable dust control plan, or proposed revisions to an existing plan, to the District Manager for approval. It also requires that, if requested, the operator must provide a copy to the representative of miners at the time of the 5-day notification. Final paragraph (a)(2), like the proposal, requires the operator to make available for inspection by the miners' representative a copy of the proposed respirable dust control plan and any proposed revisions that have been submitted for District Manager approval. Final paragraph (a)(3), like the proposal, requires a copy of the proposed respirable dust control plan, and any proposed revision, to be posted on the mine bulletin board at the time of submittal to the District Manager for approval. It further requires that the proposed plan or revision remain posted on the bulletin board until approved, withdrawn, or denied. Final paragraph (a)(4), like the proposal, allows the miners' representative, following receipt of a proposed dust control plan or proposed revision, to submit timely written comments to the District Manager for consideration during the plan review process. Final paragraph (a)(4), like the proposal, also requires the District Manager to provide operators with a copy of the miners' representatives' comments when requested to do so.

One commenter stated that, to allow for sufficient review and comment, the operator should be required to provide a copy of the respirable dust control plan to the miners' representative, without the representative having to request it, at least 10 days before the operator's submission to the District Manager.

MSHA agrees from experience that input from miners on proposed dust control measures in plans is important. However, providing a copy of the proposed plan, or revisions, to the miners' representative within the 5-day notification period, upon request, allows sufficient time and opportunity for the miners' representative to become familiar with the proposed plan or revisions and to discuss and resolve any issues prior to its submission to the District Manager for approval. In addition, the requirement is consistent with procedures for submitting plans in other MSHA standards. Final paragraphs (a)(1)–(4) ensure that miners' representatives have access to copies of proposed plan documents for their review, that miners are made aware of the contents of the proposed plan, and that all parties to the dust control plan process are aware of each other's positions on potential issues.

Final § 71.300(b), like the proposal, requires that each respirable dust control plan include at least the following: (1) The mine identification number and DWP number assigned by MSHA, the operator's name, mine name, mine address, and mine telephone number and the name, address, and telephone number of the principal officer in charge of health and safety at the mine; (2) the specific DWP at the mine to which the plan applies; (3) a detailed description of the specific respirable dust control measures used to abate the violation of the respirable dust standard; and (4) a detailed description of how each of the respirable dust control measures described in response to paragraph (b)(3) of this section will continue to be used by the operator, including at least the specific time, place, and manner the control measures will be used. Except for nonsubstantive changes, the requirements of final paragraph (b)(1)–(4) are the same as existing § 71.300(b)(1)–(4). MSHA did not receive comments on these provisions and they are finalized as proposed.

14. Section 71.301 Respirable Dust Control Plan; Approval by District Manager and Posting

Final § 71.301(a), like the proposal, provides that the District Manager will approve respirable dust control plans on a mine-by-mine basis. It further provides that when approving respirable dust control plans, the District Manager must consider whether: (1) The respirable dust control measures would be likely to maintain concentrations of respirable coal mine dust at or below the standard; and (2) the operator's compliance with all provisions of the respirable dust control plan could be objectively ascertained by MSHA.

One commenter questioned why the criteria are not an MSHA internal document or published guideline, instead of a regulation.

Final paragraph (a)(1) is derived from existing § 71.301(a)(1). Under existing § 71.301(a)(1), the District Manager considers whether the dust control measures would likely maintain ''compliance with the respirable dust standard.'' Like the proposal, final paragraph (a)(1) clarifies that the District Manager's review will ensure that control measures in the plan would likely maintain respirable dust concentrations at or below the standard at the DWP identified in the citation so that concentrations do reach ECV levels. This clarification will improve protection for miners.

Final paragraph (a)(2), like the proposal, is the same as existing § 71.301(a)(2).

Final § 71.301(b), like the proposal, provides that MSHA may take respirable dust samples to determine whether control measures in the operator's plan effectively maintain concentrations of respirable coal mine dust at or below the standard. Final paragraph (b), like

the proposal, is derived from existing § 71.301(b). Paragraph (b) clarifies that MSHA sampling will ensure that control measures in the plan are effective at maintaining respirable dust concentrations at or below the standard. This clarification will improve protection for miners. MSHA did not receive comments on proposed paragraph (b) and it is finalized as proposed.

Final § 71.301(c), like the proposal, is the same as existing § 71.301(c).

Final § 71.301(d)(1), (2) and (3), like the proposal, requires that the approved respirable dust control plan and any revisions must be: Provided upon request to the representative of miners; made available for inspection by the representative of miners; posted on the mine bulletin board within 1 working day following notification of approval; and remain posted for the period that the plan is in effect.

Miners and their representatives play an important role in the plan approval process and need to be kept aware of the contents of the approved plan. Consistent with procedures for plan approval in other MSHA standards, final paragraphs (d)(1), (2), and (3) ensure that miners and their representatives have timely access to the approved plan or plan revisions following notification of approval. These provisions also ensure that miners and their representatives are informed of the respirable dust controls in the approved plan that should be in use at the mine. Posting on the mine bulletin board within 1 working day following notification of approval is a reasonable time and provides improved protection for miners.

MSHA did not receive comments on proposed paragraphs (d)(1)–(3) and they are finalized as proposed.

C. 30 CFR Part 72—Health Standards for Coal Mines

1. Section 72.100 Periodic Examinations

Final § 72.100(a), like the proposal, requires each operator of a coal mine to provide to each miner periodic examinations including chest x-rays, spirometry, symptom assessment, and occupational history at a frequency specified in this section and at no cost to the miner. The examinations are important for the early detection and prevention of disease.

Final paragraph (a)(1), like the proposal, requires each operator to use NIOSH-approved facilities to provide the examinations specified in final paragraph (a).

Final paragraph (a)(2) is new. It requires that the results of examinations or tests made pursuant to this section be furnished only to the Secretary of Labor, the Secretary of HHS, or, at the request of the miner, to the miner's designated physician.

Final paragraph (b), like the proposal, pertains to voluntary examinations. It requires that each operator provide the opportunity to have the examinations specified in paragraph (a) at least every 5 years to all miners employed at a coal mine. It also requires that the examinations be made available during a 6-month period that begins no less than 3.5 years and not more than 4.5 years from the end of the last 6-month period. Final paragraph (b) allows some flexibility for mine operators and approved facilities in scheduling examinations and is consistent with the time frames established in NIOSH's existing program. For example: If an operator provided examinations to miners during a 6-month period of July 1, 2009 to December 31, 2009, the operator would be notified by NIOSH by April 1, 2013, 3 months prior to July 1, 2013, to schedule the next 6-month period within which to offer miners the examinations.

Final paragraph (c) pertains to mandatory examinations and is the same as the proposed rule. It requires that for each miner who begins work at a coal mine for the first time, the operator must provide an examination specified in final paragraph (a). Final paragraph (c)(1) requires that the operator provide the initial examination no later than 30 days after beginning employment. Final paragraph (c)(2) requires the operator to provide a follow-up examination no later than 3 years after the initial examination in paragraph (c)(1). Final paragraph (c)(3) requires the operator to provide a follow-up examination no later than 2 years after the examination in paragraph (c)(2), if the chest x-ray shows evidence of pneumoconiosis or if the spirometry examination indicates evidence of decreased lung function. Paragraph (c)(3) also specifies that for this purpose, evidential criteria will be defined by NIOSH.

On March 8, 2011, MSHA issued in the **Federal Register** a request for comments (76 FR 12648). MSHA solicited comments on the periodic medical surveillance provisions in the proposed rule. The proposal would have required operators to provide an initial examination to each miner who begins work at a coal mine for the first time and then at least one follow-up examination after the initial examination.

Commenters generally supported periodic medical surveillance examinations for all coal miners including underground and surface coal miners. Most commenters also supported spirometry, occupational history, and symptom assessment examinations in addition to the X-ray examinations that are required by NIOSH's existing regulations at 42 CFR part 37 pertaining to Specifications for Medical Examinations of Underground Coal Miners. One commenter did not support adding more medical tests, including spirometry. Another commenter suggested that more frequent mandatory chest x-rays would be more beneficial than spirometry testing.

Final § 72.100 is consistent with the existing ''Coal Workers' X-Ray Surveillance Program'' administered by NIOSH. The Program was established under the Federal Coal Mine Health and Safety Act of 1969, as amended by Section 203(a) of the Mine Act (30 U.S.C. 843(a)). The existing NIOSH regulations, 30 CFR part 37, consist of specifications for giving, interpreting, classifying, and submitting chest X-rays for underground coal miners. According to 30 CFR 37.3, mandatory chest X-rays include an initial chest X-ray within 6 months of beginning employment, another chest X-ray 3 years later, and a third chest X-ray 2 years after the second if the miner is still engaged in underground coal mining and if the second chest X-ray showed evidence of category 1 or higher pneumoconiosis. In addition to these mandatory chest X-rays, mine operators are required to offer an opportunity for periodic, voluntary chest X-rays every 5 years.

Final § 72.100 is also consistent with the 1996 Dust Advisory Committee Report and 1995 NIOSH Criteria Document. The Advisory Committee Report unanimously recommended that, in addition to the chest X-rays at the time of employment and then at the specified intervals thereafter, spirometry and questionnaire data should be collected periodically during a miner's employment. The Advisory Committee also unanimously recommended that medical testing of underground coal miners should be extended to surface miners.

The NIOSH Criteria Document recommended that spirometric examinations be included in the medical screening and surveillance program for coal miners. NIOSH also recommended the inclusion of surface coal miners in medical screening and surveillance program.

Requiring operators to provide spirometry, symptom assessment, and occupational history, in addition to X-

rays, and include surface coal miners in the periodic examination requirement will provide increased protection of health for every coal miner. A spirometry examination complements a chest x-ray by detecting effects, other than pneumoconiosis, of dust on the lung, such as Chronic Obstructive Pulmonary Disease (COPD). COPD cannot be detected by a chest x-ray. A spirometry examination is the most practical screening tool to detect reduced lung function in miners, which is common evidence of COPD. Periodic chest x-rays and spirometry will enable early detection of pneumoconiosis and COPD, respectively, both of which are irreversible and, for miners who are subject to continued overexposure to respirable dust, progressive. Spirometry examination results would provide miners with the knowledge of an abnormal decline in lung function, which would enable them to be proactive in their approach to their health. In the absence of medical monitoring and early intervention, a miner may continue to be overexposed, allowing disease to progress so that the miner may suffer material impairment of health or functional capacity.

Surface coal miners are included in final § 72.100 because they too are at risk of developing pneumoconiosis and COPD as a result of exposure to respirable coal mine dust. MSHA data indicate that some occupations at surface mines (e.g., drill operators, bulldozer operators, and truck drivers) experience high exposure to respirable coal mine dust, including silica, and there are many former underground miners among surface miners with chest x-rays that show CWP. Surface miners, like underground miners, would benefit from the availability of periodic medical monitoring. It would provide them with information on the status of their health and enable them to take actions to prevent disease progression. For example, for miners at surface mines who are not provided any periodic examinations under existing regulations, a chest x-ray that shows evidence of pneumoconiosis under the final rule would allow them to exercise their rights to work in a less dusty job of the mine under 30 CFR part 90.

Some commenters stated that the proposal will cause confusion with the existing NIOSH X-ray surveillance program. These commenters stated that the NIOSH Program only covers chest X-rays for underground coal miners and that MSHA and NIOSH must coordinate the medical surveillance program to ensure a seamless program.

MSHA intends to work with NIOSH to coordinate each agency's regulatory requirements, where appropriate, and to implement a smooth transition to ensure medical examinations are provided to all coal miners under the CWHSP. Including these requirements in the final rule will allow MSHA to use its inspection and enforcement authority to protect miners' health and ensure that operators comply with the examination requirements.

One commenter stated that the proposal is not clear about who should review chest radiographs and suggested that they be reviewed by B-readers to ensure accuracy and consistency.

The final rule only requires that operators use NIOSH-approved facilities to provide the periodic examinations, but does not address who should review the chest x-rays. NIOSH regulations under 42 CFR part 37 provide specifications for giving, interpreting, classifying, and submitting chest x-rays. A discussion of NIOSH's B-reader program is included in Section III.A., Health Effects, of the preamble.

Some commenters stated that miners do not participate in NIOSH's surveillance program due to concerns that their private medical information will not be kept confidential. They also expressed concern with how the medical information will be used. One commenter referred to OSHA's asbestos rule that requires that the results of medical examinations be given to employers, and a NIOSH Criteria Document that recommends that medical findings for refractory ceramic fibers workers be provided to employers.

Final paragraph (a)(2) is responsive to commenters' concerns on confidentiality. It limits the persons who can be provided miners' examination and test results. Although MSHA will not routinely get results of a miner's examination or tests, there will be shared information when necessary. For example, MSHA will be informed when a miner's chest x-ray from a mandatory follow-up examination under final paragraph (c)(2) shows evidence of pneumoconiosis. This information is crucial so that MSHA can ensure that the operator provides the affected miner with a subsequent follow-up examination under final paragraph (c)(3) of this section. In addition, final paragraph (a)(2) is consistent with Federal privacy laws, such as HIPAA, the Privacy Act, and FOIA, which protect personal medical data from disclosure.

Many commenters supported mandatory medical monitoring, but for all coal miners. Some of these commenters stated that voluntary examinations exclude some miners and that such exclusion violates Section 101(a)(6)(A) of the Mine Act, which requires MSHA to set standards which most adequately assure that no miner will suffer material impairment of health or functional capacity. Other commenters stated that voluntary miner participation has not succeeded in improving disease prevention. Some commenters stated that mandatory participation by all miners would provide early diagnosis of disease and is the best tool to implement intervention measures and prevent disease progression. One commenter added that mandatory miner participation would provide a true measure of health under the existing 2.0 mg/m^3 standard and the opportunity to be proactive in stopping disease progression.

Some commenters supported voluntary examinations for miners and expressed concern that medical information may be used in a retaliatory manner against miners. One commenter objected to being subjected to radiation and medical testing as a result of any regulation.

MSHA does not believe that requiring mandatory medical examinations for all miners is appropriate. MSHA acknowledges the concerns of the commenters who believe that the voluntary program has not worked and deprives miners of examinations that could detect respiratory disease and information to address potential disease. However, as noted in Section III.A., Health Effects, of the preamble, although the numbers vary over time, the percentage of actively employed underground miners who volunteered for medical surveillance in NIOSH's Coal Workers' Health Surveillance Program (CWHSP) has increased from a low of approximately 20% in the 1990–1994 time period to approximately 43% in the 2005–2009 time period (see Table III–2).

MSHA also recognizes that periodic examinations, such as those required under final paragraph (b), are necessary for early detection of respiratory disease and early intervention to prevent its progression. However, MSHA is reluctant to require all miners to submit to medical examinations that they do not wish to undergo. MSHA is also reluctant to require miners to submit to the examinations when the miners may have concerns about the privacy and confidentiality of medical test records and follow-up evaluations. These concerns include medical test results that could be used to fire a miner, challenge claims for black lung benefits, or could be obtained as part of a Freedom of Information Act request.

One commenter stated that follow-up spirometry examinations should be repeated at least every 3 years. This commenter added that spirometry testing every 3 years would provide an opportunity for early identification of miners who have accelerated loss of lung function greater than that expected from aging alone, and would allow for interventional and preventive health strategies. In addition, this commenter stated that surveillance chest x-rays should be coordinated with the spirometry surveillance schedule, with the additional chest x-rays being obtained at 9 to 12 years' duration of coal mine employment and every 6 years thereafter.

Mandatory examinations provided in close proximity to when miners are first hired and first exposed to respirable coal mine dust are necessary in order to establish an accurate baseline of each miner's health. Miners may not recognize early symptoms of pneumoconiosis or COPD and, therefore, they might not be likely to seek medical assistance. A chronic respiratory symptom complex develops after prolonged exposure to respirable dust and includes chronic cough, phlegm development, and shortness of breath. However, several researchers have noted that the decline in lung function due to dust is non-linear, sometimes with much of the decline coming early in the miner's career, often in less than 3 years (Attfield and Hodous, 1992; Seixas et al., 1993). There are some individuals who respond adversely to respirable coal mine dust exposure relatively quickly, and it is important to identify those individuals early. A 3-year interval at the start of a miner's career will provide necessary information for evaluating the results of subsequent spirometry tests and final paragraph (c)(1) requires a mandatory follow-up examination be given 3 years after the miner's initial examination.

Final § 72.100 does not include the suggestion that additional chest radiographs be provided after 9 to 12 years of coal mine employment and every 6 years thereafter. The final rule is consistent with NIOSH regulations under 42 CFR 37.3(b)(2) and (b)(3). Both pneumoconiosis and COPD develop slowly. It is unusual, for example, for a miner to have a positive chest x-ray less than 10 years from first exposure to respirable coal mine dust. However, if a miner has a positive chest x-ray, it is important to intervene as promptly as possible for maximum health protection. An interval of 5 years or less between each miner's periodic spirometry examinations provides a reasonable opportunity to ensure detection of important declines in a miner's lung function due to dust exposure.

Final paragraph (d) is redesignated from proposed paragraph (d) and includes a clarification. It requires each mine operator to develop and submit for approval to NIOSH a plan in accordance with 42 CFR part 37 for providing miners with the examinations specified in paragraph (a) and a roster specifying the name and current address of each miner covered by the plan. The text ''in accordance with 42 CFR part 37'' was added to final paragraph (d) to provide a reference to corresponding NIOSH's requirements. The plan is essential to ensure that mine operators provide the examinations within the time frames established under this section and under 42 CFR part 37 and at an approved facility. The final requirement for medical examinations will allow for early detection and treatment and, to be effective, must be part of a comprehensive program designed to prevent further progression of early respiratory disease. The requirement for submitted plans to include a roster specifying the name and current address of each miner covered by the plan will provide NIOSH with the ability to ensure adequate notification of the availability of medical examinations to covered coal miners. NIOSH has found through its existing CWHSP that directly contacting coal miners who are due for a chest examination results in a higher participation rate. According to NIOSH, coal miners have indicated that they would prefer to receive a letter from CWHSP at their residence, rather than being notified by their employer, because they feel that direct contact with the program provides them greater confidentiality. NIOSH has requested that such rosters be provided since the early 1990s and almost all operators have complied; so this requirement would not create an additional burden for mine operators.

Some commenters stated that the content of the plan should be clarified. NIOSH originally published the requirements for such plans in 1978 (43 FR 33715) under 42 CFR 37.4, Plans for chest roentgenographic examinations. Most recent amendments to § 37.4 included changing the title of this section to Plans for chest radiographic examinations (77 FR 56718, September 13, 1978). This is the plan that is referenced in final paragraph (d).

Final paragraph (e), like the proposal, requires each mine operator to post the approved plan for providing periodic examinations specified in paragraph (a) on the mine bulletin board and to keep it posted at all times. Posting the approved plan on the mine bulletin board can help to improve miners' awareness of the plan, along with its purpose and provisions. This is the same requirement that exists in 42 CFR 37.4(e). MSHA received no comments on this provision, and this provision is finalized as proposed.

One commenter suggested that the proposal regarding the medical surveillance should be addressed in a separate rulemaking.

Rather than address medical monitoring separately, MSHA is including periodic examination requirements in this final rule as part of its comprehensive initiative to ''End Black Lung—Act Now!'' The Agency believes it is important to incorporate these requirements at this time to identify, prevent, and reduce the incidence of adverse and life-threatening respiratory diseases, including CWP, PMF, COPD, and emphysema, which result from occupational exposure to respirable coal mine dust.

2. Section 72.700 Respiratory Equipment; Respirable Dust

Final § 72.700 establishes requirements for operators to make available NIOSH-approved respiratory equipment, provide respirator training, and to keep training records. Final § 72.700 is the same as the proposal except for revisions to clarify final paragraph (c). Final § 72.700, like the proposal, is derived from existing § 70.300. It expands the scope of existing § 70.300 to include all coal mines, whether surface or underground, and includes coverage of part 90 miners.

Two commenters stated that final § 72.700 should require operators to establish and implement a comprehensive respiratory protection program similar to OSHA's program, which includes requirements for medical examinations and fit testing, as well as respirator maintenance, care, and storage.

In response, MSHA clarifies that the intent of the proposal was only to extend respiratory protection equipment coverage to persons at surface mines, persons at surface areas of underground mines, and part 90 miners and to provide equivalent health protection to all coal miners regardless of the type of mine at which they work. Extending coverage to part 90 miners is particularly important given the fact that they have medical evidence of the development of pneumoconiosis.

Another commenter suggested that the final rule should revise and update existing § 72.710, which incorporates by reference the American National

Standards Institute's (ANSI's) ''Practices for Respiratory Protection ANSI Z88.2–1969'' standard. The commenter stated that the 1969 ANSI standard is grossly outdated.

MSHA did not propose to modify the substance of § 72.710. The 1969 ANSI standard still provides sufficient guidance to mine operators for respiratory protection for coal miners in the limited situations specified in MSHA regulations. Additionally, MSHA's emphasis in the dust program is consistent with the Mine Act which does not permit the substitution of respirators in lieu of environmental and engineering controls.

Final § 72.700(a), like the proposal, requires respiratory protection equipment approved by NIOSH under 42 CFR part 84 (Approval of Respiratory Protective Devices) to be made available to all persons as required under parts 70, 71, and 90. In addition, it provides that the use of respirators must not be substituted for environmental control measures in the active workings. It also requires that each operator must maintain an adequate supply of respirators.

MSHA received a number of comments on this provision. One commenter supported the requirement that operators make respirators available to persons when their respirable dust exposure exceeds the standard. The commenter, however, stated the rule should clarify that operators are prohibited from offering respirators that are not NIOSH-approved. In response, final paragraph (a) is explicit in requiring that operators must make available respiratory equipment approved by NIOSH in accordance with 42 CFR part 84. Respirators that have not been approved by NIOSH under 42 CFR part 84 have not met the construction, performance, and respiratory protection thresholds established by NIOSH.

Many commenters offered a number of reasons why respirators, including powered air-purifying respirators (PAPRs), should be required as a primary or supplemental means of controlling a miner's exposure to respirable coal mine dust. Some commenters stated that respirators provide the most protective and cost-effective way to protect miners from respirable dust, especially in certain applications, such as on longwalls and at mines on a reduced standard due to the presence of quartz. Other commenters said that engineering and environmental controls alone cannot protect miners' health. Some commenters stated that respirators provide an added layer of health protection and ensure that miners take a proactive role in protecting their own health.

In addition, several commenters stated that MSHA should allow mine operators to use a hierarchy of controls to limit miners' exposure to coal mine dust. This hierarchy of controls consists of using engineering controls first, followed by administrative controls, and finally suitable respirators, including NIOSH-approved PAPRs. These commenters noted that MSHA permits the use of a hierarchy of controls in metal and nonmetal mines to control miners' exposure to diesel particulate matter. They also stated a rulemaking under section 101 of the Mine Act could be used to establish a hierarchy of controls and supersede the interim standard established by section 202(h) of the Mine Act which prohibits the use of respirators as a substitute for environmental controls in the active workings of the mine.

Some of these commenters stated that MSHA's failure to allow the use of respirators, such as PAPRs, as a temporary supplemental control is inconsistent with MSHA's 2000 and 2003 Plan Verification proposed rules previously issued under two different Administrations. These commenters noted that the previous proposed rules would have allowed the use of PAPRs in limited circumstances as a supplementary control. They further added that, even though MSHA had never considered PAPRs or any other respirator to be an engineering control, MSHA included a provision for PAPRs as a supplementary control in the previously proposed rules, in part, as a response by MSHA to a Petition for Rulemaking filed by the Energy West Mining Company. These commenters stated that MSHA failed to provide any explanation for rejecting the use of PAPRs as supplementary controls in the proposed rule and that MSHA's failure to do so is a violation of Section 555(e) of the Administrative Procedure Act. Finally, these commenters stated that PAPRs should be treated as environmental controls similar to environmentally controlled cabs that are allowed to be used on bulldozers or shuttle cars.

Other commenters stated that using respirators as a means of complying with the dust standard is contrary to the Mine Act and would provide miners with a false sense of protection. Some commenters cited the difficulty of wearing respirators in hot and sweaty jobs, and dusty, dirty conditions, including in low coal. One commenter stated that carrying a respirator adds an additional load to miners, who are already overburdened with other equipment that they must carry into the mine. The commenter further stated that allowing a mine operator to control a miner's exposure to respirable dust by the use of a respirator rather than engineering controls could result in dangerous concentrations of dust suspended in the atmosphere, increasing the risk of a coal dust explosion.

In the preambles to the 2000 and 2003 Plan Verification proposed rules, MSHA stated that the Agency was addressing the Energy West petition for rulemaking to allow the use of PAPRs as a supplemental means of compliance. In the preamble to the 2000 proposed rule, MSHA stated that the Agency would ''permit, under certain circumstances, the limited use of either approved loose-fitting PAPRs or verifiable administrative controls for compliance purposes'' (65 FR 42135). In the preamble to the 2003 proposed rule, MSHA stated that the Agency was proposing to ''permit the limited use of either approved PAPRs, administrative controls, or a combination of both, for compliance purposes, in those circumstances where further reduction of dust levels cannot be reasonably achieved using all feasible engineering controls'' (68 FR 10800). In so doing, MSHA emphasized that the Mine Act specifically prohibits using respirators as a substitute for environmental controls in the active workings of the mine because environmental or engineering controls are reliable, provide consistent levels of protection to a large number of miners, allow for predictable performance levels, can be monitored continually and inexpensively, and can remove harmful levels of respirable coal mine dust from the workplace (68 FR 10799). MSHA further stated that the proposed rule, which would expand the use of supplementary controls under limited circumstances to protect individual miners, ''is not a departure from the Agency's long-standing practice of relying on engineering controls to achieve compliance, since these measures would not be used as a substitute or replacement for engineering control measures in the active workings'' (68 FR 10800).

In the preamble to the 2010 proposed rule, MSHA noted that it had received comments on the 2000 and 2003 Plan Verification proposed rules that operators should be allowed to use respiratory equipment in lieu of environmental and engineering controls to achieve compliance with the proposed dust standards (75 FR 64446). In response, MSHA stated:

. . . proposed § 72.700(a) would retain the existing requirement that environmental controls be used as the primary means of complying with applicable dust standards. MSHA experience indicates that even when respirators are made available, miners may not use them because they can be uncomfortable and impractical to wear while performing work duties. In some cases, a miner may not be able to use a respirator due to health issues. General industrial hygiene principles recognize that engineering and environmental controls provide more consistent and reliable protection.

The final rule does not contain provisions to allow operators to use the hierarchy of controls or to use respirators, including PAPRs, as supplementary controls to achieve compliance with the respirable dust standards. As specified in Sections 201(b) and 202(h) of the Mine Act and since passage of the 1969 Coal Act, MSHA has enforced an environmental standard at coal mines; that is, the Agency samples the concentration of respirable dust in the mine atmosphere rather than the personal exposure of any individual. This is discussed elsewhere in the preamble under final § 70.201(c).

Engineering controls, also known as environmental controls, are the most protective means of controlling dust generation at the source. Used in the mining environment, engineering controls work to reduce dust generation or suppress, dilute, divert, or capture the generated dust. Well-designed engineering controls, such as environmentally controlled cabs, provide consistent and reliable protection to all workers because the controls are, relative to administrative controls and respirators, less dependent upon individual human performance, supervision, or intervention to function as intended.

The use of engineering controls as the primary means to control respirable dust in the mine atmosphere is consistent with Sections 201(b) and 202(h) of the Mine Act. Section 201(b) of the Mine Act states that the purpose of the dust standards is ''to provide, to the greatest extent possible, that the working conditions in each underground coal mine are sufficiently free of respirable dust concentrations in the mine atmosphere . . .'' (30 U.S.C. 841(b)). In addition, Section 202(h) of the Mine Act, and MSHA's existing respiratory equipment standard under 30 CFR 70.300, both explicitly state that ''[u]se of respirators shall not be substituted for environmental control measures in the active workings'' (30 U.S.C. 842(h)).

Final paragraph (a) is also consistent with the Dust Advisory Committees' unanimous recommendation that respiratory equipment should not be permitted to replace environmental control measures, but should continue to be provided to miners until environmental controls are implemented that are capable of maintaining respirable dust levels in compliance with the standard.

The final rule requires an operator to make respirators available to all persons whenever exposed to concentrations of respirable dust in excess of the levels required to be maintained. The use of approved respiratory equipment should be encouraged until the operator determines the cause of the overexposure and takes corrective actions.

NIOSH also recognized the importance of controlling miners' exposure to respirable coal mine dust by using environmental controls. NIOSH's 1995 Criteria Document recommends that engineering controls continue to be relied on as the primary means of protecting coal miners from respirable dust.

Under the final rule, operators must continue to engineer such dust out of the mine atmosphere in order to maintain ambient dust levels in the active workings at or below the standard. In the preambles to the 2000 and 2003 Plan Verification proposed rules, MSHA explained that its experience at that time was that there were limited situations where exposures could not be consistently controlled by available technologies (65 FR 42134; 68 FR 10798–10799, 10818). MSHA has determined that it is technologically feasible for mine operators to achieve compliance with the dust standards in this final rule using existing and available engineering controls and work practices. Engineering controls, unlike respirators or administrative controls, have the advantage of curbing atmospheric dust concentrations, which reasonably ensures that all miners in the area are adequately protected from overexposures. Based on MSHA's experience, respirators are not as effective as engineering controls in reducing miners' exposures to respirable coal mine dust. MSHA is aware that miners are likely to remove their respirators when the miners are performing arduous tasks, chewing tobacco, sick, hot or sweaty, or when the respirator is uncomfortable, thereby subjecting the miner to ambient dust concentrations that may not meet the standard.

Similarly, the effectiveness of administrative controls requires oversight to ensure that miners adhere to the controls, such as restrictions of time in an area or switching duties. Using administrative controls also requires that there must be a sufficient number of qualified miners available to perform the specific duties.

Moreover, as pointed out by some commenters, using engineering controls to regulate dust concentrations provides a critical collateral safety benefit because such control mechanisms, by reducing dust, also reduce the risk of coal dust-fueled explosions or fires. Rotating miners in and out of dusty atmospheres or requiring them to use respirators in dusty conditions does not ensure that coal mine dust, an explosive fuel, is suppressed in the first instance.

For these reasons, the final rule, like existing § 70.300, requires mine operators to rely on engineering or environmental dust controls to ensure that respirable dust concentrations in the atmosphere do not exceed the respirable dust standard.

Final § 72.700(b), like the proposal, provides that when required to make respirators available, the operator must provide training prior to the miner's next scheduled work shift, unless the miner received training within the previous 12 months on the types of respirators made available. It further requires that the training must include the care, fit, use, and limitations of each type of respirator.

The final training requirements are consistent with the recommendations made in the 1995 NIOSH Criteria Document. As explained in the proposal, the training requirement ensures that miners are informed about the respiratory protection options available to them. The value of all personal protective equipment, including respirators, is partially contingent on the correct use, fit, and care of the device by the wearer. Meaningful instruction to miners in how to use, care, and fit the available respirators, as well as their technical and functional limitations, encourages miners to actively participate in maximizing the potential benefits of using a respirator, especially during periods when the respirable dust levels are reported as exceeding the allowable level. In addition, retraining on the respiratory equipment is necessary when the miner has not been trained within the previous 12 months on the specific types of respirators that are made available. Retraining should reiterate the information presented during the initial training session to refresh miners' knowledge.

One commenter stated that the training should include a requirement that operators explain why respirators are necessary. This commenter stated that an explanation of the need for

respirators would motivate miners to use them. Final paragraph (b) is intended to provide a basic framework for minimum areas of instruction. Because the training required by final paragraph (b) is performance-oriented, operators can adapt the training to best meet the needs of their miners. As clarified in the proposal, operators can develop a training module that includes course content beyond the subject-matter requirements set forth in final paragraph (b), or they can choose to allot a different amount of training time to each subject matter, based on the particular skills and knowledge of the miners. Although final paragraph (b) does not explicitly provide that operators must explain why respirators may be needed, MSHA anticipates that such a basic topic will be addressed in any well-designed training curriculum.

Final paragraph (b) neither specifies a minimum required duration for the training, nor requires MSHA approval of the operator's training curriculum. Mine operators should customize training programs, and adjust them as needed, so as to best accommodate the individual circumstances at each mine.

During the public comment period, MSHA requested comment on whether the time required for respirator training should be separate from part 48 training. One commenter responded. This commenter recommended that training time should be specifically devoted for that purpose, rather than allow such training to be subsumed by part 48 training.

Like the proposal, final paragraph (b) requires that the training provided under this section be in addition to the training given to fulfill part 48 requirements. Separating the training on how to use, care, and fit the available respirators, as well as their technical and functional limitations, from the part 48 training requirements will give each of the specified areas the focused treatment that is needed for effective training.

Final § 72.700(c) includes a nonsubstantive change from the proposal. It requires that an operator keep the training record at the mine site for 24 months after completion of the training. The proposal would have required a ''2 year'' retention period. The term ''24 months'' included in final paragraph (c) is consistent with other provisions in the final rule. Final paragraph (c) further provides that an operator may keep the training record elsewhere if the record is immediately accessible from the mine site by electronic transmission. In addition, it requires that upon request from an authorized representative of the Secretary, Secretary of HHS, or representative of miners, the operator must promptly provide access to any training records. Final paragraphs (c)(1)–(3) require the record to include the date of training, the names of miners trained, and the subjects included in the training.

Final paragraphs (c)(1)–(i)(3) are new; the paragraphs were added to ensure that authorized representatives of the Secretary or Secretary of HHS, or the miners' representative can determine whether and when the training required by § 72.700(b) has been provided to miners who may use respiratory protection equipment.

During the public comment period, MSHA solicited comment on the proposed requirement that operators retain the training record for 2 years. MSHA received a few comments supporting the proposal. As with MSHA's other training record requirements, the 24-month retention requirement allows MSHA sufficient time within which to verify that the required training has been provided. In addition, because a 12-month interval can elapse before retraining becomes applicable, the 24-month record retention period is reasonable.

MSHA recognizes that it may be more efficient for some mine operators to store records at a centralized location. Given that electronic recordkeeping has become commonplace in the mining industry, final paragraph (c) allows mine operators to store the training record at locations that are remote or at a distance from the mine site, so long as they are immediately accessible by electronic transmission (e.g., fax or computer). In addition, final paragraph (c) is consistent with MSHA's other recordkeeping provisions, as well as with the Agency's statutory right to access records under Section 103(h) of the Mine Act.

3. Section 72.701 Respiratory Equipment; Gas, Dusts, Fumes or Mists

Final § 72.701 is the same as the proposal. Final § 72.701, like the proposal, is derived from existing § 70.305. It expands the scope of existing § 70.305 to include all coal mines, whether surface or underground, and includes coverage of part 90 miners. It requires that respiratory equipment approved by NIOSH under 42 CFR part 84 must be provided to persons exposed for short periods to inhalation hazards from gas, dusts, fumes, or mists. It further requires that when exposure is for prolonged periods, the operator must take other measures to protect such persons or to reduce the hazard.

Because inhalation hazards from gases, dusts, fumes, and mists can be found at surface operations too, the final rule expands the scope of coverage to include miners at both surface and underground operations. MSHA's longstanding interpretation of the term ''short periods'' means, for example, the time required to drill three or four holes for trolley hangers, to drill holes to take down a piece of loose roof, to drill shot holes in a roof fall, to make small spray applications of paint or sealing compound. MSHA considers prolonged periods to be any duration of time that does not fit the interpretation of ''short periods.''

One commenter stated that MSHA standards for respiratory protection are outdated. The commenter pointed out that, in 1998, NIOSH revised its requirements to require a cartridge change schedule to be established for air purifying respirators that are used to reduce the inhalation hazards from gas. The commenter also added that OSHA's standards address the cartridge change schedule.

In response, MSHA clarifies that the intent of the proposal was only to extend the respiratory equipment coverage to persons at surface mines, persons at surface areas of underground mines, and part 90 miners. The proposal did not intend to modify the existing technical standards concerning respiratory equipment to control miners' exposure to gas, dusts, fumes, or mists. Any revisions of that nature would be undertaken in a separate rulemaking.

4. Section 72.800 Single, Full-Shift Measurement of Respirable Coal Mine Dust

Final § 72.800 is clarified from the proposal. It provides that the Secretary will use a single, full-shift measurement of respirable coal mine dust to determine the average concentration on a shift, since that measurement accurately represents atmospheric conditions to which a miner is exposed during such shift.

Proposed § 72.800 provided that the Secretary may use a single full-shift sample to determine compliance with the dust standard if a single sample is an accurate measurement of miners' exposure to respirable coal mine dust. The Secretary has found, in accordance with sections 101 (30 U.S.C. 811) and 202(f)(2) (30 U.S.C. 842(f)(2)) of the Mine Act, that the average concentration of respirable dust to which each miner in the active workings of a coal mine is exposed can be accurately measured over a single shift. Accordingly, the

1972 Joint Finding,[60] by the Secretary of the Interior and the Secretary of Health, Education, and Welfare, on the validity of single-shift sampling is rescinded. Final § 72.800 clarifies that MSHA will make a compliance determination based on a single full-shift MSHA inspector sample.

In addition, final § 72.800 clarifies that noncompliance with the respirable dust standard or the applicable respirable dust standard when quartz is present, in accordance with subchapter O, is demonstrated when a single, full-shift measurement taken by MSHA meets or exceeds the applicable ECV in Table 70–1, 71–1, or 90–1, that corresponds to the applicable standard and the particular sampling device used. Final § 72.800 is consistent with proposed §§ 70.207(e); 70.208(d); 70.209(c); 71.207(i); 90.208(c); and 90.209(c). Those proposed provisions provided that no single full-shift sample meet or exceed the ECV that corresponds to the applicable dust standard in Tables 70–1, 71–1, and 90–1, and would have applied to both operator and MSHA inspector samples. However, as explained elsewhere in this preamble under final § 70.208(e), under the final rule, a noncompliance determination based on a single full-shift sample only applies to MSHA inspector samples and not operator samples. Accordingly, the single full-shift sampling provision is included in final § 72.800 and not in parts 70, 71, and 90.

Likewise, final § 72.800 clarifies that upon issuance of a citation for a violation of the standard, and for MSHA to terminate the citation, the operator must take the specified actions in subchapter O, as applicable. Final § 72.800 is consistent with the actions specified in proposed §§ 70.207(g) and (h); 70.208(f); 70.209(e) and (f); 71.207(k) and (l); and 90.209(e). Those proposed provisions would have applied to both operator and MSHA inspector single full-shift samples. Under final § 72.800, a noncompliance determination on a single full-shift sample is only based on an MSHA inspector's single full-shift sample and not an operator's single full-shift sample. Noncompliance based on an operator's samples consists of either 2 or 3 operator samples (depending on where the sample is taken) or the average of all operator samples, but not both. Accordingly, the specified actions are included in final § 72.800. These actions are consistent with final §§ 70.206(h) and (i); 70.207(g) and (h); 70.208(h) and (i); 70.209(f) and (g); 71.206(k) and (l); and 90.207(f), which apply when a citation is issued based on an operator's samples.

Several commenters stated that, in accordance with § 202(f) of the Mine Act, MSHA is required to conduct congressionally-mandated joint rulemaking with NIOSH to support a finding that single full-shift samples provide accurate results and that MSHA cannot unilaterally rescind the 1972 Joint Finding. Nothing in Section 202(f) of the Mine Act requires a joint rulemaking with NIOSH either to rescind the 1972 Joint Finding by MSHA and HHS or to promulgate the single sample provision. Section 202(f) of the Mine Act states verbatim from § 202(f) of the Coal Act. It states that the term ''average concentration'' means a determination that accurately represents the atmospheric conditions regarding the respirable coal mine dust to which each miner in the active workings is exposed as measured over a single shift only, unless the Secretary and the Secretary of Health and Human Services find, in accordance with section 101 of the Mine Act, that such single shift measurement will not accurately represent such atmospheric conditions during such shift.

On July 17, 1971, MSHA's predecessor, the Department of the Interior, Mining Enforcement and Safety Administration, together with the Secretary of Health, Education, and Welfare, issued a proposed ''Notice of Finding That Single Shift Measurements of Respirable Dust Will Not Accurately Represent Atmospheric Conditions During Such Shift'' (36 FR 13286). The proposed notice stated that pursuant to Section 101 of the Federal Coal Mine Health and Safety Act of 1969, the Secretaries were planning to jointly issue a finding ''that single shift measurement of respirable dust will not, after applying valid statistical techniques to such measurement, accurately represent the atmospheric conditions to which the miner is continuously exposed.'' On February 23, 1972, the Agencies issued the Notice of Finding That a Single Shift Measurement of Respirable Dust Will Not Accurately Represent Atmospheric Conditions During Such Shift (37 FR 3833) (1972 Joint Finding).

The 1972 Joint Finding is based on Section 202(f) of the Mine Act. Section 201(a) of the Mine Act states that sections 202 through 206 are interim standards. Therefore, the 1972 Joint Finding is an interim mandatory health standard. *See National Mining Association* v. *Secretary of Labor,* 153 F.3d 1264, 1267–68 (11th Cir. 1998).

Section 201(a) of the Mine Act gives the Secretary the authority to supersede interim mandatory health standards of the Mine Act with ''improved mandatory health and safety standards.'' In doing so, Section 201(a) states that the Secretary must enact the new standards according to the provisions of Section 101 of the Mine Act. Id. at 1268. Section 101(a)(6) authorizes the Secretary, alone, to promulgate mandatory health standards. The use of a single, full-shift measurement of respirable coal mine dust to determine average concentration on a shift is an improved mandatory health standard promulgated by MSHA under section 101 of the Mine Act. One commenter acknowledged that, in accordance with Section 201(a) of the Mine Act, an ''interim mandatory health standard under the Mine Act can be revised under the rulemaking provisions of the Mine Act § 101.'' In accordance with § 201(a), the 1972 Joint Finding is superseded by final § 72.800—an improved mandatory health standard.

In addition, final § 72.800 is consistent with the 1998 Final Joint Finding, issued by both MSHA and NIOSH, which concluded that the 1972 Joint Finding was incorrect and that the average respirable dust concentration to which a miner is exposed can be accurately measured over a single shift (63 FR 5664). Final § 72.800 is also consistent with the 1995 Criteria Document which recommends the use of single, full-shift samples to compare miners' exposures to the recommended exposure limit (REL).

Several commenters stated that they supported the use of single, full-shift samples to make noncompliance determinations. Others questioned the accuracy of single, full-shift samples, stating a preference for MSHA's existing five-sample average approach.

Final § 72.800 allows MSHA to base determinations of noncompliance on the results of single, full-shift samples collected by the Agency. It is based on MSHA's experience, review of section 202(f) of the Mine Act, significant improvements in sampling technology, updated data, and comments and testimony on previous notices and proposals addressing the accuracy of single, full-shift measurements meeting the NIOSH Accuracy Criterion. In addition, this finding is consistent with recommendations contained in both the 1995 NIOSH Criteria Document and the 1996 Dust Advisory Committee Report. In the Criteria Document, NIOSH recommended the use of single, full-shift samples to compare worker exposures with its REL and concluded that this action is consistent with

[60] See footnote 2 of this preamble.

Section 202(f) of the Act. The Dust Advisory Committee recommended that MSHA change its compliance sampling program to allow the use of single full-shift samples for determining compliance; seven of nine Committee members affirmed this recommendation.

Section 202(f) of the Mine Act does not define the term ''accurately represent.'' Therefore, MSHA applied the accuracy criterion developed and adopted by NIOSH (Kennedy et al., 1995) in judging whether a single, full-shift measurement will accurately represent the full-shift atmospheric dust concentration on the particular shift sampled. For a single, full-shift concentration to be considered an accurate measurement, the NIOSH Accuracy Criterion requires that such measurement come within 25 percent of the corresponding true dust concentration at least 95 percent of the time (Kennedy et al., 1995). It covers both precision and uncorrectable bias. Because a single, full-shift sample measures the average respirable coal mine dust on a specific shift at the sampling location, environmental variability beyond what occurs at the sampling location on the specific shift sampled is not relevant to assessing measurement accuracy.

Since first published in 1977 (Taylor et al., 1977), the NIOSH Accuracy Criterion has been used by NIOSH and others in the occupational health professions to validate sampling and analytical methods. It was devised as a goal for the development and acceptance of sampling and analytical methods capable of generating reliable exposure data for contaminants at or near the OSHA permissible exposure limits.

MSHA recognizes that all measurements of atmospheric conditions are susceptible to some degree of measurement error. Although the Mine Act requires that each measurement ''accurately represent'' the concentration of respirable dust, the Act neither defines ''accurately represent'' nor provides limits on the degree of potential error to be tolerated. The NIOSH Accuracy Criterion is relevant and widely recognized and accepted in the occupational health professions as providing acceptable limits for industrial hygiene measurements. MSHA considers a single, full-shift measurement of respirable coal mine dust to ''accurately represent'' atmospheric conditions at the sampling location, if the sampling and analytical method used meet the NIOSH Accuracy Criterion.

Although the NIOSH Accuracy Criterion does not require field testing to determine method accuracy, it recognizes that field testing does provide a further test of the method. However, in order to avoid confusing real differences in dust concentration with measurement errors when testing is done in the field, precautions may have to be taken to ensure that all samplers are exposed to the same concentrations (Kennedy et al., 1995). To determine, so far as possible, the accuracy of its sampling and analytical method under mining conditions, MSHA conducted 22 field tests in an underground coal mine. To provide a valid basis for assessing accuracy, 16 CMDPSUs were exposed to the same dust concentration during each field test using a specially designed portable chamber. The data from these field experiments were used by NIOSH in its direct approach to determining whether MSHA's method meets the long-established NIOSH Accuracy Criterion (Kogut et al., 1997).

The criterion requires that, with high confidence, measurements must consistently fall within a specified percentage of the true concentration being measured. Measurements that were repeatable but significantly biased, so that they systematically missed the mark by a wide margin, would not meet the Accuracy Criterion. Therefore, fulfilling the NIOSH Accuracy Criterion depends not only on measurement precision, but also on measurement bias if any such bias exists. Precision refers to consistency or repeatability of results, while bias refers to a systematic error that is present in every measurement.

Since the amount of dust present on a filter capsule in a CMDPSU used by an MSHA inspector is measured by subtracting the pre-exposure weight from the post-exposure weight, any bias present in both weight measurements is mathematically canceled out by subtraction. Furthermore, as will be discussed later, a control (i.e., unexposed) filter capsule has been and will continue to be pre- and post-weighed along with the exposed filter capsule. The weight gain of the exposed capsule will be adjusted by the weight gain or loss of the control filter capsule. Therefore, any bias that may be associated with differences in pre- and post-exposure laboratory conditions or with changes introduced during storage and handling of the filter capsules used with the CMDPSU will also be mathematically canceled out. The use of control filters is unnecessary when sampling with the approved CPDM due to the unit's design. Unlike the CMDPSU, which is a dust sampling pump capable of only collecting respirable dust particles from the mine air that must be weighed later in the laboratory, the CPDM is a complete sampling system that does the sample collection and pre- and post-weighing of the collection filter on the same day. As a result, there is no need to address the potential bias that may be associated with day-to-day changes in laboratory conditions or introduced during storage and handling of the collection filter. Therefore, MSHA concludes that the improved sampling and analytical method is statistically unbiased. This means that such measurements contain no systematic error. In addition, if any systematic error existed, it would be present in all measurements, and so, measurement bias would not be reduced by making multiple measurements.

For unbiased sampling and analytical methods, a standard statistic—called the Coefficient of Variation (CV)—is used to determine if the method meets the NIOSH Accuracy Criterion. The CV, which is expressed as either a fraction (e.g., 0.05) or a percentage (e.g., 5 percent), quantifies measurement accuracy for an unbiased method. An unbiased method meets the NIOSH Accuracy Criterion if the true CV is no more than 0.128 (12.8 percent). However, since it is not possible to determine the true CV with 100-percent confidence, the NIOSH Accuracy Criterion contains the additional requirement that there be 95-percent confidence that measurements will come within 25 percent of the true concentration 95 percent of the time. Stated in mathematically equivalent terms, an unbiased method meets the NIOSH Accuracy Criterion if there is 95-percent confidence that the true CV is less than or equal to 0.128 (12.8 percent).

OSHA has frequently employed a version of the NIOSH Accuracy Criterion when issuing new or revised single substance standards. For example, OSHA's benzene standard provides: ''[m]onitoring shall be accurate, to a confidence level of 95 percent, to within plus or minus 25 percent for airborne concentrations of benzene'' (29 CFR 1910.1028). Similar wording can be found in the OSHA standards for vinyl chloride (29 CFR 1910.1017); arsenic (29 CFR 1910.1018); lead (29 CFR 1910.1025); 1, 2-dibromo-3-chloropropane (29 CFR 1910.1044); acrylonitrile (29 CFR 1910.1045); ethylene oxide (29 CFR 1910.1047); and formaldehyde (29 CFR 1910.1048). For vinyl chloride and acrylonitrile, the margin of error permitted for the method is ± 35 percent at 95 percent confidence at the permissible exposure limit.

When measuring exposures for enforcement purposes, OSHA uses, when possible, methods that meet the NIOSH Accuracy Criterion. However, measurement techniques meeting the NIOSH Accuracy Criterion are not available for some substances. In either case, the CV determined for the method is used in a test procedure to determine noncompliance, with at least 95-percent confidence. The noncompliance test procedure was described in the 1977 NIOSH Occupational Exposure Sampling Strategies Manual. The OSHA inspector should use the sampling and analytical method CV to determine compliance on a single shift (Leidel et al., U.S. Department of Health, Education, and Welfare, NIOSH Publication No. 77–173, 1977). The procedure NIOSH described is mathematically identical to that used, both then and now, by OSHA compliance officers.

Some commenters stated that averaging should continue to be used because coal mine dust exposure is related to chronic health effects that occur over a lifetime and not as a result of single shift's overexposure. Other commenters stated that a single, full-shift measurement cannot accurately estimate a miner's exposure on a normal workday because a single sample with high or low weight gains may be an aberration due to dust suspended in the atmosphere or changing conditions in the mine such as the height and slope of the seam.

Section 202(b) of the Mine Act (30 U.S.C. 842(b)), explicitly requires that the average dust concentration be continuously maintained at or below the applicable standard on each shift. Overexposures above the standard may occur even when the average is below the standard. In the context of MSHA's single sample finding, the ''atmospheric conditions'' means the fluctuating concentration of respirable coal mine dust during a single shift. These are the atmospheric conditions to which a miner at the sampling location may be exposed. Therefore, MSHA's single-sample determination pertains only to the accuracy in representing the average of the fluctuating dust concentration over a single shift.

Some commenters stated that the average dust concentration over a full shift is not identical at every point within a miner's work area due to humidity, weather outside, or occasional geological phenomenon. Section 202(a) of the Mine Act gives the Secretary the discretion to determine the area to be represented by respirable dust sampling collected over a single shift. Although dust concentrations in the mine environment can vary from location to location, even within a small area near a miner, the Mine Act does not specify the area that the measurement is supposed to represent, and the sampler unit may therefore be placed in any location, reasonably calculated to determine excessive exposure to respirable dust. Because the Secretary intends to prevent excessive exposures by limiting dust concentrations in the active workings as intended by the Mine Act, it is sufficient that each measurement accurately represent the respirable dust concentration at the corresponding sampling location only. Limiting the dust concentration ensures that no miner in the active workings will be exposed to excessive concentrations of respirable coal mine dust. Moreover, MSHA does not intend to use a single, full-shift measurement to estimate any miner's exposure (personal) because no sampling device can exactly duplicate the particle inhalation and deposition characteristics of a miner at any work rate (these characteristics change with work rate), let alone at the various work rates occurring over the course of a shift. Limiting the respirable dust concentration to which each miner is exposed in the active workings (area sampling) ensures that the respirable dust concentration inhaled by any miner is limited.

Some commenters supported the use of single, full-shift samples because it eliminates an important source of sampling bias due to averaging.

Final § 72.800 provides for single, full-shift sampling by MSHA because the single, full-shift samples may be above the standard even when multiple shift averages are below the standard. For example, five samples of: 3.4, 2.7, 2.6, 0.7, and 0.5 would result in an average of 1.98 mg/m^3, which meets the 2.0 mg/m^3 standard, although 3 single samples exceed the standard.

Moreover, averaging multiple samples is not likely to produce results that are more accurate than the results of a single sample. MSHA intends to apply a single sample measurement taken during a shift, and is not extrapolating those results to other past shifts. A detailed description of the issue involving sampling bias due to averaging is provided in Appendix A of the 2000 single sample proposed rule (65 FR 42108). Available at *http://www.msha.gov/REGS/FEDREG/PROPOSED/2000PROP/00-14075.PDF*].

Although averaging is one of the two methods of determining noncompliance with the respirable coal dust standard pertaining to operator sampling, in the final rule, MSHA changed the existing averaging method so that there is no longer an averaging process where miners are exposed to high levels of respirable coal mine dust and no action is taken to lower dust levels. Under the existing standards, corrective action is required only after the average of five operator samples exceeds the respirable coal mine dust standard and a citation is issued. This permits specific instances of miners' overexposures without requiring any corrective action by the operator to reduce concentrations to meet the standard. The final rule requires immediate corrective actions to lower dust concentrations when a single, full-shift operator sample meets or exceeds the excessive concentration value for the applicable dust standard. These corrective actions will result in reduced respirable dust concentrations in the mine atmosphere and, therefore, will provide better protection of miners from further high exposures.

Of the commenters who questioned the accuracy of single full-shift sampling, some stated that dust sample results from the existing and proposed sampler are only estimates of actual dust exposures and those estimates of exposures are dependent on the performance of the sampler, the impact of the conditions under which the sample is collected, and the accuracy of the analysis and weighing of the collected sample. Therefore, they stated that averaging produces a more accurate representation of the dust to which a miner is exposed, and that making health risk and protection decisions on less accurate data provides less protection than making decisions on more accurate data.

Due to advances in sampling technology, MSHA has safeguards in place to ensure that a single sample taken with an approved CMDPSU will accurately measure coal mine dust concentrations during a shift. To eliminate the potential for any bias that may be associated with day-to-day changes in laboratory conditions or introduced during storage and handling of filter capsules, MSHA is using new stainless steel backed filter cassettes which demonstrate better weighing stability to minimize pre-and post-weighing variability. In addition, both MSHA and the manufacturer of the filter cassette are using semi-micro balances with improved weighing procedures. Finally, the new generation of sampling pumps currently in use, which incorporates the latest technology in pump design to provide more constant flow throughout the sampling period, increases the accuracy of MSHA-collected dust samples. The validity of the sampling and analytical process is

an important aspect of obtaining accurate measurements. Since passage of the Coal Act, there has been an ongoing effort by MSHA and NIOSH to improve the accuracy and reliability of the entire sampling process. In 1980, MSHA issued regulations revising sampling, maintenance and calibration procedures in 30 CFR parts 70, 71, and 90. These revisions were designed to minimize human and mechanical errors and ensure that samples collected with the approved CMDPSU accurately represent the full-shift, average atmospheric dust concentration at the location of the sampler unit. These provisions require: (1) Certification of the competence of all individuals involved in the sampling process and in maintaining the sampling equipment; (2) calibration of each sampler unit at least every 200 hours; (3) examination, testing, and maintenance of units before each sampling shift to ensure that the units are in proper working order; and (4) checking of sampler units during and at the end of sampling to ensure that they are operating properly and at the proper flow rate. In addition, significant changes, including robotic weighing and the use of electronic balances, were made in 1984, 1994, and 1995. These changes improved the reliability of sample weighings at MSHA's Respirable Dust Processing Laboratory and are discussed below.

In addition, in 2010, MSHA published revised requirements that it and NIOSH use to approve sampling devices that monitor miner exposure to respirable coal mine dust (75 FR 17512, April 6, 2010). The final rule updated approval requirements for the existing CMDPSU to reflect improvements in this sampler over the past 15 years. The final rule also established criteria for approval of the new CPDM.

All of these efforts have improved the accuracy and reliability of the sampling process since the time of the 1971 proposed and the 1972 final Joint Findings. A discussion follows on each of the three phases of the sampling process involving the use of the approved CMDPSU: sampler unit performance, collection procedures, and sample processing. In addition, the accuracy of measurements taken with an approved CPDM is discussed in Section III.C., Feasibility in this preamble, and in greater detail by Volkwein, et al., in two NIOSH Reports of Investigations (RI 9663, 2004; and RI 9669, 2006).

In accordance with the provisions of section 202(e) of the Mine Act (30 U.S.C. 842(e)), both MSHA and NIOSH administer a comprehensive certification process under 30 CFR part 74 to approve dust sampler units for use in coal mines. To be approved for use, a sampler unit must be intrinsically safe, which is determined by MSHA. A sampler unit must also meet stringent technical and performance requirements established by NIOSH that govern the quantity of respirable dust collected and flow rate consistency over the full shift or up to 12 hours when operated at the prescribed flow rate. As necessary, NIOSH also conducts performance audits of approved sampler units purchased on the open market to determine if the units are being manufactured in accordance with the specifications upon which the approval was issued. The system of technical and quality assurance checks currently in place is designed to prevent a defective sampler unit from being manufactured and made commercially available to the mining industry or to MSHA. In the event that these checks identify a potential problem with the manufacturing process, established procedures require immediate action to correct the problem.

In 1992, NIOSH approved the use of new tamper-resistant filter cassettes with features that enhanced the integrity of the sample collected when using the CMDPSU. A backflush valve was incorporated into the outlet of the cassette, preventing reverse airflow through the filter cassette, and an internal flow diverter was added to the filter capsule, reducing the possibility of dust dislodged from the filter surface from falling out of the capsule inlet.

In 1999, based on MSHA studies (Kogut et al., 1999) involving the weighing stability of the CMDPSU filter design, and in an effort to standardize the manufacturing process, the filter cassette manufacturer submitted for NIOSH approval a modification to the design. The modification involved replacing the Tyvek® support pad with a stainless steel wheel, similar to the one located on the inlet side of the collection filter. On October 18, 2000, NIOSH approved the filter cassettes with stainless steel backup pads to be used to collect respirable coal mine dust exposure measurements. OSHA also began using filter cassettes with stainless steel backup pads to determine exposures for various particulates.

In 1995, MSHA replaced all pumps in use by inspectors with new constant-flow pumps that incorporated the latest technology in pump design. These pumps provide more consistent flow throughout the sampling period. Nevertheless, MSHA recognizes that as these pumps age, deterioration of the performance of older pumps could become a concern. However, there is no evidence that the age of the equipment affects its operational performance if the equipment is maintained as prescribed by 30 CFR parts 70, 71, and 90. Therefore, in addition to using these pumps, inspection procedures require MSHA inspectors to make a minimum of two flow rate checks during a sampling shift to ensure that the sampler unit is operating properly.

A sample is voided if the proper flow rate was not maintained during the final check at the conclusion of the sampling shift. In fiscal year 2011, only 118 samples, or approximately 0.2 percent, of the 54,809 inspector samples processed were voided because the sampling pump either failed to operate throughout the entire sampling period or failed to maintain the proper flow rate during the final check. Units found not meeting the requirements of part 74 are immediately repaired, adjusted, or removed from service.

The potential effect of vibration on the accuracy of a respirable dust measurement was recognized by NIOSH in 1981. An investigation, supported by NIOSH, was conducted by the Los Alamos National Laboratory which found that vibration has an insignificant effect on sampler performance (Gray and Tillery, 1981).

MSHA regulations at 30 CFR parts 70, 71, and 90 prescribe the manner in which mine operators are to take respirable dust samples. The collection procedures are designed to ensure that the samples accurately represent the amount of respirable dust in the mine atmosphere to which miners are exposed on the shift sampled. MSHA considers samples taken with an approved sampler in accordance with these procedures to be valid.

Some commenters stated that a single, full-shift measurement cannot accurately estimate a miner's exposure on a normal workday due to a miner's behavior such as dropping the sampling unit on a machine or the mine floor, brushing off dust from work clothes, or briefly taking the unit off. These commenters stated that averaging multiple samples would provide leeway by reducing the impact of an aberrant sample.

In response to commenters' concerns, the Agency notes that MSHA inspectors are normally in the general vicinity of the sampling location, and therefore have knowledge of the specific conditions under which samples are taken. In addition, MSHA inspectors are instructed to ask miners wearing the sampler units whether anything that could have affected the validity of the sample occurred during the shift. If so, the inspector will note this on the data

card and request that the sample be examined to determine its validity.

In addition, when sampling with the CMDPSU, MSHA inspectors use unexposed control filters to eliminate any bias that may be associated with changes in laboratory conditions or changes introduced during storage and handling of the filter capsules. A control filter is an unexposed filter that was pre-weighed on the same day and in the same laboratory as the filter used for sampling. This control filter is used to adjust the weight gain obtained on each exposed filter. Any change in weight of the control filter capsule is subtracted from the change in weight of each exposed filter capsule. MSHA began using control filters on May 7, 1998, and has continued this practice. The control filter cassette, which is carried by the inspector in a shirt or coverall pocket during the sampling inspection, is plugged to prevent exposure to the mine environment.

Processing samples collected with the CMDPSU consists of weighing the exposed and control (unexposed) filter capsules, recording the weight changes, and examining certain samples in order to verify their validity. Sample processing also includes electronic transmission of the results to the MSHA Standardized Information System (MSIS) center where dust concentrations are computed. The results are then transmitted to MSHA enforcement personnel and to mine operators.

The procedures and analytical equipment, as well as the facility used by MSHA to process respirable coal mine dust samples have been continuously improved since 1970 to maintain a state-of-the-art laboratory. From 1970 to 1984, samples were manually weighed using semi-microbalances. MSHA automated this process in 1984 with the installation of a state-of-the-art robotic system and electronic balances, which increased the precision of sample-weight determinations. MSHA improved the weighing precision in 1994, when both the robotic system and balances were upgraded. Also, beginning in early 1998, all respirable coal mine dust samples were processed in a new, specially designed clean room facility that maintains the temperature and humidity of the environment. Currently, the temperature and humidity are maintained at 21.0 °C ± 2.0 °C and 50% ± 10%, respectively. Using a modified HEPA filtration system, the environment is maintained at a clean room classification of 1000 (near optimum for clean room cleanliness).

In mid-1995, MSHA implemented two modifications to its procedures for processing inspector samples. One involved pre- and post-weighing filter capsules to the nearest microgram (µg) (0.001 mg) within MSHA's laboratory. Prior to mid-1995, capsules had been weighed in the manufacturer's laboratory before sampling, and then in MSHA's laboratory after sampling. To maintain the integrity of the weighing process, 8% of all filter capsules are systematically weighed a second time. If a significant deviation is found, the balance is recalibrated and all capsules with questionable weights are reweighed.

The other modification was to discontinue the practice of truncating (to 0.1 mg) the recorded weights used in calculating dust concentrations. MSHA now uses all significant digits associated with the weighing capability of the balance (0.001 mg) when processing samples. Both modifications improved the overall accuracy of the measurement process.

To eliminate the potential for any bias that may be associated with day-to-day changes in laboratory conditions or introduced during storage and handling of the filters, MSHA is using control filters in its enforcement program. Any change in the weight of the control filter is subtracted from the measured change in weight of the exposed filter.[61]

Since MSHA began pre- and post-weighing filter capsules to the nearest µg, coal mine operators have asked to use filter capsules pre-weighed to a µg to collect optional samples that they submit to MSHA for quartz analysis. The use of these pre-weighed filter capsules may eliminate the need to sample multiple shifts in order to obtain sufficient dust mass on the collection filter for quartz analysis. Currently, filter capsules used by coal mine operators to sample in accordance with 30 CFR parts 70, 71, and 90 are pre-weighed by the manufacturer to the nearest µg. However, for samples taken with filters pre-weighed to the nearest µg, only those with a net weight gain of at least 450 µg, contain sufficient dust mass to permit the percentage of quartz to be determined. In 1996, the manufacturer upgraded its equipment used to pre-weigh filter capsules and now uses the same type of balance as MSHA's Respirable Dust Processing Laboratory. This permits weight gain measurements to be made to the nearest µg.

[61] If a control filter either shows a weight gain greater than 60 micrograms or a weight loss greater than 30 micrograms, the control filter is invalid and the associated concentration measurements are not used for enforcement purposes.

The procedure requiring inspector samples to be pre- and post-weighed in the same laboratory was developed prior to adopting control filters and was based on the assumption that no control filters were being used. Since use of the control filters adjusts for differences that may exist in laboratory conditions on the days of pre- and post-weighing, it is no longer necessary to pre- and post-weigh the filters in the same laboratory. Currently, all filter cassettes being manufactured for use with the approved CMDPSU are pre-weighed by the manufacturer and post-weighed by MSHA.

To determine the viability of using exposed filters pre-weighed by the manufacturer and post-weighed by MSHA in establishing the percentage of quartz, MSHA conducted a study to quantify weighing variability between the manufacturer and MSHA laboratories (Parobeck et al., 1997). Based on this study, the overall imprecision of an interlaboratory weight-gain measurement was estimated to be 11.5 µg for capsules with a stainless steel filter support pad. This estimate closely matches the 11.6 µg result reported for capsules with stainless steel support pads in another study (Kogut et al., 1999). In the latter study, unexposed capsules were pre-weighed by MSHA, assembled into cassettes by the manufacturer, sent out to the field and carried during an inspection, and then post-weighed by MSHA.

Using the higher estimate from the two studies, NIOSH reevaluated the accuracy of MSHA's improved sampling and analytical method using the CMDPSU, which incorporates a control filter adjustment and the redesigned filter capsule. NIOSH concluded that the control filter adjustment will correct for any potential biases due to differences in laboratory conditions, so that it is no longer necessary to pre- and post-weigh filter capsules in the same laboratory (Grayson, 1999a, 1999b). Therefore, in accordance with NIOSH, MSHA revised the processing procedures for inspector samples from pre- and post-weighing samples (filter capsules) in the same laboratory (with adjustment by a control filter) to pre- and post-weighing of samples to the nearest µg in different laboratories (with continued adjustment by a control filter).

To ensure the precision and accuracy of the pre-weight of filters used by inspectors, MSHA instituted a quality assurance program to monitor the daily production of filters weighed to the nearest µg by the manufacturer. This program conformed to MIL–STD–105D,

which was replaced by ANSI/ASQ Z1.4. The most recent version is ANSI/ASQ Z1.4–2008, which defines the criteria currently used to monitor the quality of pre-weighed filters used in MSHA's operator sampling program.

One commenter stated that a new CPDM filter is used to collect respirable coal mine dust without current lab procedures that analyze blank filters to prevent known filter contamination and variability from creating false weight readings. As was discussed earlier, because of the CPDM's unique built-in weighing system, there is no need for a blank or control filter. The CPDM, unlike the CMDPSU which is primarily a sampling pump, incorporates a complete sampling and sophisticated weighing system that is designed to pre-weigh the collection filter, collect a dust sample, and then post-weigh the filter to determine the weight of respirable dust collected on the filter on the same day. This eliminates the need to address the potential bias that may be associated with day-to-day changes in laboratory conditions or introduced during storage and handling of the collection filter. More importantly, the CPDM is designed to self-zero itself at the end of the warm-up period so that any mass that may have been deposited on the filter prior to sampling is not recorded.

All respirable dust samples collected using a CMDPSU and submitted are considered valid unless the dust deposition pattern on the collection filter appears to be abnormal or other special circumstances are noted that would cause MSHA to examine the sample further. Standard laboratory procedures, involving visual and microscopic examination as necessary, are used to verify the validity of samples. Samples with a weight gain of 1.4 milligrams (mg) or more are examined visually for abnormalities such as the presence of large dust particles (which can occur from agglomeration of smaller particles), abnormal discoloration, abnormal dust deposition pattern on the filter, or any apparent contamination by materials other than respirable coal mine dust. Also, samples weighing 0.1 mg or less are examined for insufficient dust particle count. Similar checks are also performed in direct response to specific inspector or operator concerns noted on the dust data card to which each sample is attached.

Regarding the presence of large dust particles, some greater than 10 microns (μm) can be inhaled and reach the alveoli of the lungs (Lippman and Albert, 1969). According to the British National Coal Board, particles as large as 20 μm diameter may be deposited on the lungs although most lie in the range below 10 μm diameter (Goddard et al., 1973). Furthermore, due to the irregular shapes of dust particles, the respirable dust collected by the MRE instrument (the dust sampler used by the British Medical Research Establishment in the epidemiological studies on which the U.S. respirable coal mine dust standard was based) may include some dust particles as large as 20 μm (Goddard et al., 1973). Moreover, MSHA studies have shown that nearly all samples taken with approved CMDPSUs contain some oversized particles (Tomb, 1981).

There are occasions, however, when oversized particles may be considered a contaminant. For example, an excessive number of such particles could enter the filter capsule if the sampling head assembly is accidentally or deliberately ''dumped'' (turned upside down) possibly causing some of the contents of the cyclone grit pot to be deposited on the collection filter. When MSHA has reason to believe that contamination has occurred, the suspect sample is examined to verify its validity.

In addition, MSHA's laboratory procedures require any sample exhibiting an excessive weight gain (over 6 mg) or showing evidence of being ''dumped'' to be examined microscopically for the presence of an excessive number of oversized particles (U.S. Department of Labor, MSHA Method P–19, 2012). Samples identified by an inspector or mine operator as possibly contaminated are also examined. If this examination indicates that the sample contains an excessive number of oversized particles according to MSHA's established criteria, then that sample is considered to be invalid, and is voided and not used. In fiscal year 2011, only 26 of the 54,809 inspector and 42 of the 46,846 operator samples processed were found to contain an excessive number of oversize particles and thus were voided.

While rough handling of the CMDPSU or an accidental mishap could conceivably cause a sample with a weight gain less than 6 mg to become contaminated, short-term accidental inclinations of the cyclone will not affect respirable mass measurements made with CMDPSU (Treaftis and Tomb, 1974). CMDPSUs are built to withstand the rigors of the mine environment, and are therefore less susceptible to contamination than suggested by some commenters. In any event, the validity checks discussed above that are currently in place will detect contaminated samples.

With regard to the CPDM collecting respirable dust and not oversized, non-respirable dust particles, NIOSH found, through microscopic examination of previously exposed CPDM filters, no oversize particle contamination resulting from the use and cleaning of the device after 200 hours of operation (Volkwein JC, 2008).

One commenter who questioned the accuracy of a single sample in assessing miners' long term exposure stated that mine dust concentrations show great variability and that the greater the variability, the smaller the probability that a single day's sample will accurately describe the average exposure of a miner.

In response to the commenter, MSHA notes that overall variability in measurements collected on different shifts and sampling locations comes from two sources: (1) Environmental variability in the true dust concentration and (2) errors in measuring the dust concentration in a specific environment. Variability in the dust concentration is under the control of the mine operator and does not depend on the degree to which the dust concentration can be accurately measured. Measurement uncertainty, on the other hand, stems from the differing measurement results that could arise, at a given sampling location on a given shift, because of potential sampling and analytical errors. Therefore, unlike variability in dust concentration, measurement uncertainty depends directly on the accuracy of the measurement system. Measurement errors generally contribute only a small portion of the overall variability observed in datasets consisting of dust concentration measurements.

Because the measurement objective is to accurately represent the average dust concentration at the sampling location over a single shift, dust concentration variability between shifts or locations does not contribute to measurement uncertainty. Therefore, sources of dust concentration variability are not considered in determining whether a measurement is accurate. The only sources of variability relevant to establishing accuracy of a single, full-shift measurement are those related to sampling and analytical error.

As discussed above, filter capsules are weighed prior to sampling. After a single, full-shift sample is collected, the filter capsule is weighed a second time, and the weight gain (g) is obtained by subtracting the pre-exposure weight from the post-exposure weight, which will then be adjusted for the weight gain or loss observed in the control filter capsule. A measurement (x) of the atmospheric condition sampled is then calculated by Equation 1:

$$x = \frac{1.38 \bullet g}{v} \qquad \text{(Equation 1)}$$

Where:

x is the single, full-shift dust concentration measurement (mg/m^3);

1.38 is a constant MRE-equivalent conversion factor;

g is the observed weight gain (mg) after adjustment for the control filter capsule; and

v is the estimated total volume of air pumped through the filter during a typical full shift.

Random variability, inherent in any measurement process, may cause *x* to deviate either above or below the true dust concentration. The difference between *x* and the true dust concentration is the measurement error, which may be either positive or negative. Measurement uncertainty arises from a combination of potential errors in the process of collecting a sample and potential errors in the process of analyzing the sample. These potential errors introduce a degree of uncertainty when *x* is used to represent the true dust concentration.

The statistical measure used to quantify uncertainty in a single, full-shift measurement is the total sampling and analytical coefficient of variation, or CV_{total}. The CV_{total} quantifies the magnitude of probable sampling and analytical errors and is expressed as either a fraction (e.g., 0.05) or as a percent (e.g., 5 percent) of the true concentration. For example, if a single, full-shift measurement (*x*) is collected in a mine atmosphere with true dust concentration equal to 1.5 mg/m^3, and the standard deviation of potential sampling and analytical errors associated with *x* is equal to 0.075 mg/m^3, the uncertainty associated with *x* would be expressed by the ratio of the standard deviation to the true dust concentration:

CV_{total} = 0.075/1.5 = 0.05, or 5 percent.

There are three sources of uncertainty in a single, full-shift measurement, which together make up CV_{total}: (1) Variability attributed to weighing errors or handling associated with exposed and control filters capsules, CV_{weight}; (2) variability in the total volume of air pumped through the filter capsule, CV_{pump}; and (3) variability in the fraction of dust trapped on the filter, $CV_{sampler}$.

CV_{weight} covers any variability in the process of weighing the exposed or control filter capsules prior to sampling (pre-weighing), assembling the exposed and control filter cassettes, transporting the filter cassettes to and from the mine, and weighing the exposed and control filter capsules after sampling (post-weighing).

CV_{pump} covers variability associated with calibration of the pump rotameter,[62] variability in adjustment of the flow rate at the beginning of the shift, and variation in the flow rate during sampling. It should be noted that variation in flow rate during sampling was identified as a separate component of variability in MSHA's February 18, 1994, notice (59 FR 8356). Here, it is included in CV_{pump}.

$CV_{sampler}$, the variability in the fraction of dust trapped on the filter, is attributable to physical differences among cyclones.

These three components of measurement uncertainty can be combined to form an indirect estimate of CV_{total} by means of the standard propagation of errors formula:

$$CV_{total} = \sqrt{CV_{weight}^2 + CV_{pump}^2 + CV_{sampler}^2}$$

These three components are discussed in greater detail, along with responses to specific previous comments, in Appendix B to the July 7, 2000 proposed rule, *http://www.msha.gov/REGS/FEDREG/PROPOSED/2000PROP/00-14075.PDF*

Exposure variability due to job, location, shift, production level, effectiveness of engineering controls, and work practices will be different from mine to mine. This type of variability is unrelated to measurement accuracy and depends on factors under the control of the mine operator. The sampler unit is not intended to account for these factors.

In addition, CV_{total} does not account for spatial variability, or the differences in concentration related to location. Dust concentrations vary between locations in a coal mine, even within a relatively small area. However, real variations in concentration between locations, while sometimes substantial, do not contribute to measurement error. The measurement objective is to accurately measure average atmospheric conditions, or concentration of respirable dust, at a sampling location over a single shift. What is being measured is the average respirable coal mine dust concentration on a specific shift at the sampling location. For example, there may be variation in measurements collected simultaneously on opposite shoulders of miners due to a combination of measurement imprecision and real, differences in the average concentration over the full shift. But these shoulder-to-shoulder differences in average full-shift concentration result from how miners orient themselves in the confines of the mining environment, with respect to the sources of dust and the direction of the air stream. These differences have no bearing on the accuracy of the average, full-shift concentration as measured on a particular shoulder.

Regarding the differences or variations in dust concentrations that occur shift to shift, the measurement objective is to measure average atmospheric conditions on the specific shift sampled. This is consistent with the Mine Act, which requires that concentrations of respirable mine dust be maintained at or below the standard during each shift.

One commenter questioned the value MSHA is using to represent variability in initially setting the pump flow rate. MSHA conducted a study to verify the magnitude of this variability component. This study simulated flow rate adjustment under realistic operating conditions by including a number of persons checking and adjusting initial flow rate under various working situations (Tomb, September 1, 1994). Results showed the coefficient of

[62] The rotameter consists of a weight or ''float'' that is free to move up and down within a vertical tapered tube which is larger at the top than the bottom. Air being drawn through the filter cassette passes through the rotameter, suspending the ''float'' within the tube. The pump is ''calibrated'' by drawing air through a calibration device (usually what is known as a bubble meter) at the desired flow rate and marking the position of the float on the tube. The processes of marking the position on the tube (laboratory calibration) and adjusting the pump speed in the field so that the float is positioned at the mark are both subject to error.

variation associated with the initial flow rate adjustment to be 3 ± 0.5 percent, which is less than the 5-percent value used by MSHA in the February 18, 1994 notice (59 FR 8356). In addition, based on a review of published results, MSHA has concluded that the component of uncertainty associated with the combined effects of variability in flow rate during sampling and potential errors in calibration is actually less than 3 percent. As explained in Appendix C of the July 7, 2000 proposed rule (*http://www.msha.gov/REGS/FEDREG/PROPOSED/2000PROP/00-14075.PDF*), these two sources of uncertainty can be combined to estimate uncertainty in the total volume of air pumped through the filter, as expressed by $CV_{pump.}$ After reviewing the available data and the comments submitted, MSHA concludes that the best available estimate of CV_{pump} is 4.2 percent.

Some commenters stated that MSHA improperly calculated the MRE equivalency of the CPDM which adversely impacts the accuracy of single shift samples for representing miner exposure. The CPDM performance was compared to the defined and accepted reference standard within the U.S. mining industry, which uses the gravimetric method, and was described in detail in a NIOSH paper by Page et al. (2008). In its evaluation of CPDM performance, NIOSH collected and analyzed samples that were statistically representative of the underground bituminous coal mining industry. The samples were collected at approximately 20 percent of the active mechanized mining units. Statistically representative samples are critical for correct estimation of the bias of the CPDM relative to the existing approved gravimetric method being used to collect respirable coal mine dust samples in coal mines, in that the bias will not necessarily be properly estimated from studies conducted in a limited number of mines and regions, regardless of the number of samples obtained at these locations. The methodology used by NIOSH was reviewed and approved by various members of the mining sector prior to data collection and prior to publishing the final results. In terms of bias, the results presented by one of the commenters supported those published by NIOSH, demonstrating that the average concentration measured by the approved CMDPSU (0.83 mg/m^3) was virtually identical to the CPDM average value of 0.82 mg/m^3. MSHA believes that NIOSH has conducted sufficient experiments with the CPDM that demonstrate that the precision of the CPDM is equivalent to that of the CMDPSU. Additional discussion on the accuracy of the CPDM is contained elsewhere in this preamble under Section III.C. concerning Feasibility.

Some commenters stated that MSHA did not properly evaluate the inaccuracy of single full-shift sampling because MSHA must analyze single full-shift results, not averages, which smooth inaccuracies and reduce the variability of single full-shift results. These commenters stated that this accuracy analysis was not conducted for both the CMDPSU and CPDM sampling methods for the proposed 1.0 mg/m^3 limit, the extended shift lower limits (e.g., 0.8 mg/m^3 for 10-hour shifts and 0.67 mg/m^3 for 12-hour shifts), and silica content reduced limits.

One commenter submitted sampling results and stated that the results demonstrate the inaccuracy of MSHA's single shift sampling results. According to the commenter: (1) MSHA ignored the accepted scientific concept of calculating the impact of compounding errors because MSHA did not analyze or consider the significant errors associated with silica analysis on its accuracy finding, even though MSHA reduces its coal mine dust standard for silica content, significantly impacting coal mine dust sampling accuracy; (2) MSHA did not evaluate increased errors and inaccuracy at the proposed lower exposure levels, mandated by the proposed adjustment for shift lengths, nor the proposed silica content exposure level reduction adjustment; and (3) MSHA did not analyze its accuracy finding at the lower levels of coal mine dust reported by current MSHA sampling data, acknowledged by the scientific literature to create greater levels of measurement inaccuracy than higher levels.

In response to the commenter's concerns, MSHA points out that the accuracy of a respirable dust concentration measurement is different from the concerns expressed by the commenters. To establish the accuracy of a single full-shift sample, MSHA need not address lower respirable dust levels, shift length, or silica content.

MSHA has a separate program in which silica analysis is used to set the applicable respirable coal mine dust standard, in accordance with section 205 of the Mine Act (30 U.S.C. 845), when the respirable dust in the mine atmosphere of the active workings contains more than 5 percent quartz. As shown by Equation 1 above, no silica analysis is used in a single, full-shift measurement of the respirable dust concentration. There is a critical difference between the process of setting a reduced standard and the use of single shift samples for compliance purposes. MSHA's measurements of quartz content are used to set standards that apply to multiple shifts, while MSHA's measurements of dust concentration relate to compliance on individual shifts. Any standard, whether or not reduced, remains in effect until it is revised based on a subsequent determination of quartz content. Therefore, the objective of a quartz content determination is to derive a standard that will continue to protect miners over multiple shifts.

Compliance with the applicable standard, on the other hand, must be maintained on each shift, in accordance with Section 202(b)(2) of the Mine Act. Therefore, as described earlier in this preamble, the measurement objective in determining compliance relates entirely to the specific shift on which the sample is taken. Because of this crucial difference in measurement objectives, averaging measurements of quartz content for purposes of setting a reduced standard has no bearing on the question of whether it is appropriate to average dust concentration measurements for purposes of a compliance determination. It is appropriate to average measurements of quartz content from several shifts to determine a standard that will apply to multiple shifts. But, since MSHA's objective is to regulate compliance on every shift, MSHA is discontinuing the existing practice of averaging respirable dust concentration measurements from multiple occupations on the same shift, based on MSHA-collected samples.

NIOSH's first independent analysis of MSHA's sampling and analytical method involved MSHA's 1995 field study data using CMDPSUs (Kogut et al., 1997). These data incorporated certain improvements that NIOSH had proposed for MSHA's sampling and analytical method. These improvements were later adopted for all MSHA inspector samples. From these data, NIOSH determined, with 95-percent confidence, that the true CV_{total} for MSHA's proposed sampling and analytical method was less than the target maximum value of 12.8 percent for dust concentrations of 0.2 mg/m^3 or greater (Wagner, 1995). This demonstrated that MSHA's sampling and analytical method for collecting and processing single full-shift samples would meet the NIOSH Accuracy Criterion whenever the true dust concentration was at least 0.2 mg/m^3.

In the same analysis, NIOSH also applied an indirect approach for assessing the accuracy of MSHA's sampling and analytical method. The

indirect approach involved combining separate estimates of weighing imprecision, pump-related variability, and variability associated with physical differences between individual sampler units. This indirect approach also indicated that MSHA's sampling and analytical method would meet the NIOSH Accuracy Criterion at concentrations greater than or equal to 0.2 mg/m^3, thereby corroborating the analysis of MSHA's field data.

MSHA later obtained data suggesting that filter capsules containing Tyvek® backup pads sometimes exhibit spurious changes in weight. Although the changes observed were relatively small compared to weight gains required for MSHA's noncompliance determinations, these changes led MSHA to begin using unexposed control filters in its enforcement program. The use of a control filter adjustment eliminates systematic errors due to such effects, but also affects the precision of a single, full-shift measurement. Consequently, NIOSH reevaluated the accuracy of MSHA's sampling and analytical method, taking into account the effects of using a control filter capsule (Wagner, 1997). After accounting for the effects of control filter capsules on both bias and precision, NIOSH concluded, based on both its direct and indirect approaches, that a single, full-shift measurement will meet the NIOSH Accuracy Criterion at true dust concentrations greater than or equal to 0.3 mg/m^3.

MSHA compiled data showing that weight stability of the filter capsule would be improved, minimizing pre- and post-weighing variability, by substituting stainless steel support grids for the Tyvek® support pads that were in use (Kogut et al., 1999). Consequently, NIOSH again reevaluated the accuracy of MSHA's method, this time taking into account the proposal to switch to stainless steel support grids (Grayson, 1999a; 1999b). After accounting for the effects of switching to stainless steel support grids, and of using unexposed control filters to adjust for any potential systematic errors that might remain, NIOSH once again concluded that a single, full-shift measurement met the NIOSH Accuracy Criterion at true dust concentrations greater than or equal to 0.3 mg/m^3.

The purpose of any measurement process is to produce an estimate of an unknown quantity. MSHA has concluded that its sampling and analytical method for inspectors meets the NIOSH Accuracy Criterion for true concentrations at or above 0.3 mg/m^3, but it is also possible to calculate the range of measurements for which the Accuracy Criterion is fulfilled. Since CV_{total} increases at the lower concentrations, all that is necessary is to determine the lowest measurement at which the NIOSH Accuracy Criterion is met. This is done as follows: if the true concentration exactly equaled the lowest concentration at which MSHA's sampling and analytical method meets the Accuracy Criterion (i.e., 0.3 mg/m^3), then no more than 5% of single, full-shift measurements are expected to exceed 0.36 mg/m^3 (Wagner, May 28, 1997). Conversely, if a measurement equals or exceeds 0.36 mg/m^3, it can be inferred, with at least 95% confidence, that the true dust concentration equals or exceeds 0.3 mg/m^3 (Wagner, 1997). Consequently, MSHA's improved sampling and analytical method satisfies the NIOSH Accuracy Criterion whenever a single, full-shift measurement is at or above 0.36 mg/m^3.

Future technological improvements in MSHA's CMDPSU sampling and analytical method may reduce CV_{total} below its current value. Also, as additional data are accumulated, updated estimates of CV_{total} may become available. However, so long as the method remains unbiased and CV_{total} remains at or below 12.8 percent, at a 95-percent confidence level, the sampling and analytical method will continue to meet the NIOSH Accuracy Criterion, and the present finding will continue to be valid.

NIOSH's studies of the equivalency of the CPDM with the CMDPSU are more representative and more appropriate for evaluating the suitability of the CPDM as a compliance instrument (Volkwein et al., NIOSH, RI 9663, 2004, and NIOSH RI 9669, 2006; Page et al., 2008) than sampling results submitted by the commenter. In terms of bias, the results presented by the commenter support those published by NIOSH demonstrating that the average concentration measured by the CMDPSU (0.83 mg/m^3) was virtually identical to the CPDM average value of 0.82 mg/m^3. The conclusion that should be drawn from both the commenter and NIOSH data sets is that there is no statistically significant difference and that the bias between the CPDM and the approved CMDPSU is zero.

MSHA has concluded that: Sufficient data exist for determining the uncertainty associated with a single, full-shift measurement; rigorous requirements are in place, as specified by 30 CFR parts 70, 71, and 90, to ensure the validity of a respirable coal mine dust sample; and valid statistical techniques were used to determine that MSHA's improved dust sampling and analytical method meets the NIOSH Accuracy Criterion. For these reasons, the Secretary of Labor finds that a single, full-shift CMDPSU concentration measurement at or above 0.36 mg/m^3 will accurately represent atmospheric conditions to which a miner is exposed during such shift. The Secretary also finds that a single, full-shift CPDM concentration measurement at or above 0.2 mg/m^3 will accurately represent atmospheric conditions to which a miner is exposed during such shift, based on Section III.C., Feasibility, of this preamble, two NIOSH Reports of Investigations (Volkwein et al., NIOSH RI 9663, 2004, and NIOSH RI 9669, 2006), and requirements in 30 CFR 74.8. Therefore, pursuant to section 202(f) (30 U.S.C. 842(f)) and in accordance with section 101 (30 U.S.C. 811) of the Mine Act, the 1972 Joint Notice of Finding is rescinded.

Both approved CMDPSU and CPDM sampling devices are capable of accurately measuring levels of respirable coal mine dust at low levels of exposure. The minimum detection limits of the commercial CPDM and the CMDPSU are 0.2 mg/m^3 and 0.11 mg/m^3, respectively (Page et al., 2008). Therefore, the concern expressed by some commenters that the CPDM is not as accurate as the CMDPSU is not an issue.

Some commenters stated that the single full-shift provision violates section 101(a)(6) of the Mine Act because MSHA has neither grounded its 2010 proposed single shift finding on any evaluation or declaration of increased risk of material impairment of health resulting from the 1972 Joint Finding, nor any health benefits resulting from the implementation of the 2010 proposed finding.

Section 101(a)(6) of the Mine Act provides that, in promulgating mandatory health standards, the Secretary shall set standards which most adequately assure on the basis of the best available evidence that no miner will suffer material impairment of health from exposure to toxic materials or harmful physical agents over his working life. (30 U.S.C. 811(a)(6)(A)).

MSHA complied with section 101(a)(6) of the Mine Act by addressing, in the QRA to the proposed rule, the following three questions regarding the proposed single shift sampling provision: (1) Whether potential health effects associated with existing exposure conditions constitute material impairments to a miner's health or functional capacity; (2) whether existing exposure conditions place miners at a significant risk of incurring any of these material impairments; and (3) whether

the proposed rule has the potential to substantially reduce those risks.

MSHA's QRA for the proposed rule included an observation of single-shift dust concentrations by occupation and estimated the reduction in health risks under the proposed respirable dust standard and single shift sampling provisions. The QRA for the proposal showed that these two proposed provisions should reduce the risks of CWP, severe emphysema, and death from non-malignant respiratory disease (NMRD).

The QRA for the final rule is changed from the QRA for the proposed rule because the final rule includes respirable dust standards of 1.5 mg/m^3 for most miners and 0.5 mg/m^3 for intake air and part 90 miners, rather than the proposed standards of 1.0 mg/m^3 for most miners and 0.5 mg/m^3 for intake air and part 90 miners. The QRA to the final rule establishes that exposures at existing levels are associated with CWP, COPD including severe emphysema, and death due to NMRD. All of these outcomes constitute material impairments to a miner's health or functional capacity. In addition, the QRA to the final rule establishes that, in every exposure category, including clusters of occupational environments showing the lowest average dust concentrations, existing exposure conditions place miners at a significant risk of incurring each of the material impairments considered. Lastly, the QRA to the final rule establishes that the final rule is expected to reduce the risks of CWP, severe emphysema, and NMRD mortality attributable to respirable coal mine dust exposures. Additional discussion is in the QRA to the final rule, which is summarized in Section III.B, Quantitative Risk Assessment, of this preamble.

In addition, MSHA projects that there would be additional reductions in cases of CWP, PMF, severe emphysema, and NMRD resulting from the definition of normal production shift in the final rule. If the normal production shift definition had been in effect in 2009, the amount of dust on the samples would have been higher because of the higher levels of production during sampling. Lowering exposures from these higher levels to the levels in the final rule will result in additional benefits beyond those associated with the recorded sampling results. MSHA used additional data from the feasibility assessment to extrapolate the further impact of the normal production shift provision. Additional discussion of the benefits of the final rule is provided in Section V.B., Benefits, of this preamble.

Some commenters stated that MSHA must consider whether single-shift sampling provides any benefit to miner health, or reduces protections, or whether it simply makes compliance more difficult and costly without corresponding benefits. These commenters analyzed the 71,959 sample results in the MSHA sampling database for 2010 and concluded that, under the proposed single-shift sample provision, there would be a dramatic increase in both the number of required operator DO and ODO samples and the number of violations for exceeding the permissible level.

MSHA estimates that the number of noncompliance determinations under the final rule will be less than those in the proposal because of changes made in the final rule. The final rule does not require an operator to sample 24 hours a day, 7 days per week. It also does not include the proposed 1.0 mg/m^3 standard and the proposed provision that a noncompliance determination could be made on a single full-shift operator sample. Instead, the final rule provides that a noncompliance determination for operator sampling is based on either two or three valid representative operator samples depending on where the sample is taken, or the average of all operator samples collected during the sampling period. In addition, the feasible dust standards in the final rule are 1.5 mg/m^3 for underground and surface mines and 0.5 mg/m^3 for intake air at underground mines and part 90 miners. Additional discussion on the feasibility of the dust standards in the final rule is provided in Section III.C., Feasibility, of this preamble. Additional discussion on the estimate of the number of required corrective actions and determinations of noncompliance in the final rule are provided in Appendix A of the REA to this final rule.

Noncompliance determinations based on single full-shift MSHA sampling will improve working conditions for miners because mine operators will be compelled either to implement and maintain more effective dust controls or to take corrective actions to lower those dust concentrations that are shown to be in excess of the standard. To the extent that the use of single full-shift samples reduces a miner's cumulative exposure to respirable coal mine dust, compared to the current method of dust sampling, single full-shift samples will reduce a miner's risk of developing occupational respiratory disease. The health benefit that each miner receives from this rule will vary depending on each miner's cumulative exposure over the years worked and other associated factors, such as the percentage of quartz and rank of the coal. Yet, all miners, irrespective of their cumulative exposure to respirable coal mine dust, will benefit by having fewer shifts with overexposures to respirable coal mine dust over the course of each miner's working life, thus reducing their occupational hazard—the risk of developing simple CWP or PMF.

Some commenters stated that the single full-shift sampling provision fails to comply with the Mine Act and the Administrative Procedure Act (APA) because it is not based on the best or latest data and science, and that the use of dormant rulemaking and stale data is arbitrary and capricious. These commenters stated that much of the information relied upon by MSHA to support the proposed accuracy finding, risk assessment, and rule provisions is contained in the 1995 NIOSH Criteria Document and the 1996 Dust Advisory Committee Report. The commenters added that even though MSHA stated in the proposed rule that new science changed the basis of the 2000 proposal, there is no evidence that MSHA re-examined the Criteria Document or Dust Advisory Committee Report, or the updated information it used for this rulemaking, in light of the latest scientific research, such as: (a) 2006–2010 NIOSH prevalence and MSHA exposure data; (b) technological advances like the deployment of the new sampler; and (c) published studies targeting silica as the cause of the geographically limited new CWP cases.

As discussed in Section III.A., Health Effects, of this preamble, MSHA evaluated over 150 peer-reviewed papers as part of the Agency's health effects assessment (75 FR 64460, October 19, 2010), in addition to the data from MSHA's proposed rule on Plan Verification (68 FR 10784, March 6, 2003). The literature review focused on studies of morbidity and mortality among coal miners in many countries, including the United States, South Africa, Europe, Britain, China, Australia, Turkey, and Japan. This research evaluated the relationship between respirable coal mine dust exposure and the respiratory diseases it causes. The research reported on the etiology of these adverse respiratory diseases, including coal workers pneumoconiosis (CWP), the more advanced form of CWP—progressive massive fibrosis (PMF), and nonmalignant respiratory diseases (NMRD), such as chronic obstructive pulmonary disease (COPD) and emphysema. The fact that similar results have been found in decades of research, covering a wide variety of populations

at various respirable coal mine dust exposure levels and working conditions, supports the determination that exposure to coal mine dust is a significant causal factor in the development of respiratory disease in coal miners. The conclusion of MSHA's review of this research is that chronic coal mine dust exposure causes respiratory health effects including CWP, PMF, COPD, and emphysema.

In addition, some commenters stated the latest report of scientific research on coal mine dust related disease published by NIOSH (2011) should have been included in the proposed rule. As stated previously in this preamble, MSHA did not use the 2011 NIOSH document in the proposed rule's health effects assessment because it was unavailable when the proposed rule was published in October 2010, otherwise it would have been included as a secondary literature source. The conclusions of the NIOSH (2011) review of literature since 1995 concur with MSHA's conclusions based on the same literature.

Some commenters stated that prevalence of coal workers' pneumoconiosis was overstated in the proposed rule and, if it does occur, is due to silica exposure. MSHA addressed prevalence issues and associated comments in Section III.A. Health Effects of the preamble of this final rule.

Commenters also suggested that silica exposure, not coal dust exposure, is behind the increased incidence of CWP. According to the research, exposure to quartz does not change the risk of CWP due to exposure to respirable coal mine dust. MSHA has concluded that evidence the Agency reviewed and presented indicates that respirable coal mine dust exposure is an independent causative factor in the development of CWP and NMRD, including COPD and emphysema. Additional detailed discussion on this topic is located in Section III.A. Health Effects and section III.B. Quantitative Risk Assessment of this preamble. In addition, some commenters stated that MSHA used old data to estimate risk. The QRA used exposure data from 2004 through 2008 and estimated risks based on those data.

Some commenters stated that, in relying on NIOSH Reports RI 9663 (USDHHS, CDC, NIOSH, 2004) and RI 9669 (USDHHS, CDC, NIOSH, 2006) to declare the accuracy and precision of the CPDM, the accuracy, precision and bias calculations relied upon by MSHA are false, based on how they were determined. These commenters further stated that the accuracy and precision of the new sampler are proven false by the side-by-side analysis submitted by a commenter that sets forth actual accuracy and precision data. These issues are discussed in Section III.C. of this preamble (Feasibility).

The variability reported by one of the commenters was primarily due to large sample variability (due to uncontrolled variables) known to exist in field samples, even when two identical samplers are placed side-by-side. Because the experimental design did not control for the variability resulting from the samplers themselves, the commenter's analysis was not an appropriate estimate of the CPDM's precision. Instead, the data introduced by the commenter included variability potentially caused by significant dust gradients known to exist, sampler inlet location differences, and the nature of mine ventilation. MSHA recognizes that ventilation currents found in mines can produce widely varying results or seemingly poor precision between two identical side-by-side instruments, even though their inlets may be separated by only a few inches. To correctly estimate the precision of the CPDM, the experimental design must minimize the uncontrolled variables in the sampling.

MSHA concurs with NIOSH's assessment, included in its comments to the rulemaking record, that the data and analysis introduced by the commenter are based upon flawed experimental design and analysis methods. NIOSH has conducted the necessary scientific studies, whose results were published in a peer-reviewed document, which adequately demonstrated the CPDM to be an accurate instrument by meeting the long-standing NIOSH Accuracy Criterion. The 2011 NIOSH approval of the commercial instrument as meeting the CPDM requirements of 30 CFR part 74 is further evidence of the CPDM's readiness as a compliance sampling device for use in coal mines, in that it is approved as meeting the required accuracy.

Some of the commenters stated that MSHA failed to analyze alternatives to the proposed single sample provision such as whether specific occupations or specific regions or specific conditions should be addressed, rather than imposing new industry-wide mandates.

As discussed in Section III.A., Health Effects, of the preamble, occupational lung disease continues to occur at in coal mines throughout the country, not just in specific occupations, regions, or under specific conditions.

In any event, MSHA considered alternatives to the proposed single sample provision. Section 202(f) of the Mine Act expresses a preference for measurements ''over a single shift only.'' Eighteen months after the enactment of Mine Act, the ''average concentration'' of respirable dust in coal mines was to be measured over a single shift only. The Senate's Report of its bill provides a clear interpretation of section 202(f) when read with the statutory language. The Senate Committee stated:

> The committee * * * intends that the dust level not exceed the specified standard during any shift. It is the committee's intention that the average dust level at any job, for any miner in any active working place during each and every shift, shall be no greater than the standard.

One of the alternatives that MSHA specifically considered, and requested comments on, was whether taking single shift samples to determine noncompliance with the proposed respirable dust standard should apply only to MSHA inspector samples, or to both operator and MSHA samples (75 FR 64415). In response, commenters only recommended as an alternative MSHA's existing sampling method consisting of averaging five samples, which applies to both MSHA inspector sampling and mine operator sampling.

During development of the final rule, MSHA evaluated alternatives to determining compliance. With respect to determining noncompliance based on operator samples, MSHA reevaluated its enforcement strategy. MSHA determined that the proposal would have resulted in little time for an operator to correct noncompliance determinations based on an operator's single sample. The final rule ensures that an operator will take corrective action on a single overexposure and, therefore, provides protection similar to the protection that would have been provided under the proposal. Under the final rule, when a single full-shift operator sample meets or exceeds the ECV that corresponds to the applicable standard and particular sampling device used, the operator is made aware of a potential problem with the dust controls being used. Therefore, the final rule requires that an operator must make approved respiratory equipment available; immediately take corrective action; and record the corrective actions. These protections are similar to those that would have been required by the proposal in the event that an operator's single full-shift sample exceeded the ECV for the standard. Therefore, miners will be afforded protection from overexposures during a single shift. In addition, the final rule, like the proposal, will provide miners' with the additional protection afforded by MSHA's single sampling under § 72.800. Under the final rule, only MSHA inspector samples will be used

to make compliance determinations based on a single full-shift measurement.

D. 30 CFR Part 75—Mandatory Safety Standards—Underground Coal Mines

1. Section 75.325 Air Quantity

Final § 75.325(a)(2), like the proposal, requires that the quantity of air reaching the working face be determined at or near the face end of the line curtain, ventilation tubing, or other ventilation control device. It also requires that if the curtain, tubing, or device extends beyond the last row of permanent roof supports, the quantity of air reaching the working face be determined behind the line curtain or in the ventilation tubing at or near the last row of permanent supports. It further requires that when machine-mounted dust collectors are used in conjunction with blowing face ventilation systems, the quantity of air reaching the working face be determined with the dust collector turned off.

Several commenters supported the proposal stating that determining air measurement reaching the working face with the dust collector (scrubber) turned off will ensure that the minimum amount of air will ventilate the face. Other commenters stated that the dust collector (scrubber) should not be turned off because the scrubbers are a useful means of controlling dust and mitigating exposure. Some of these commenters stated that the proposal appeared to discourage the use of scrubbers or limit the effectiveness of scrubber technology.

A dust collector, or scrubber, is a supplemental dust control device that is used primarily to assist in filtering dust from the air. After filtering, the scrubber exhausts clean air out the back of the dust collector system. Although a scrubber is a useful means of controlling dust and mitigating exposure to dust, the required quantity of air in the working face areas must be maintained to ensure that the dust collector operates efficiently. More importantly, the required quantity of air is essential to protecting miners' health.

Underground coal mines need adequate quantities of air to ventilate the working face to dilute, render harmless, and carry away flammable, explosive, noxious and harmful gases, dusts, smoke, and fumes. Before mining begins in a working face, an operator must measure the amount of air coming into that area. To ensure that the working face is ventilated with the amount of air required by the approved ventilation plan, final paragraph (a)(2), like existing § 75.325(a)(2), states where the air quantity measurement at the face must be taken: At or near the face end of the line curtain, ventilation tubing, or other ventilation control device. However, if the curtain, tubing, or device extends beyond the last row of permanent roof supports, the quantity of air reaching the working face must be determined behind the line curtain or in the ventilation tubing at or near the last row of permanent supports.

The requirement in the final paragraph (a)(2) that the quantity of air reaching the working face must be determined with the dust collector turned off does not discourage the use of scrubbers or limit the effectiveness of scrubber technology. Rather, the requirement ensures that the required quantity of air reaches the working face. Some mine operators that are using blowing ventilation in the working face are measuring the air quantity in that area after the continuous mining machine is moved into the area and the dust collector system on the machine is turned on. This practice does not provide an accurate measurement of the air coming into the working face. When the dust collector system is on, it acts as a vacuum. It pulls air from behind the line curtain and recirculates air from the scrubber exhaust, which results in a higher air quantity measurement in the working face than the actual quantity of air reaching the area. Therefore, the final paragraph (a)(2) requires mine operators who use a dust collector system in conjunction with blowing face ventilation systems to determine the air quantity with the dust collector turned off. This provision ensures that the mine operator gets a more accurate air quantity reading thereby providing better protection for the miners.

2. Section 75.332 Working Sections and Working Places

Final § 75.332(a)(1) is unchanged from existing § 75.332(a)(1). Proposed § 75.332(a)(1) would have revised existing § 75.332(a)(1) to require that each ''MMU'' on each working section and each area where mechanized mining equipment is being installed or removed, be ventilated by a separate split of intake air directed by overcasts, undercasts or other permanent ventilation controls. During the public comment period, MSHA solicited comment on the impact, if any, of proposed paragraph (a)(1) on current mining operations, any suggested alternatives, and how the alternatives would be protective of miners. Many commenters expressed economic and feasibility concerns with requiring that each MMU be ventilated by a separate split of intake air directed by overcasts, undercasts or other permanent ventilation controls. The majority of commenters did not support the proposal because it would prohibit an operator from using a single intake airway to provide intake air to two mechanized mining units. Many stated, for example, that operators would no longer be able to split intake air inby the section loading point to provide intake air to two MMUs. This practice, referred to as ''fish-tail'' ventilation, is used by numerous operators. Several commenters stated that proposed § 75.332(a)(1) would also eliminate the practice of two MMUs sharing a common section loading point.

Some commenters supported the proposed § 75.332(a)(1) requirement that a separate split of intake air be provided to each MMU. These commenters stated proposed § 75.332(a)(1) would better protect the health and safety of the miners working on the MMU by ensuring that fresh, uncontaminated air is provided to each MMU.

MSHA evaluated all the comments and determined not to include the proposed requirement in the final rule. MSHA does not intend to potentially restrict the use of a single intake airway to provide intake air to two mechanized mining units or eliminate the practice of two MMUs sharing a common section loading point. Therefore, existing § 75.332(a)(2) remains unchanged. However, in an effort to ensure miners are protected from exposures to excessive concentrations of respirable coal mine dust, the final rule establishes as ODOs, as defined in final § 70.2, all face haulage equipment operators who are on sections that use split ventilation (fish-tail ventilation) to provide intake air to two MMUs. Additional discussion on ODOs is located elsewhere in this preamble under §§ 70.201 and 70.208.

2. Section 75.350 Belt Air Course Ventilation

Final § 75.350(b)(3)(i)(A), like the proposal, includes the same requirement in existing § 75.350(b)(3)(i) that the average concentration of respirable dust in the belt air course, when used as a section intake air course, be maintained at or below 1.0 mg/m^3.

Final § 75.350(b)(3)(i)(B) is changed from the proposal. It requires that as of August 1, 2016, the average concentration of respirable dust in the belt air course, when used as a section intake air course, be maintained at or below 0.5 mg/m^3.

The proposal would have required the 0.5 mg/m^3 respirable dust standard be implemented 6 months after the effective date of the final rule. The

August 1, 2016 compliance date in final paragraph (b)(3)(i)(B) is 24 months after the effective date of the final rule and allows a mine operator adequate time to comply with the dust standard. It is also consistent with the 24-month period for other respirable dust standards in the final rule. MSHA did not receive any comments on the proposed 6-month period.

Several commenters supported the proposed 0.5 mg/m³ standard because of the large amount of dust generated and directed onto the working face. One commenter suggested reducing the standard to below 0.5 mg/m³, but did not recommend a specific level.

MSHA has historically required that a lower dust standard be maintained in the belt entry when belt air is used as a source of intake air. Maintaining the dust concentration in the belt entry at or below 0.5 mg/m³ when belt air is used as a source of intake air ensures that relatively clean air is used to ventilate the face where major dust generating sources are located. This will improve health protection for miners. Also, maintaining the lower dust level in the belt entry by using available engineering controls makes it more likely that an operator can maintain compliance with respirable dust standards in the MMU. The relatively clean air will supplement the intake air to the face which will further dilute the respirable dust levels generated in the face areas.

Final § 75.350(b)(3)(ii), like the proposal, makes a conforming change to existing § 75.350(b)(3)(ii). It requires that where miners on the working section are on a reduced standard below that specified in § 75.350(b)(3)(i), the average concentration of respirable dust in the belt entry must be at or below the lowest applicable standard on that section. Final paragraph (b)(3)(ii) replaces ''1.0 mg/m³'' in the existing standard with ''that specified in § 75.350(b)(3)(i)'' because the standard changes from 1.0 mg/m³ to 0.5 mg/m³ after 24 months. MSHA did not receive any comments on the proposal.

3. Section 75.362 On-Shift Examinations

Final § 75.362(a)(2) is similar to the proposal. Like the proposal, § 75.362(a)(2) requires that a person designated by the operator conduct an examination and record the results and the corrective actions taken to assure compliance with the respirable dust control parameters specified in the approved mine ventilation plan. However, § 75.362(a)(2) clarifies that in those instances when a shift change is accomplished without an interruption in production on a section, the examination must be made anytime within 1 hour after the shift change. The proposal would have required that the examination be made anytime within 1 hour of the shift change. Final paragraph (a)(2) clarifies that, when ''hot-seating,'' an on-shift examination must be done after the shift change so that the miners who are working after the shift change know that the dust controls are in place and working properly.

Final paragraph (a)(2), like the proposal, further requires that in those instances when there is an interruption in production during the shift change, the examination be made before production begins on a section. It also requires that deficiencies in dust controls be corrected before production begins or resumes.

Final paragraph (a)(2), like the proposal, requires that the examination include: Air quantities and velocities; water pressures and flow rates; excessive leakage in the water delivery system; water spray numbers and orientations; section ventilation and control device placement; roof bolting machine dust collector vacuum levels; scrubber air flow rate; work practices required by the ventilation plan; and any other dust suppression measures. In the final rule, MSHA reorganized the paragraph to clarify that the examination requires that all listed parameters must be measured or observed and the results recorded.

Lastly, paragraph (a)(2) in the final rule states that measurements of the air velocity and quantity, water pressure and flow rates are not required if continuous monitoring of these controls is used and indicates that the dust controls are functioning properly.

Final § 75.362(g)(2)(i) and (ii), like the proposal, requires that the certified person directing the on-shift examination to assure compliance with the respirable dust control parameters specified in the approved mine ventilation plan must certify by initials, date, and time on a board maintained at the section load-out or similar location showing that the examination was made prior to resuming production; and verify, by initials and date, the record of the results of the on-shift examination required under paragraph (a)(2) to assure compliance with the respirable dust control parameters specified in the mine ventilation plan. It further requires that the verification must be made no later than the end of the shift for which the examination was made.

Final § 75.362(g)(3), like the proposal, requires that the mine foreman or equivalent mine official countersign each examination record required under paragraph (a)(2) after it is verified by the certified person under paragraph (g)(2)(ii), and no later than the end of the mine foreman's or equivalent mine official's next regularly scheduled working shift. It further requires that the record must be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration.

Final § 75.362(g)(4), like the proposal, requires that records must be retained at a surface location at the mine for at least 1 year and must be made available for inspection by authorized representatives of the Secretary and the representative of miners.

One commenter stated that requiring mine management officials to countersign examination records would hold them accountable and emphasize the seriousness of these critical health protections. Another commenter stated that it was unnecessary to require every on-shift respirable dust control examination to be entered in a record book, signed and countersigned each shift by a certified person and the mine official. The commenter added that the rationale for requiring the records is no longer valid, since the CPDM records dust concentration data on the device.

In response to commenters' concerns, MSHA notes that an on-shift record of the results and corrective actions taken to assure compliance with the respirable dust control parameters specified in the approved mine ventilation plan is vital to protecting miners' health. The record assists a mine operator and MSHA in evaluating whether dust control parameters approved in the mine ventilation plan continue to be effective in controlling miners' respirable dust exposure. This is particularly important since the final rule does not require 24/7 continuous sampling of the MMU. The record provides a mine operator with an early warning of deteriorating dust controls. This will enable the mine operator to take corrective action before dust controls fail.

Paragraph (a)(2) in the final rule is consistent with the Dust Advisory Committee's unanimous recommendations that a mine operator should record the results of on-shift examinations and that MSHA should examine all recorded operational data and information on miner exposure and dust control measures as part of MSHA's ongoing and six-month review of the ventilation plan.

Similarly, final rule paragraphs (g)(2)(i) and (ii) ensure that the on-shift examinations are being conducted and that the certified person and other mine officials are aware of the examination

results and corrective action taken. The requirement to post a certification on a board maintained at the section load-out or similar location, under paragraph (g)(2)(i), allows miners on the section to confirm easily that the required examination was made in a timely manner.

In addition, verification by the certified person of the record of the examination results and subsequent countersigning of that record by a mine foreman or equivalent mine official, under paragraphs (g)(2)(ii) and (g)(3), emphasize accountability and ensure that a person with authority is informed and can implement any necessary changes to dust control parameters to maintain compliance with respirable dust standards. Verification helps ensure that an operator is complying with the provisions of the dust control parameters of the approved ventilation plan on all production shifts, not just when respirable dust samples are collected. This provides miners with some assurance that if the plan parameters control respirable dust when samples are being collected, then they will control respirable dust when samples are not being collected.

The requirement in final paragraph (g)(3) that the examination and corrective action record be kept in a secure book that is not susceptible to alteration or recorded electronically in a secure computer system will provide a history of the conditions documented at the mine. It will alert miners and mine management to recurring problems or conditions that need to be corrected, and corrective actions taken. The final rule allows records to be kept in the traditional manner in a secure book, or to be kept electronically in a secure manner. To ensure their integrity, the records must be maintained so that they are not susceptible to alteration. To satisfy the requirements of final paragraph (g)(3), electronically stored records are permitted provided that they are able to capture the information and signatures required, and are accessible to the representative of miners and MSHA. Electronic records meeting these criteria are as practical and as reliable as traditional records. Once records are properly completed and reviewed, mine management can use them to evaluate whether dust control parameters are adequate or need appropriate adjustments; whether the same conditions or problems, if any, are recurring; and whether corrective measures are effective.

Finally, final paragraph (g)(3) is consistent with the Dust Advisory Committee's unanimous recommendation that mine operators should conduct periodic reviews of the adequacy of the dust control parameters stipulated in the mine ventilation plan and make modifications necessary to achieve and maintain compliance with the dust standard.

Final paragraph (g)(4) is consistent with recordkeeping provisions in other MSHA standards. The one-year retention period is sufficient to allow for MSHA's evaluation during several inspections and inspection by miners' representatives. In addition, it is consistent with the Dust Advisory Committee's unanimous recommendation that recordkeeping be required as a part of on-shift examinations under § 75.362. The Committee explained that the results of the on-shift examinations were informative and should be recorded and shared with workers who have been properly trained concerning their interpretation and importance. Furthermore, the Committee unanimously recommended that MSHA inspections should include: A review of recorded parameter data; dust control measures observed in operation; and input from miners regarding whether the dust controls and coal production are representative of usual operations.

4. Section 75.371 Mine Ventilation Plan; Contents

Final § 75.371(f), like the proposal, requires the operator to specify in the mine ventilation plan for each MMU, the section and face ventilation systems used and the minimum quantity of air that will be delivered to the working section for each MMU, including drawings illustrating how each system is used, and a description of each dust suppression system used on equipment, identified by make and model, on each working section, including: (1) The number, types, location, orientation, operating pressure, and flow rate of operating sprays; (2) the maximum distance that ventilation control devices will be installed from each working face when mining or installing roof bolts in entries and crosscuts; (3) procedures for maintaining the roof bolting machine dust collection system in approved condition; and (4) recommended best work practices for equipment operators to minimize dust exposures. A nonsubstantive change was made in final paragraph (f)(3) to replace ''roof bolter'' with ''roof bolting machine.''

Final § 75.371(j) is unchanged from the proposal. It requires the operator to include in the mine ventilation plan the operating volume of machine mounted dust collectors or diffuser fans, if used (see § 75.325(a)(3)), including the type and size of dust collector screen used, and a description of the procedures to maintain dust collectors used on equipment.

Final § 75.371(t) is the same as the proposal, except for a conforming change. It requires that the operator specify locations where samples for ''designated areas'' will be collected, including the specific location of each sampling device, and the respirable dust control measures used at the dust generating sources for these locations (see §§ 70.207 and 70.209 of this chapter). Final paragraph (t) includes a reference to § 70.207 as a conforming change from the proposal. Except for the conforming change, final paragraph (t) is the same as existing § 75.371(t).

Some commenters generally supported the additional information required to be included in the approved mine ventilation plan. One commenter suggested that the operator should determine the best dust control methods rather than have MSHA impose unrealistic requirements that do not take into account different conditions at the mine.

In response to commenters, MSHA notes that it is each mine operator's responsibility to determine the best measures to control respirable dust at his mine. The final rule does not limit the operator's flexibility to make that determination or appropriate adjustments to mine ventilation and dust suppression systems for MMUs based on the conditions at the mine. The additional information required under the final rule will eliminate ambiguities in the mine ventilation plan requirements, assist miners in determining the types of dust controls being used, assist on-shift mine examiners in conducting adequate on-shift examinations of the dust controls, and allow operators, miners, and MSHA to observe and measure specific dust control parameters to better evaluate the effectiveness of dust control systems. In addition, if a respirable dust standard were exceeded, the operator and MSHA would be in a more advantageous position to determine what areas of dust control should be evaluated and adjusted to provide miners with protection from exposures to hazardous dust levels on each shift.

Final § 75.371(f), (j), and (t) are consistent with the recommendations of the 1992 Report of the Coal Mine Respirable Dust Task Group which identified insufficient detail and specificity as a major factor that can adversely affect the quality of dust control plans. In addition, final paragraphs (f)(1) through (3) are consistent with the recommendations of an enforcement initiative conducted by

MSHA's Respirable Dust Emphasis Teams, which focused on miners' exposures to respirable coal mine dust at selected underground coal mines as part of the Agency's Comprehensive Black Lung Initiative to End Black Lung—Act Now! MSHA determined that due to ambiguities in ventilation plans, miners had trouble determining the types of dust controls to use and how to evaluate their effectiveness. After reviewing results from this initiative, MSHA concluded that mine operators needed to include in mine ventilation plans: The type of water sprays and water volume at the minimum pressure to be used; orifice size; spray pattern; location where each type of spray will be used; and minimum number of sprays that will be maintained. MSHA also recommended that the ventilation plans include the location of curtains where roof bolting is being performed, since the distance from the face is important in the effectiveness of ventilation, and guidance was provided to mine operators on the proper maintenance of roof bolting machine dust collectors.

E. 30 CFR Part 90—Mandatory Health Standards—Coal Miners Who Have Evidence of the Development of Pneumoconiosis

1. Section 90.1 Scope

Final § 90.1, like the proposal, states that this part 90 establishes the option of miners who are employed at coal mines and who have evidence of the development of pneumoconiosis to work in an area of a mine where the average concentration of respirable dust in the mine atmosphere during each shift is continuously maintained at or below the standard as specified in § 90.100. It also states that the rule sets forth procedures for miners to exercise this option, and establishes the right of miners to retain their regular rate of pay and receive wage increases and that the rule also sets forth the operator's obligations, including respirable dust sampling for part 90 miners. Additionally, it states that this part 90 is promulgated pursuant to section 101 of the Act and supersedes section 203(b) of the Federal Mine Safety and Health Act of 1977, as amended.

Final § 90.1 revises existing § 90.1 by including surface coal miners. It extends to miners at all coal mines who have evidence of the development of pneumoconiosis the option to work in an area of a mine where the average concentration of respirable dust in the mine atmosphere during each shift is continuously maintained at or below the standard as specified in § 90.100. Miners at surface coal mines, as well as miners at underground mines, are at risk of developing chronic lung disease as a result of exposure to respirable coal mine dust. In the absence of medical monitoring and intervention, a miner may continue to be exposed, allowing the disease to progress so that the miner may suffer material impairment of health or functional capacity.

Commenters supported extending the scope of part 90 to surface coal miners.

2. Section 90.2 Definitions

The final rule does not include the proposed definitions for *Weekly Accumulated Exposure* and *Weekly Permissible Accumulated Exposure* that would have applied when operators use a CPDM to collect respirable dust samples under proposed part 90. These two definitions are not needed since the related proposed sampling requirements are not included in the final rule. In addition, final part 90 does not include the existing definitions for ''surface work area of an underground coal mine'' and ''underground coal mine'' as those terms are no longer used.

Act

The final rule, like the proposal, defines Act as the Federal Mine Safety and Health Act of 1977, Public Law 91–173, as amended by Public Law 95–164 and Public Law 109–236.

Active Workings

Final § 90.2, like the proposal, makes no change to the existing definition of active workings.

Approved Sampling Device

The final § 90.2 definition, like the proposal, is the same as the final part 70 definition discussed elsewhere in the preamble related to final § 70.2.

Certified Person

Final § 90.2 makes nonsubstantive changes to clarify the existing definition of certified person. It does not include the parenthetical text following the references to §§ 90.202 and 90.203.

Coal Mine Dust Personal Sampler Unit (CMDPSU)

The final § 90.2 definition, like the proposal, is the same as the final part 70 definition discussed elsewhere in the preamble related to final § 70.2.

Concentration

Final § 90.2, like the proposal, makes no change to the existing definition of concentration.

Continuous Personal Dust Monitor (CPDM)

The final § 90.2 definition, like the proposal, is the same as the final part 70 definition discussed elsewhere in the preamble related to final § 70.2.

District Manager

Final § 90.2, like the proposal, makes no change to the existing definition of District Manager.

Equivalent Concentration

The final § 90.2 definition is changed from the proposal. It is the same as the final part 70 definition discussed elsewhere in the preamble related to final § 70.2.

Mechanized Mining Unit (MMU)

The final definition of MMU is clarified from the proposal. It is the same as the final part 70 definition discussed elsewhere in the preamble related to final § 70.2.

MRE Instrument

Final § 90.2, like the proposal, makes no change to the existing definition of MRE instrument.

MSHA

Final § 90.2, like the proposal, makes no change to the existing definition of MSHA.

Normal Work Duties

Final § 90.2, like the proposal, makes no change to the existing definition of normal work duties.

Part 90 Miner

The final definition of part 90 miner is substantially the same as the proposal. Like the proposal, the definition applies to a miner employed at a coal mine and replaces the 1.0 mg/m^3 standard in the existing definition with ''the applicable standard.'' This change reflects that, under final § 90.100, the respirable dust standard changes from 1.0 mg/m^3 to 0.5 mg/m^3 24 months after the effective date of the rule.

Quartz

The final definition of quartz is changed from the proposal. It is the same as the final part 70 definition discussed elsewhere in the preamble related to final § 70.2.

Representative Sample

The final rule defines a representative sample as a respirable dust sample, expressed as an equivalent concentration, that reflects typical dust concentration levels in the working environment of the part 90 miner when

the miner is performing normal work duties.

The final definition is identical to the proposed definition except that the language, ''expressed as an equivalent concentration'' is added. The added text clarifies that each respirable dust sample measurement must be converted to a concentration that is equivalent to one measured by the MRE instrument. MSHA did not receive comment on the proposed definition.

Under the final rule, MSHA would consider ''typical dust concentration levels'' to exist during sampling if they approximate and are characteristic of the part 90 miner's dust concentration levels during periods of non-sampling. Samples would be required to be taken while the part 90 miner performs ''normal work duties,'' as that term is defined in § 90.2. A sample that is taken when the part 90 miner is engaged in an atypical task, or some other activity that does not mirror the duties that the miner performs on a routine, day-to-day basis in the part 90 miner's job classification at the mine, would not be considered a representative sample of the part 90 miner. The final definition ensures that operators conduct respirable dust sampling when working conditions and work duties accurately represent part 90 miners' dust exposures. Ensuring that dust samples for part 90 miners are representative of their exposures is important for these miners, as they already have medical evidence of the development of pneumoconiosis. The final definition of representative samples will provide protection for miners' health by allowing MSHA to objectively evaluate the functioning of operators' dust controls and the adequacy of operators' approved plans.

Respirable Dust

Final § 90.2 makes nonsubstantive changes to the existing definition of respirable dust. It is the same as the final part 70 definition discussed elsewhere in the preamble related to final § 70.2.

Secretary

Final § 90.2 makes nonsubstantive changes to the existing definition of Secretary. It is the same as the final part 70 definition discussed elsewhere in the preamble related to final § 70.2.

Secretary of Health and Human Services

Final § 90.2, like the proposal, makes no change to the existing definition of Secretary of Health and Human Services.

Transfer

Final § 90.2 makes a nonsubstantive change to the existing definition of transfer. It uses the abbreviation MMU for mechanized mining unit.

Valid Respirable Dust Sample

For clarification, the final rule revises the definition under existing § 90.2 for a *valid respirable dust sample* to mean a respirable dust sample collected and submitted as required by this part, including any sample for which the data were electronically transmitted to MSHA, and not voided by MSHA.

The final definition adds language to clarify that for CPDM samples, the data files are ''electronically'' transmitted to MSHA, and not physically transmitted like samples collected with the CMDPSU. The proposed rule did not include this clarification.

3. Section 90.3 Part 90 Option; Notice of Eligibility; Exercise of Option

Final § 90.3(a), like the proposal, requires that any miner employed at a coal mine who, in the judgment of the Secretary of HHS, has evidence of the development of pneumoconiosis based on a chest X-ray, read and classified in the manner prescribed by the Secretary of HHS, or based on other medical examinations must be afforded the option to work in an area of a mine where the average concentration of respirable dust in the mine atmosphere during each shift to which that miner is exposed is continuously maintained at or below the standard. It further requires that each of these miners be notified in writing of eligibility to exercise the option.

Final paragraph (a) revises existing § 90.3(a) by extending to surface coal miners the option to work in an area of a mine where the average concentration of respirable dust in the mine atmosphere during each shift is continuously maintained at or below the standard. As explained in the preamble discussion of § 90.1, miners at surface coal mines, as well as miners at underground coal mines, are at risk of developing chronic lung disease as a result of exposure to respirable coal mine dust. In addition, it replaces the ''1.0 milligrams per cubic meter of air'' standard with ''the applicable standard.'' This change reflects that, under final § 90.100, the respirable dust standard changes from 1.0 mg/m^3 to 0.5 mg/m^3 24 months after the effective date of the rule.

Final § 90.3(b) is the same as existing § 90.3(b). It requires that any miner who is a section 203(b) miner on January 31, 1981, will be a part 90 miner on February 1, 1981, entitled to full rights under this part to retention of pay rate, future actual wage increases, and future work assignment, shift, and respirable dust protection. The proposal did not include any changes to existing § 90.3(b).

Final § 90.3(c) is the same as existing § 90.3(c). It requires that any part 90 miner who is transferred to a position at the same or another coal mine will remain a part 90 miner entitled to full rights under this part at the new work assignment. The proposal did not include any changes to existing § 90.3(c).

Final § 90.3(d), like the proposal, requires that the option to work in a low dust area of the mine may be exercised for the first time by any miner employed at a coal mine who was eligible for the option under the old section 203(b) program (36 FR 20601, October 27, 1971, precursor to the current part 90 program), or is eligible for the option under this part by signing and dating the Exercise of Option Form and mailing the form to the Chief, Division of Health, Coal Mine Safety and Health, MSHA, 1100 Wilson Boulevard, Arlington, Virginia 22209. Final paragraph (d) includes a conforming change to existing § 90.3(d) to extend the part 90 transfer option to surface coal miners. It also makes a nonsubstantive change from the proposal by including ''(36 FR 20601, October 27, 1971),'' which is the citation to the section 203(b) program that is stated in the existing definition.

Final § 90.3(e), like the proposal, requires that the option to work in a low dust area of the mine may be re-exercised by any miner employed at a coal mine who exercised the option under the old section 203(b) program (36 FR 20601, October 27, 1971), or exercised the option under this part by sending a written request to the Chief, Division of Health, Coal Mine Safety and Health, MSHA, 1100 Wilson Boulevard, Arlington, Virginia 22209. It further requires that the request should include the name and address of the mine and operator where the miner is employed. Final paragraph (e) includes a conforming change to existing § 90.3(e) to extend the part 90 transfer option to surface coal miners. It also makes a nonsubstantive change from the proposal by including ''(36 FR 20601, October 27, 1971),'' which is the citation to the section 203(b) program that is stated in the existing definition.

Final § 90.3(f) is substantially the same as existing § 90.3(f). It states that no operator shall require from a miner a copy of the medical information received from the Secretary or Secretary

of HHS. The proposal did not include any changes to existing § 90.3(f). Final paragraph (f) includes a nonsubstantive change. It uses the abbreviation HHS.

A few commenters recommended that mandatory transfers to less dusty areas of the mine be required for all part 90 miners. Some commenters supported mandatory part 90 transfers for miners diagnosed with more severe CWP (e.g., Category 2). However, MSHA recognizes that a mandatory transfer program would violate the confidentiality of the medical monitoring program. It would reveal information about a miner's medical condition and would have a chilling effect on a miners' participation in the medical monitoring program. Consequently, the final rule does not include a mandatory transfer provision.

Some commenters recommended that miners who have developed occupational chronic obstructive pulmonary disease (COPD) due to coal mine dust exposure be included as part 90 miners with the transfer option since it would reduce the risk of worsening their lung disease.

While the final rule includes a new requirement for spirometry, it continues to afford the part 90 transfer option only to coal miners who have been diagnosed with pneumoconiosis based on x-ray evidence. Administration of chest x-rays and the criteria used in diagnosing pneumoconiosis are governed by HHS regulations under 42 CFR part 37. The addition of spirometry examinations will provide miners with supplementary information concerning the health of their lungs on which to base future potential occupational exposures. With this information, for example, miners may choose to bid on less dusty jobs or modify their work practices to minimize coal mine dust exposures.

4. Section 90.100 Respirable Dust Standard

Final § 90.100, is almost identical to proposed § 90.100. It requires that after the 20th calendar day following receipt of notification from MSHA that a part 90 miner is employed at the mine, the operator must continuously maintain the average concentration of respirable dust in the mine atmosphere during each shift to which the part 90 miner in the active workings of the mine is exposed, as measured with an approved sampling device and expressed in terms of an equivalent concentration, at or below: (a) 1.0 milligrams of respirable dust per cubic meter of air (mg/m^3), and (b) 0.5 mg/m^3 as of August 1, 2016.

Final § 90.100 makes a nonsubstantive change from proposed § 90.100. The term ''expressed,'' which was inadvertently omitted from the proposal, is added.

Final paragraph (b) replaces the proposed 6-month phase-in period with an implementation date that is 24 months after the effective date of the final rule. This is consistent with the time periods in final §§ 70.100(b) and 71.100(b).

The 0.5 mg/m^3 standard provides protection for part 90 miners when coupled with the final rule's requirements that the sampling devices remain operational during the part 90 miner's entire shift, including time spent performing normal work duties and traveling to and from the assigned work location, and that the required samples are representative of the miner's exposure while performing normal work duties. The final 0.5 mg/m^3 standard will ensure that part 90 miners, who are already suffering from decreased lung function, are adequately protected. In addition, most operators are already in compliance with the final standard and MSHA has concluded that the final standard is feasible. The feasibility of the 0.5 mg/m^3 standard is discussed in more detail elsewhere in this preamble under Section III. C., concerning the Technological Feasibility of Achieving the Required Dust Standards. Commenters supported the proposed standard.

5. Section 90.101 Respirable Dust Standard When Quartz Is Present

Final § 90.101(a), like proposed § 90.101(a), requires that each operator continuously maintain the average concentration of respirable quartz in the mine atmosphere during each shift to which a part 90 miner in the active workings of each mine is exposed at or below 0.1 mg/m^3 (100 micrograms per cubic meter or μg/m^3) as measured with an approved sampling device and expressed in terms of an equivalent concentration.

Final paragraph (b), like the proposed rule, requires that when the mine atmosphere of the active workings where the part 90 miner performs his or her normal work duties exceeds 100 μg/m^3 of respirable quartz dust, the operator must continuously maintain the average concentration of respirable dust in the mine atmosphere during each shift to which a part 90 miner is exposed as measured with an approved sampling device and expressed in terms of an equivalent concentration at or below the applicable standard. It also states that the applicable standard is computed by dividing the percent of quartz into the number 10 and that application of this formula must not result in an applicable standard that exceeds the standard specified in § 90.100.

Final paragraphs (a) and (b) include a nonsubstantive change and add the term ''expressed'' which was inadvertently omitted from the proposal, but is contained in existing § 90.101.

Final § 90.101, like proposed § 90.101, includes an example of how a reduced standard is calculated, based on the equivalent concentration of 0.5 mg/m^3 dust standard. The example states that: Suppose a valid respirable dust sample with an equivalent concentration of 0.50 mg/m^3 contains 25.6% of quartz dust, which corresponds to a quartz concentration of 128 μg/m^3. The average concentration of respirable dust in the mine atmosphere associated with that part 90 miner must be maintained on each shift at or below 0.4 mg/m^3 (10/25.6% = 0.4 mg/m^3).

Commenters supported the proposed standard.

6. Section 90.102 Transfer; Notice

Final § 90.102(a), like the proposal, requires that whenever a part 90 miner is transferred in order to meet the standard (§ 90.100, the respirable dust standard or § 90.101, the respirable dust standard when quartz is present), the operator must transfer the miner to an existing position at the same coal mine on the same shift or shift rotation on which the miner was employed immediately before the transfer. It further provides that the operator may transfer a part 90 miner to a different coal mine, a newly-created position or a position on a different shift or shift rotation if the miner agrees in writing to the transfer. It states that the requirements of this paragraph do not apply when the respirable dust concentration in a part 90 miner's work position complies with the standard but circumstances, such as reductions in workforce or changes in operational status, require a change in the miner's job or shift assignment.

Final paragraph (a) revises existing § 90.102(a) by establishing an exception to the transfer requirement. The exception is consistent with existing Agency policy, which is to accommodate an operator's good faith need to reassign a part 90 miner when unforeseen circumstances and unexpected mine or market conditions arise. The exception provides a mine operator with flexibility with respect to the assignment of a part 90 miner without compromising the objectives of the part 90 program.

The Agency received one comment on proposed § 90.102 in which the commenter expressed general support for the standard.

Final § 90.102(b) is unchanged from the proposal and substantially the same as existing § 90.102(b). It requires that on or before the 20th calendar day following receipt of notification from MSHA that a part 90 miner is employed at the mine, the operator must give the District Manager written notice of the occupation and, if applicable, the MMU unit to which the part 90 miner will be assigned on the 21st calendar day following receipt of the notification from MSHA. The proposal did not include any substantive change to existing § 90.102(b). Like the proposal, final paragraph (b) makes nonsubstantive changes to existing § 90.102(b).

Final § 90.102(c) is unchanged from the proposal and substantially the same as existing § 90.102(c). It requires that after the 20th calendar day following receipt of notification from MSHA that a part 90 miner is employed at the mine, the operator must give the District Manager written notice before any transfer of a part 90 miner. It further requires that this notice include the scheduled date of the transfer. The proposal did not include any substantive change to existing § 90.102(c). Final paragraph (c) includes a nonsubstantive change to existing § 90.102(c).

7. Section 90.103 Compensation

Final § 90.103(a) is unchanged from the proposal and substantially the same as existing § 90.103(a). It requires that the operator compensate each part 90 miner at not less than the regular rate of pay received by that miner immediately before exercising the option under § 90.3. The proposal did not include any substantive change to existing § 90.103(a). Final paragraph (a) makes a nonsubstantive change to existing § 90.103(a). It does not include the parenthetical text following the reference to § 90.3.

Final § 90.103(b) is unchanged from the proposal. It requires that, whenever a part 90 miner is transferred, the operator must compensate the miner at not less than the regular rate of pay received by that miner immediately before the transfer. The proposal did not include any changes to existing § 90.103(b).

Final § 90.103(c), like the proposal, requires that once a miner has been placed in a position in compliance with the provisions of part 90, paragraphs (a) and (b) of this section do not apply when the part 90 miner initiates and accepts a change in work assignment for reasons of job preference.

One commenter generally expressed support for the proposal.

Final paragraph (c) is consistent with MSHA's longstanding policy of not applying the part 90 miner compensation provisions under the circumstances where, once a miner has been placed in a position that complies with the provisions in part 90, the part 90 miner on his own initiative applies for and accepts another job in a work area with an average respirable dust concentration at or below the part 90 respirable dust standard. As an example: A miner exercised the part 90 option when the miner's job paid $20 per hour. If the operator keeps the part 90 miner in the same work position because compliance with the part 90 respirable dust standard is maintained, or if the operator transfers the miner to a new work position to achieve compliance with part 90, the miner cannot be paid less than $20 per hour—the amount paid immediately before exercising the option. However, once the operator has placed the miner in a position that complies with the provisions of part 90, if the miner prefers a different job and initiates and accepts a job change that only pays $17 per hour, the miner would receive $17 per hour in the new position. Under final paragraph (c), a miner-initiated job change to a position that is at or below the part 90 respirable dust standard would not constitute a waiver of other part 90 rights. In the new job, the miner would retain part 90 status and all other requirements of part 90 continue in effect, including the operator's obligations to continuously maintain the part 90 respirable dust standard and to give MSHA notice whenever the miner's work assignment changes or lasts longer than one shift.

Final § 90.103(d) is unchanged from the proposal. It is redesignated from and is the same as existing § 90.103(c). It requires that the operator compensate each miner who is a section 203(b) miner on January 31, 1981, at not less than the regular rate of pay that the miner is required to receive under section 203(b) of the Act immediately before the effective date of this part. The proposal did not include any changes to existing § 90.103(c).

Final § 90.103(e) is unchanged from the proposal. It is redesignated from and is substantially the same as existing § 90.103(d). It requires that, in addition to the compensation required to be paid under paragraphs (a), (b), and (d) of this section, the operator must pay each part 90 miner the actual wage increases that accrue to the classification to which the miner is assigned. Final paragraph (e), like the proposal, includes a conforming change referring to paragraphs (a), (b), and (d) of this section.

Final § 90.103(f), like the proposal, is redesignated from and is substantially similar to existing § 90.103(e). It requires that if a miner is temporarily employed in an occupation other than his or her regular work classification for two months or more before exercising the option under § 90.3, the miner's regular rate of pay for purposes of paragraphs (a) and (b) of this section is the higher of the temporary or regular rates of pay. If the temporary assignment is for less than two months, the operator may pay the part 90 miner at his or her regular work classification rate regardless of the temporary wage rate. The proposal did not include any changes to existing § 90.103(e). Final paragraph (e) includes two nonsubstantive changes. It deletes the parenthetical text following the reference to § 90.3 and changes the word ''paragraph'' in the proposal to ''paragraphs''.

Final § 90.103(g)(1) and (2) is substantially the same as the proposal and is redesignated from existing § 90.103(f)(1) and (2). It requires that if a part 90 miner is transferred, and the Secretary subsequently notifies the miner that notice of the miner's eligibility to exercise the part 90 option was incorrect, the operator must retain the affected miner in the current position to which the miner is assigned and continue to pay the affected miner the rate of pay provided in paragraphs (a), (b), (d), and (e) of this section, until:

(1) The affected miner and operator agree in writing to a position with pay at not less than the regular rate of pay for that occupation; or

(2) A position is available at the same coal mine in both the same occupation and on the same shift on which the miner was employed immediately before exercising the option under § 90.3 or under the old section 203(b) program (36 FR 20601, October 27, 1971).

(i) When such a position is available, the operator shall offer the available position in writing to the affected miner with pay at not less than the regular rate of pay for that occupation.

(ii) If the affected miner accepts the available position in writing, the operator shall implement the miner's reassignment upon notice of the miner's acceptance. If the miner does not accept the available position in writing, the miner may be reassigned and protections under part 90 shall not apply. Failure by the miner to act on the written offer of the available position within 15 days after notice of the offer is received from the operator shall operate as an election not to accept the available position.

The proposal did not include any substantive changes to existing § 90.103(f)(1) and (2). Final paragraph (g)(2) makes a nonsubstantive change from the proposal by including ''(36 FR 20601, October 27, 1971),'' which is the citation to the section 203(b) program that is stated in the existing definition.

8. Section 90.104 Waiver of Rights; Re-Exercise of Option

Final § 90.104 is unchanged from the proposal. It provides that a part 90 miner may waive his or her rights and be removed from MSHA's active list of miners who have rights under part 90 by: (1) Giving written notification to the Chief, Division of Health, Coal Mine Safety and Health, MSHA, that the miner waives all rights under this part; (2) applying for and accepting a position in an area of a mine which the miner knows has an average respirable dust concentration exceeding the standard; or (3) refusing to accept another position offered by the operator at the same coal mine that meets the requirements of §§ 90.100, 90.101 and 90.102(a) after dust sampling shows that the present position exceeds the standard.

Final paragraph (a)(1) is the same as existing § 90.104(a)(1). Final paragraphs (a)(2) and (3) change existing § 90.104(a)(2) and (3) by including the term ''applicable standard'' rather than ''1.0 milligrams per cubic meter of air or the respirable dust standard established by § 90.101 (Respirable dust standard when quartz is present.'' These are conforming changes consistent with other provisions of the final rule.

Final § 90.104(b), like the proposal, provides that if rights under part 90 are waived, the miner gives up all rights under part 90 until the miner re-exercises the option in accordance with § 90.3(e) (Part 90 option; notice of eligibility; exercise of option). Final paragraph (b) is the same as existing § 90.104(b).

Final § 90.104(c), like the proposal, provides that if rights under part 90 are waived, the miner may re-exercise the option under this part in accordance with § 90.3(e) (Part 90 option; notice of eligibility; exercise of option) at any time. Final paragraph (c) is the same as existing § 90.104(c).

MSHA received one comment expressing general support for this section and it is finalized as proposed.

9. Section 90.201 Sampling; General and Technical Requirements

Final § 90.201 addresses general and technical requirements concerning operator sampling. One commenter expressed support for the proposal.

Final paragraph (a) is substantially similar to the proposal. It requires that an approved coal mine dust personal sampler unit (CMDPSU) must be used to take samples of the concentration of respirable coal mine dust in the working environment of each part 90 miner as required by this part for the first 18 months after the effective date of the rule. Paragraph (a) changes the implementation date for using the approved CPDM from the proposed 12 months to 18 months after the effective date of the rule. On February 1, 2016, part 90 miners must be sampled only with a CPDM as required by this part, and an approved CMDPSU must not be used unless notified by the Secretary to continue to use an approved CMDPSU to conduct quarterly sampling. The rationale for paragraph (a) is the same as that for final § 70.201(a), which is discussed elsewhere in this preamble. MSHA received no comments on the proposal.

Final paragraph (b) is like the proposal with nonsubstantive changes. It requires that if using a CMDPSU, the sampling device must be worn or carried to and from each part 90 miner, and if using a CPDM, the sampling device must be worn by the part 90 miner at all times. It also requires that approved sampling devices be operated portal-to-portal and remain operational during the part 90 miner's entire shift, which includes the time spent performing normal work duties and while traveling to and from the assigned work location. It further requires that if the work shift to be sampled is longer than 12 hours and the sampling device is a CMDPSU, the operator must switch-out the unit's sampling pump prior to the 13th-hour of operation; and, if the sampling device is a CPDM, the operator must switch-out the CPDM with a fully charged device prior to the 13th-hour of operation.

Paragraph (b) is similar to final § 70.201(b). The rationale for paragraph (b) is the same as that for final § 70.201(b), which is discussed elsewhere in this preamble. MSHA received no comments on the proposal.

Final paragraph (c) is unchanged from the proposal and is identical to existing requirements. It requires that unless otherwise directed by the District Manager, the respirable dust samples required under this part using a CMDPSU be taken by placing the sampling device as follows: (1) On the part 90 miner; (2) on the piece of equipment which the part 90 miner operates within 36 inches of the normal working position; or, (3) at a location that represents the maximum concentration of dust to which the part 90 miner is exposed. MSHA received no comments on the proposal.

Final paragraph (d), like the proposal, requires that if using a CMDPSU, one control filter must be used for each shift of sampling. It further requires that each control filter must: (1) Have the same pre-weight date (noted on the dust data card) as the filter used for sampling; (2) remain plugged at all times; (3) be used for the same amount of time, and exposed to the same temperature and handling conditions as the filter used for sampling; and (4) be kept with the exposed samples after sampling and in the same mailing container when transmitted to MSHA. Final paragraph (d)(4) clarifies that the control filter must be in the same mailing container as the exposed samples when transmitted to MSHA. MSHA received no comments on the proposal.

In addition, paragraphs (d)(1)–(4) are identical to final § 70.201(d)(1)—(4). The rationale for paragraphs (d)(1)–(4) is discussed under final § 70.201(d)(1)–(4) of this preamble.

Final paragraph (e), like the proposal, requires that the respirable dust samples required by this part and taken with a CMDPSU must be collected while the part 90 miner is performing normal work duties. Paragraph (e) is substantially the same as the existing requirement. MSHA received no comments on the proposal. Paragraph (e) is unchanged from the proposal.

Final paragraph (f), like the proposal, requires that records showing the length of each shift for each part 90 miner be made and retained for at least six months, and be made available for inspection by authorized representatives of the Secretary and submitted to the District Manager when requested in writing. Paragraph (f) is similar to final § 70.201(e). The rationale for paragraph (f) is discussed elsewhere in this preamble under § 70.201(e). Paragraph (f) is unchanged from the proposal.

Final paragraph (g), like the proposal, requires that upon request from the District Manager, the operator must submit the date and time any respirable dust sampling required by this part will begin. It further requires that this information be submitted at least 48 hours prior to scheduled sampling. Paragraph (g) is identical to final § 70.201(f). The rationale for paragraph (g) is discussed under final § 70.201(f). Paragraph (g) is unchanged from the proposal.

Final paragraph (h) is substantially the same as the proposal. It requires that operators using CPDMs provide training to all part 90 miners. It makes nonsubstantive changes to require that the training must be completed prior to

a part 90 miner wearing a CPDM and then every 12 months thereafter.

Final paragraphs (h)(1)–(4) are similar to proposed paragraphs (h)(1)–(5). Proposed paragraph (h)(2) would have required miners to be instructed on how to set up the CPDM for compliance sampling. The final rule requires mine operators to have certified persons set up the CPDM for compliance. Therefore, the final rule does not include this proposed provision.

Paragraph (h)(1) is similar to proposed (h)(5). Like the proposal, it requires that the training include the importance of monitoring dust concentrations and properly wearing the CPDM. Paragraph (h)(1) makes a conforming change. The proposal would have required training on the importance of ''continuously'' monitoring dust concentrations. Since continuous monitoring is not required by the final rule, the term ''continuously'' is not included in paragraph (h)(1).

Final paragraph (h)(2) is the same as proposed (h)(1). It requires that the training include explaining the basic features and capabilities of the CPDM.

Final paragraph (h)(3), like the proposal, requires that the training include discussing the various types of information displayed by the CPDM and how to access that information.

Final paragraph (h)(4), like the proposal, requires that the training include how to start and stop a short-term sample run during compliance sampling.

The training requirements of paragraphs (h)(1)–(4) are identical to the training requirements of final § 70.201(h)(1)–(4). The rationale for paragraph (h)(1)–(4) is discussed under final § 70.201(h)(1)–(4) of this preamble.

Final paragraph (i), like the proposal, requires that an operator keep a record of the CPDM training at the mine site for 24 months after completion of the training. It also provides that an operator may keep the record elsewhere if the record is immediately accessible from the mine site by electronic transmission. It further requires that upon request from an authorized representative of the Secretary or Secretary of HHS, the operator must promptly provide access to any such training records. Final paragraphs (i)(1)–(3) require the record to include the date of training, the names of miners trained, and the subjects included in the training.

Paragraph (i) includes a non-substantive change by replacing the proposed term ''2 years'' with ''24 months.''

Final paragraphs (i)(1)–(3) are new and were added to clarify that the record must contain sufficient information for an authorized representative of the Secretary or Secretary of HHS to determine that the operator has provided CPDM training in accordance with requirements in paragraph (h). Like final § 70.201(i), this is the type of information that is generally required for all training records to establish that the training has occurred.

The requirements of paragraph (i) are identical to final § 70.201(i). The rationale for paragraph (i) is discussed elsewhere in this preamble under final § 70.201(i).

Final paragraph (j) is new. It provides that an anthracite mine using the full box, open breast, or slant breast mining method may use either a CPDM or a CMDPSU to conduct the required sampling. It requires that the mine operator notify the District Manager in writing of its decision to not use a CPDM.

Paragraph (j) is identical to final § 70.201(j). The rationale for paragraph (j) is discussed elsewhere in this preamble under final § 70.201(j).

10. Sections 90.202 Certified Person; Sampling and 90.203 Certified Person; Maintenance and Calibration

Final §§ 90.202 and 90.203 are identical to final §§ 70.202 and 70.203. Comments on proposed §§ 90.202 and 90.203 were the same as comments on proposed §§ 70.202 and 70.203. The comments and MSHA's rationale are discussed elsewhere in this preamble under §§ 70.202 and 70.203.

11. Section 90.204 Approved Sampling Devices; Maintenance and Calibration

Final § 90.204 and its rationale are identical to final § 70.204, discussed elsewhere in this preamble under final § 70.204. One commenter generally supported proposed § 90.204.

12. Section 90.205 Approved Sampling Devices; Maintenance and Calibration

Final § 90.205 and its rationale are identical to final § 70.205, discussed elsewhere in this preamble under final § 70.205. One commenter generally supported proposed § 90.205.

13. Section 90.206 Exercise of Option or Transfer Sampling

Final § 90.206 is derived from existing § 90.207 pertaining to ''Compliance sampling.'' Final § 90.206 changes the existing section heading to distinguish sampling that occurs when a part 90 miner opts to exercise his option to work in a low dust area of a mine or when a transfer in the part 90 miner's work assignment occurs from the quarterly compliance sampling required under final § 90.207.

Final § 90.206(a)(1) and (2) require that the operator take five valid representative dust samples for each part 90 miner within 15 calendar days after: (1) The 20-day period specified for each part 90 miner in § 90.100; and (2) implementing any transfer after the 20th calendar day following receipt of notification from MSHA that a part 90 miner is employed at the mine. Final paragraph (a)(1) is the same as proposed § 90.207(a)(1). Final paragraph (a)(2) is the same as proposed § 90.207(a)(3). Proposed § 90.207(a)(2), which was the same as existing § 90.207(a)(2), would have specified the action that an operator would take when the operator received notification from MSHA that compliance samples taken under part 90 exceeded the standard. Proposed § 90.207(a)(2) is not included in the final rule because final § 90.207(c) specifies the actions that a mine operator must take when part 90 miner sample results show respirable dust overexposures.

Final § 90.206(b), like the proposal, provides that noncompliance with the standard be determined in accordance with final § 90.207(d). Under the proposal, noncompliance determinations would have been determined in accordance with proposed § 90.207(d) pertaining to a part 90 miner's single-shift exposure, as well as the miner's weekly accumulated exposure. However, for reasons discussed elsewhere in this preamble, the proposed single-shift sampling and weekly accumulated exposure provisions for operators' sampling are not included in the final rule. Rather, final § 90.207(d) lists the two means by which noncompliance with the standard will be determined and is discussed elsewhere in this preamble under § 90.207(d). Final paragraph (b) ensures that operators are aware how compliance determinations will be made for exercise of option and transfer samples taken under final paragraphs (a)(1) and (a)(2).

Final § 90.206(c), like the proposal, provides that upon issuance of a citation for a violation of the standard, the operator must comply with § 90.207(f). Final paragraph (c) is derived from existing § 90.201(d), which requires corrective action and an additional five samples from the part 90 miner after a citation is issued. Final paragraph (c) ensures that a mine operator is aware of the abatement termination procedures that apply when a citation is issued for respirable dust overexposure on

samples taken after a miner exercises the part 90 option to work in a low dust area of the mine or when a part 90 miner is transferred.

The Agency received one comment on proposed § 90.207 in which the commenter expressed general support for the proposal.

14. Section 90.207 Quarterly Sampling

Final § 90.207 is redesignated proposed § 90.208 regarding procedures for sampling with CMDPSUs and § 90.209 regarding procedures for sampling with CPDMs. It revises the sampling requirements of existing §§ 90.207 and 90.208. The section heading is changed from the proposal by adding ''quarterly'' to distinguish the required sampling period under § 90.207 from that specified for exercise of option or transfer sampling under final § 90.206. It does not include the specific sampling device because the device is specified under final § 90.201.

According to final § 90.201(a), part 90 miners must be sampled with a CMDPSU on the effective date of the final rule. On February 1, 2016, part 90 miners must be sampled only with an approved continuous personal dust monitor (CPDM) as required by this part and an approved CMDPSU must not be used, unless notified by the Secretary to continue to use an approved CMDPSU to conduct quarterly sampling.

Final § 90.207(a) is substantially similar to proposed § 90.208(a). It requires that each operator must take five valid representative samples every calendar quarter from the environment of ''each'' part 90 miner while performing normal work duties. Final paragraph (a) further requires that part 90 miner samples must be collected on consecutive work days. The quarterly periods are: (1) January 1–March 31; (2) April 1–June 30; (3) July 1–September 30; (4) October 1–December 31.

Final paragraph (a) does not include the 24/7 continuous sampling frequency in proposed § 90.209(a) while using a CPDM. Proposed § 90.209(a) would have required that, when using the CPDM, each operator sample the working environment of the part 90 miner during each shift, 7 days per week, if applicable, 52 weeks per year.

One part 90 commenter stated that the CPDM would affect miners' performance, back, hips, legs and knees.

In response to the comment, MSHA has concluded that 24/7 continuous sampling of a part 90 miner using a CPDM may be too burdensome on a part 90 miner who is already suffering from decreased lung function. Therefore, final paragraph (a) includes the sampling frequency in proposed § 90.208(a) which would have required the operator to take five samples each calendar quarter when using the CMDPSU.

Because the proposed sampling frequency while using a CPDM could have affected a part 90 miner's performance, and back, hips, legs and/or knees, final paragraph (a) replaces the existing bimonthly sampling period with a quarterly sampling period and increases sampling from one to five samples collected on consecutive work days during a quarterly period. This is the same sampling frequency in proposed § 90.208(a) which would have required the operator to take five samples each calendar quarter when using the CMDPSU. Sampling part 90 miners during five consecutive work days on a quarterly basis provides a better representation of typical dust conditions to which a part 90 miner is exposed as compared to the existing bimonthly sampling period. Therefore, final paragraph (a) provides greater protection for miners than the existing standard. In addition, final paragraph (a) protects part 90 miners because the sampling results obtained during the quarterly sampling periods will provide mine operators with information to evaluate the dust controls specified in their approved ventilation plan and the maintenance of those controls. As long as dust controls are properly maintained to ensure continuing compliance with the respirable dust standard, part 90 miners will be protected from overexposures. This is particularly so because MSHA certifies that the part 90 miner is in an occupation that meets the respirable dust standard and cannot be moved to a different occupation unless certified by MSHA.

Final paragraph (b) is redesignated from and is similar to proposed §§ 90.208(b) and 90.209(b). Paragraph (b) clarifies the time frame for implementation when there is a change in the applicable standard. Paragraph (b) requires that when the respirable dust standard is changed in accordance with § 90.101, the new standard becomes effective 7 calendar days after the date of the notification of the change by MSHA. Under the proposal, a new standard would have gone into effect on the first shift after receipt of notification. MSHA did not receive comments on proposed §§ 90.208(b) or 90.209(b).

Final paragraph (b) is substantially similar to final §§ 70.206(c), 70.207(b), 70.208(c), 70.209(b) and 71.206(b), except for conforming changes. The rationale for paragraph (b) is discussed elsewhere in this preamble under final § 70.208(c).

Final paragraph (b) does not include the requirements in proposed § 90.208(b)(1) and (b)(2). Proposed § 90.208(b)(1) would have required that if all samples for the part 90 miner from the most recent quarterly sampling period do not exceed the new standard (reduced due to the presence of quartz), respirable dust sampling of the part 90 miner would begin on the first shift on which that miner is performing normal work duties during the next quarterly period following notification of the change. Proposed § 90.208(b)(2) would have required that if any sample from the most recent quarterly sampling period exceeds the new standard (reduced due to the presence of quartz), the operator must make necessary adjustments to the dust control parameters within three days and then collect samples from the affected part 90 miner on consecutive work days until five valid representative samples are collected. It further provided that the samples collected will be treated as normal quarterly samples under this part. MSHA did not receive any comments on the proposal.

MSHA's rationale for not including § 90.208(b)(1) and (b)(2) is discussed elsewhere in this preamble under final § 70.206(c)(1) and (2).

Final paragraph (c) is changed from the proposal. It requires that when a valid representative sample taken in accordance with this section meets or exceeds the ECV in Table 90–1 that corresponds to the applicable standard and particular sampling device used, the operator must: (1) Make approved respiratory equipment available; (2) Immediately take corrective action; and (3) Record the corrective actions. Paragraph (c) is similar to proposed § 90.208(e) and (g), regarding compliance sampling procedures for sampling with CMDPSUs, and § 90.209(e) and (f), regarding compliance sampling procedures for sampling with CPDMs. The actions required by final paragraph (c) are similar to those proposed.

Proposed § 90.208(e) would have applied to sampling with a CMDPSU and would have required that during the time for abatement fixed in a citation, the operator would have to: (1) Make approved respiratory equipment available, (2) submit proposed corrective actions to the District Manager, and either (i) implement the corrective actions after District Manager approval and conduct additional sampling, or (ii) transfer the part 90 miner to a work position meeting the standard and conduct additional sampling.

Proposed § 90.208(g) would have applied to sampling with a CMDPSU and would have required that when a valid sample exceeds the standard but is less than the applicable ECV in proposed Table 90–1, the operator would have to: (1) Make approved respiratory equipment available, (2) take corrective action, and (3) record the corrective action taken in the same manner as the records for hazardous conditions required by § 75.363.

Proposed § 90.209(e) would have applied to sampling with a CPDM and would have required that when a valid end-of-shift equivalent concentration meets or exceeds the applicable ECV, or a weekly accumulated exposure exceeds the weekly permissible accumulated exposure, the operator would have to: (1) Make approved respiratory equipment available, (2) implement corrective actions, (3) submit dust control measures to the District Manager for approval, (4) review and revise the CPDM Performance Plan, (5) record the excessive dust condition as part of and in the same manner as the records for hazardous conditions required by § 75.363, and (6) sample any transferred part 90 miner.

Proposed § 90.209(f) would have applied to sampling with a CPDM and would have required that when a valid end-of-shift equivalent concentration exceeds the standard but is less than the applicable ECV, the operator would have to: (1) Make approved respiratory equipment available, (2) implement corrective actions, (3) record the excessive dust condition as part of and in the same manner as the records for hazardous conditions required by § 75.363, and the corrective actions taken, and (4) review and revise the CPDM Performance Plan.

As noted previously in the discussion on final § 70.206(e), MSHA clarified, in the March 8, 2011, request for comments (76 FR 12650), that the proposal would require that operators record both excessive dust concentrations and corrective actions in the same manner as conditions are recorded under § 75.363 and that ''MSHA would not consider excessive dust concentrations to be hazardous conditions, since the proposed requirement is not a section 75.363 required record'' (76 FR 12650). MSHA did not receive any comments on the proposal.

Final paragraph (c) is changed from the proposal. It does not require action if the dust sample exceeds the standard but is less than the ECV in Table 90–1. Rather, it requires an operator to take certain actions when a respirable dust sample meets or exceeds the ECV in Table 90–1. Although the Secretary has determined that a single full-shift measurement of respirable coal mine dust accurately represents atmospheric conditions to which a miner is exposed during such shift, MSHA has concluded that a noncompliance determination based on a single full-shift sample will only be made on MSHA inspector samples. With respect to operator samples, MSHA reevaluated its enforcement strategy under the proposed rule. MSHA determined that the proposal would have resulted in little time for an operator to correct noncompliance determinations based on an operator's single sample. The final rule ensures that an operator takes corrective actions on a single overexposure. If sampling with a CMDPSU, the actions must be taken upon notification by MSHA that a respirable dust sample taken in accordance with this section meets or exceeds the ECV for the applicable standard. If sampling with a CPDM, the actions must be taken when the sampling measurement shows that a dust sample taken in accordance with this section meets or exceeds the ECV for the applicable standard.

Final paragraph (c)(1) is similar to proposed §§ 90.208(e)(1) and (g)(1) and 90.209(e)(1) and (f)(1). It requires that the operator make approved respiratory equipment available to affected miners in accordance with § 72.700 of this chapter. Some commenters stated that a part 90 miner should not be required to wear a respirator and should be removed from the environment when any sample exceeds the respirable dust standard.

The combination of specific actions that an operator is required to take under the final rule, which includes making approved respiratory equipment available, immediately taking corrective action, and recording the corrective actions, provides immediate health protection to a part 90 miner. Additional discussion on the rationale for final paragraph (c)(1) can be found elsewhere in this preamble under final § 70.206(e)(1).

Final paragraph (c)(2) is similar to proposed §§ 90.208(e)(2)(i) and (g)(2) and 90.209(e)(2) and (f)(2). It requires that the operator immediately take corrective action to lower the concentration of respirable coal mine dust to at or below the standard. Paragraph (c)(2) is consistent with existing § 90.201(d), which requires a mine operator to take corrective action to lower the concentration of respirable dust. Paragraph (c)(2) clarifies that corrective action needs to be taken immediately to protect miners from overexposures. MSHA did not receive any comments on the proposal. The rationale for final paragraph (c)(2) is the same as that for final § 70.206(e)(2) and is discussed in that section.

Final paragraph (c)(3) is similar to proposed §§ 90.208(g)(3) and 90.209(f)(3)(v). Final paragraph (c)(3) requires that the mine operator make a record of the corrective actions taken. The record must be certified by the mine foreman or equivalent mine official no later than the end of the mine foreman's or equivalent mine official's next regularly scheduled working shift. It also requires that the record must be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration. Final paragraph (c)(3) further requires that the records must be retained at a surface location at the mine for at least 1 year and be made available for inspection by authorized representatives of the Secretary and the part 90 miner. MSHA did not receive any comments on the proposal. The rationale for paragraph (c)(3) is the same as that for final § 70.206(e)(3) and is discussed in that section.

Final paragraph (c) does not include the provisions in proposed §§ 90.208(e)(2) and 90.209(e)(3) regarding the submission of corrective actions to the District Manager for approval. MSHA did not receive comments on the proposal. MSHA's rationale is discussed elsewhere in this preamble under final § 70.206(h)(4).

In addition, unlike proposed § 90.209(e)(4) and (f)(4), final paragraph (c) does not require operators to review and revise a CPDM Performance Plan. MSHA did not receive any comments on the proposal. As discussed elsewhere in this preamble under § 70.206, the final rule does not include the proposed requirements for a CPDM Performance Plan.

For consistency between the sampling requirements of the final rule, final paragraphs (c)(1)–(3) are identical to final § 70.206(e)(1)–(3) regarding bimonthly sampling of MMUs, § 70.207(d)(1)–(3) regarding bimonthly sampling of designated areas, § 70.208(e)(1)–(3) regarding quarterly sampling of MMUs, § 70.209(c)(1)–(3) regarding quarterly sampling of designated areas, and § 71.206(h)(1)–(3) regarding quarterly sampling, except for conforming changes. Under final paragraph (c)(3), the operator must make the corrective action record available for inspection to the part 90 miner and not to the representative of the miners, due to privacy considerations.

Final paragraph (d) is redesignated and changed from proposed §§ 90.208(c) and 90.209(c) and (d). It states that noncompliance with the standard is demonstrated during the sampling shift when: (1) Two or more valid representative samples meet or exceed the excessive concentration value (ECV) in Table 90–1 that corresponds to the applicable standard and the particular sampling device used; or (2) The average for all valid representative samples meets or exceeds the ECV in Table 90–2 that corresponds to the applicable standard and the particular sampling device used.

In the March 8, 2011, request for comments (76 FR 12649), MSHA stated that the Agency was interested in commenters' views on what actions should be taken by MSHA and the mine operator when a single shift respirable dust sample meets or exceeds the ECV. The Agency also requested comments on alternative actions, other than those contained in the proposal, for MSHA and the operator to take if operators use a CPDM. MSHA further stated that it was particularly interested in alternatives to those in the proposal and how such alternatives would be protective of miners.

Proposed §§ 90.208(c) and 90.209(c) would have required that no valid end-of-shift equivalent concentration meet or exceed the ECV that corresponds to the applicable standard in the respective Table 90–1 or 90–2. Proposed § 90.209(d) would have required that no weekly accumulated exposure exceed the weekly permissible accumulated exposure.

MSHA did not receive any comments on proposed §§ 90.208(c) or 90.209(c) and (d). The rationale for paragraphs (d)(1) and (2) is the same as that for final §§ 70.206(f)(1) and (2), 70.207(e)(1) and (2), 70.208(f)(1) and (2), 70.209(d)(1) and (2), and 71.206(i)(1) and (2), and is discussed elsewhere in this preamble under final § 70.208(f)(1) and (2).

For consistency between the sampling requirements of the final rule, final paragraphs (d)(1) and (2) are the same as, except for conforming changes, final §§ 70.206(f)(1) and (2), 70.207(e)(1) and (2), 70.208(f)(1) and (2), 70.209(d)(1) and (2), and 71.206(i)(1) and (2).

Comments on the ECVs in proposed Tables 90–1 and 90–2 are discussed elsewhere in this preamble under § 70.208(f). In addition, a detailed discussion on the derivation of the ECVs in both Tables 90–1 and 90–2 is included in Appendix A of the preamble. Final Table 90–1 revises one ECV when the CPDM is used from proposed Table 70–2 due to rounding inconsistencies; the final ECV is changed from proposed 0.80 mg/m^3 to 0.79 mg/m^3 when the applicable standard is 0.7 mg/m^3. This is consistent with the change to the ECV in final Table 70–1.

Final paragraph (e) is redesignated from proposed § 90.208(d) and makes clarifying and conforming changes. It provides that upon issuance of a citation for a violation of the standard, paragraph (a) of this section will not apply to that part 90 miner until the violation is abated and the citation is terminated in accordance with paragraphs (f) and (g) of this section. Paragraph (e) clarifies that a violation must be abated and the citation must be terminated before resuming quarterly sampling. Final paragraphs (f) and (g) are discussed below.

Final paragraph (e) includes an exception to allow the District Manager flexibility to address extenuating circumstances that would affect sampling. An example of extenuating circumstances would occur when an uncorrected violation would require abatement sampling that continues into the next sampling period.

Final paragraph (e) is similar to existing § 90.208(c). MSHA did not receive comments on the proposal.

For consistency between the sampling requirements of the final rule, except for conforming changes, final paragraph (e) is the same as final §§ 70.206(g), 70.207(f), 70.208(g), 70.209(e), and 71.206(j).

Final paragraph (f) is redesignated from proposed §§ 90.208(e) and 90.209(e). It requires that upon issuance of a citation for a violation of the standard, the operator must take the following actions sequentially: (1) Make approved respiratory equipment available, (2) immediately take corrective action, and (3) record the corrective action. The actions required by paragraph (f) are similar to those in proposed §§ 90.208(e)(1)–(2) and 90.209(e)(1)–(6) which are discussed in this preamble under final paragraph (c). In addition, paragraph (f) includes the term ''sequentially'' to ensure that corrective actions are taken in the order they are listed.

Final paragraph (f)(1), like proposed §§ 90.208(e)(1) and 90.209(e)(1), requires that the mine operator make approved respiratory equipment available to affected miners in accordance with § 72.700 of this chapter. Comments on proposed §§ 90.208(e)(1) and 90.209(e)(1) are discussed under final paragraph (c). The rationale for final paragraph (f)(1) is the same as that for final § 70.206(e)(1), which is discussed elsewhere in this preamble.

Final paragraph (f)(2) is similar to proposed §§ 90.208(e)(2)(i) and (ii) and 90.209(e)(2) and (6). It requires that the operator immediately take corrective action to lower the concentration of respirable coal mine dust to at or below the standard.

Paragraph (f)(2) is consistent with existing § 90.201(d), which requires a mine operator to take corrective action to lower the concentration of respirable dust. Paragraph (f)(2) clarifies that the corrective action must be taken immediately to protect miners from overexposures. The types of corrective actions that could be taken to reduce the respirable dust levels in the work position of the part 90 miner are discussed elsewhere in this preamble under § 70.206(e)(2) and could also include modifications to the part 90 miner's normal work duties. Final paragraph (f)(2)(i) makes a minor change to proposed paragraph (e)(2)(i). It replaces ''environment'' with ''position'' to clarify that respirable dust levels in the part 90 miner's specific work position must be reduced to meet the standard. Under final paragraph (f)(2)(ii), corrective action could also include transferring the part 90 miner to another work position. MSHA received no comments on the proposal. The rationale for final paragraph (f)(2) is the same as that for final § 70.206(e)(2) and (h)(2), which are discussed elsewhere in this preamble under § 70.206(e)(2) and (h)(2).

Final paragraph (f)(2) further provides that if the corrective action involves reducing the respirable dust levels in the work position of the part 90 miner identified in the citation, the operator must implement the proposed corrective actions and begin sampling the affected miner within 8 calendar days after the date the citation is issued until five valid representative samples are taken. If the corrective action involves transferring the part 90 miner to another work position at the mine to meet the standard, the operator must comply with § 90.102 and then sample the affected miner in accordance with § 90.206(a).

Final paragraph (f)(2)(i) clarifies that the operator must sample within 8 calendar days after the date the citation is issued. Proposed § 90.208(e)(2)(i) would have required sampling after corrective actions were approved by the District Manager and implemented. The final rule does not require the submission of corrective actions to the District Manager for approval. Final paragraph (f)(2)(ii) is the same as proposed §§ 90.208(e)(2)(ii) and 90.209(e)(6), except for conforming

changes. MSHA received no comments on the proposal.

Final paragraph (f)(3) is similar to proposed § 90.209(e)(5)(v). Final paragraph (f)(3) requires that the operator make a record of the corrective actions taken. The record must be certified by the mine foreman or equivalent mine official no later than the end of the mine foreman's or equivalent mine official's next regularly scheduled working shift. It also requires that the record must be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration. Final paragraph (f)(3) further requires that the records must be retained at a surface location at the mine for at least 1 year and be made available for inspection by authorized representatives of the Secretary and the representative of miners. MSHA did not receive any comments on the proposal. The rationale for final paragraph (f)(3) is the same as that for final § 70.206(e)(3) and is discussed elsewhere in this preamble under final § 70.206(e)(3).

Final paragraph (f) does not include the provisions in proposed § 90.208(e)(2) regarding the submission of corrective actions to the District Manager for approval. MSHA received no comments on the proposal. MSHA's rationale for omitting this provision is discussed in this preamble under final § 70.206(h)(4).

In addition, unlike proposed § 90.209(e)(3), final paragraph (f) does not require operators to submit corrective actions to the District Manager pertaining to the part 90 dust control plan because the requirements are contained in final § 90.300 (Respirable dust control plan; filing requirements). MSHA received no comments on the proposal.

Unlike proposed § 90.209(e)(4), final paragraph (f) also does not require operators to review and revise a CPDM Performance Plan. MSHA did not receive any comments on the proposal. As discussed elsewhere in this preamble under § 70.206, the final rule does not include the proposed requirements for a CPDM Performance Plan.

For consistency between the sampling requirements of the final rule, except for conforming changes, paragraph (f) is the same as final § 70.206(h) regarding bimonthly sampling of MMUs, § 70.207(g) regarding bimonthly sampling of designated areas, § 70.208(h) regarding quarterly sampling of MMUs, § 70.209(f) regarding quarterly sampling of designated areas, and § 71.206(k) regarding quarterly sampling. Under final paragraph (f)(3), the operator must make available for inspection the corrective action record to the part 90 miner under § 90.207(c)(3), and not to the representative of the miners, due to privacy considerations.

Final paragraph (g) is similar to proposed § 90.208(f). It provides that a citation for a violation of the standard will be terminated by MSHA when the equivalent concentration of each of the five valid representative samples is at or below the standard. The final rule does not include the proposed requirement that within 15 calendar days after receipt of the sampling results from MSHA indicating the concentration has been reduced to at or below the standard, the operator must submit to the District Manager for approval a proposed dust control plan for that part 90 miner or proposed changes to the approved dust control plan as prescribed in § 90.300. It also does not include the proposed requirement that the revised parameters reflect the control measures used to maintain the concentration of respirable dust to at or below the standard. The proposed requirements to submit a dust control plan with revised dust control measures for a part 90 miner are included in final § 90.300, which also requires a description of the specific control measures used to continuously maintain respirable dust concentration to at or below the standard. Therefore, these requirements are not included in final paragraph (f). MSHA did not receive any comments on the proposal.

15. Section 90.208 Respirable Dust Samples; Transmission by Operator

Final § 90.208 is similar to proposed § 90.210. Final § 90.208, like the proposal, revises existing § 90.209(a) and (c), and adds a new paragraph (f). It also redesignates, without change, existing § 90.209(b), (d) and (e) to paragraphs (b), (d), and (e), respectively, of this section.

Final § 90.208(a) is changed from the proposal. It requires the operator, if using a CMDPSU, to transmit within 24 hours after the end of the sampling shift all samples collected, including control filters, in containers provided by the manufacturer of the filter cassette to MSHA's Pittsburgh Respirable Dust Processing Laboratory, or to any other address designated by the District Manager. Final paragraph (a) clarifies that operators must include the control filters with the dust sample transmissions to the Respirable Dust Processing Laboratory. As explained in the preamble to the proposed rule, MSHA uses control filters to improve measurement accuracy by eliminating the effect of differences in pre- and post-exposure laboratory conditions, or changes introduced during storage and handling of the filter cassettes. Including control filters with the dust samples ensures that the appropriate control filter is associated with the appropriate sample filter.

Final § 90.208(b) is the same as proposed § 71.208(b).

Final § 90.208(c) is substantially the same as proposed § 90.208(c). It requires that a person certified in sampling must properly complete the dust data card that is provided by the manufacturer for each filter cassette. It further requires that the dust data card must have an identification number identical to that on the filter cassette used to take the sample and be submitted to MSHA with the sample. It also requires that each dust data card must be signed by the certified person who actually performed the examinations during the sampling shift and must include that person's MSHA Individual Identification Number (MIIN).

As an example, the certified person who performs the required examinations during the sampling shift is the individual responsible for signing the dust data card and verifying the proper flowrate, or noting on the back of the card that the proper flowrate was not maintained. Since the certified person who conducted the examination is most knowledgeable of the conditions surrounding the examination, final paragraph (c) requires that certified person sign the dust data card. In addition, the MIIN number requirement is consistent with MSHA's existing policy. Since July 1, 2008, MSHA has required that the certified person section of the dust data card include the MIIN, a unique identifier for the certified person, instead of the person's social security number. To ensure privacy and to comport with Federal requirements related to safeguarding personally identifiable information, MSHA has eliminated requirements to provide a social security number.

Finally, paragraph (c) provides that respirable dust samples with data cards not properly completed may be voided by MSHA. This is a change from the proposal. The proposal would have required that, regardless of how small the error, an improperly completed dust data card must be voided by MSHA. Final paragraph (c) allows MSHA flexibility in voiding an improperly completed dust data card. MSHA received no comments on this proposed provision.

Final § 90.208(d) and (e) are the same as proposed § 90.208(d) and (e) and are the same as existing § 90.209(d) and (e).

Final § 90.208(f) is changed from the proposal. It requires that, if using a CPDM, the person certified in sampling must validate, certify, and transmit electronically to MSHA within 24 hours after the end of the sampling shift all sample data file information collected and stored in the CPDM, including the sampling status conditions encountered when sampling each part 90 miner; and, not tamper with the CPDM or its components in any way before, during, or after it is used to fulfill the requirements of 30 CFR part 90, or alter any sample data files. It further requires that all CPDM data files transmitted electronically to MSHA must be maintained by the operator for a minimum of 12 months.

Final paragraph (f) includes the term ''person certified in sampling'' rather than ''designated mine official.'' This change makes paragraph (f) consistent with final paragraph (c). Final paragraph (f) also includes a clarification that CPDM data files are ''electronically'' transmitted to MSHA, unlike the physical transmission of samples collected with the CMDPSU. As a clarification to the proposal, final paragraph (f) does not require ''error data file information'' to be transmitted to MSHA. Rather, final paragraph (f) requires ''the sampling status conditions encountered when sampling'' to be transmitted to MSHA. The clarification ensures that conditions that may occur during the sampling shift (e.g., flowrate, temperature, humidity, tilt indicator, etc.) and that may affect sampling results are recorded and transmitted to MSHA. This change is also consistent with final § 70.210(f).

The requirement in final paragraph (f) that the certified person not tamper with the CPDM or alter any CPDM data files is new. It is consistent with the requirements for CMDPSUs, under existing § 90.209(b) and final § 90.208(b), which provide that an operator not open or tamper with the seal of any filter cassette, or alter the weight of any filter cassette before or after it is used to fulfill the requirements of 30 CFR part 90. It is also consistent with the requirement in 30 CFR 74.7(m) that a CPDM be designed to be tamper-resistant or equipped with an indicator that shows whether the measuring or reporting functions of the device have been tampered with or altered. MSHA has a long history of taking action against persons who have tampered with CMDPSUs or altered the sampling results obtained from such devices in order to protect miners' health and ensure the integrity of MSHA's dust program. Therefore, a similar requirement is included for samples taken with a CPDM.

MSHA received one comment on proposed § 90.210. The commenter expressed general support for the proposal and suggested that each operator be required to maintain CPDM data files for a minimum of 24 months, rather than for 12 months, as proposed. Further, the commenter suggested that the rule include a requirement that all CPDM data files be made available to all parties.

MSHA believes that a 12-month retention period is reasonable in light of other requirements in the final rule. Specifically, under final § 90.209(b), the part 90 miner will receive a copy of the MSHA report to the mine operator that provides a variety of data on the respirable dust samples that were collected from the affected miner. Also, under final § 90.209(c), when a CPDM is used to sample, the part 90 miner will receive a paper record of the sample run within 12 hours of the end of each sampling shift. Because these provisions of the final rule ensure that the affected part 90 miner has ongoing access to sampling data, there is no need to require a mine operator to retain CPDM data files for more than 12 months. Moreover, the final rule does not include the commenter's suggestion that CPDM data files be made available to all parties. Special consideration must be given to part 90 miners' sampling data due to personal privacy implications associated with sampling such miners. Making the sampling data of part 90 miners available to all parties would be inappropriate and would jeopardize part 90 miners' privacy rights.

Final § 90.208 and its rationale are identical to final § 70.210, discussed elsewhere in this preamble under § 70.210.

16. Section 90.209 Respirable Dust Samples; Report to Operator

Final § 90.209 is similar to proposed § 90.211. One commenter expressed general support for the proposal.

Paragraph (c) of final § 90.209 is essentially the same as the proposed rule except for conforming changes. Final § 90.209(a)(1)–(a)(6), and (c)(1)–(c)(5) are identical to final § 70.211(a)(1)–(a)(6), and (c)(1)–(c)(5), and the rationale is the same as that discussed elsewhere in this preamble related to final § 70.211.

Final paragraph (c) requires that if using a CPDM, the person certified in sampling must print, sign, and provide to each part 90 miner, a paper record (Dust Data Card) of the sample run within one hour after the start of the part 90 miner's next work shift.

Three provisions of final § 90.209 are unique to part 90 and are not included in final § 70.211. First, final paragraph (a)(7), like the proposal, provides that MSHA's report will contain the part 90 miner's MSHA Individual Identification Number (MIIN) instead of a social security number. To ensure privacy and to comport with Federal requirements related to safeguarding personally-identifiable information, MSHA has eliminated the use of social security numbers on its document.

Second, final § 90.209(b), like the proposed rule, requires that upon receipt of the MSHA report provided to the operator under final § 90.209(a), the operator must provide a copy of this report to the part 90 miner. It also prohibits the operator from posting on the mine bulletin board the original or a copy of the MSHA report. Final paragraph (b) is identical to existing § 90.210(b).

Third, final § 90.209(d), like the proposal, does not allow the operator to post data on respirable dust samples for part 90 miners on the mine bulletin board. No specific comments were received on these three provisions and they are finalized as proposed.

17. Section 90.210 Status Change Reports

Final § 90.210 is similar to proposed § 90.212 and existing § 90.220. One commenter expressed general support for the proposal.

Final § 90.210, like proposed § 90.212(a), provides an operator the option of reporting to MSHA changes in the status of a part 90 miner electronically instead of in writing. MSHA received no comment on this provision and it is finalized as proposed.

Unlike proposed § 90.212(b), final § 90.210 does not require the designated mine official to report status changes affecting the operational readiness of any CPDM within 24 hours after the status change occurred. MSHA received no comment on this provision. The rationale for not including proposed § 90.212(b) in the final rule is the same as the rationale for not including proposed § 70.212(c) in the final rule, which is discussed in the preamble related to final § 70.212.

18. Section 90.300 Respirable Dust Control Plan; Filing Requirements

Final § 90.300 is derived from existing § 90.300 and addresses requirements for operators to file a respirable dust control plan for a part 90 miner.

Final § 90.300(a) requires that if an operator abates a violation of the standard by reducing the respirable dust

level in the work position of the part 90 miner, the operator must submit to the District Manager for approval a written respirable dust control plan for the part 90 miner in the work position identified in the citation within 15 calendar days after the citation is terminated. It further requires that the respirable dust control plan and any revisions must be suitable to the conditions and the mining system of the coal mine and be adequate to continuously maintain respirable dust to at or below the standard for that part 90 miner.

Final paragraph (a) does not include the proposal's references to §§ 90.208(f) and 90.209(e)(3) because they were confusing and duplicative of final § 90.300 requirements. Instead, final paragraph (a) is consistent with existing § 90.300(a) regarding when a respirable dust control plan is required. It also establishes the same 15 calendar-day time period requirement for plan submission for operators using a CMDPSU or a CPDM.

One commenter, who generally supported the proposal, suggested that the plan be made available to the miners' representative.

To prevent the disclosure of the part 90 miner's identity and ensure the miner's privacy, the final rule does not include the commenter's suggestion.

Final § 90.300(b), like the proposal, specifies the required content of each part 90 miner respirable dust control plan. Final paragraph (b)(1) requires that the plan include the mine identification number assigned by MSHA, the operator's name, mine name, mine address, and mine telephone number, and the name, address, and telephone number of the principal officer in charge of health and safety at the mine. Final paragraph (b)(2) requires that the plan include the name and MSHA Individual Identification Number of the part 90 miner and the position at the mine to which the plan applies. Final paragraph (b)(3) requires that the plan contain a detailed description of the specific respirable dust control measures used to continuously maintain concentrations of respirable coal mine dust at or below the standard. Final paragraph (b)(4) requires that the plan include a detailed description of how each of the respirable dust control measures described in final paragraph (b)(3) will continue to be used by the operator, including at least the specific time, place, and manner the control measures will be used. Except for minor changes, final paragraphs (b)(1)–(4) are substantially the same as existing § 90.300(b)(1)–(4). MSHA did not receive comments on proposed paragraphs (b)(1)–(b)(4) and they are finalized as proposed.

19. Section 90.301 Respirable Dust Control Plan; Approval by District Manager; Copy to Part 90 Miner

Final § 90.301, like the proposal, addresses the criteria that MSHA will use to approve the respirable dust control plan for each part 90 miner, and requires operators' compliance with all provisions of the approved plan. Final § 90.301(a) through (c) and (e) are identical to final § 71.301(a) through (c) and (e), discussed elsewhere in this preamble.

Final § 90.301(d), like the proposal, requires the operator to provide a copy of the current respirable dust control plan to the affected part 90 miner and prohibits the operator from posting the original or a copy of the plan on the mine bulletin board.

One commenter, who generally supported the proposal, suggested that the plan be made available to the miners' representative. Final § 90.301 does not include the commenter's suggestion for the same reason it is not included in final § 90.300, which is discussed elsewhere in this preamble under final § 90.300(a). MSHA did not receive other comments on § 90.301 and it is finalized as proposed.

V. Executive Order 12866: Regulatory Planning and Review; and Executive Order 13563: Improving Regulation and Regulatory Review

Executive Orders (E.O.) 12866 and 13563 direct regulatory agencies to assess all costs and benefits of regulations 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). Executive Order 13563 emphasizes the importance of quantifying both costs and benefits, reducing costs, harmonizing rules, and promoting flexibility. To comply with the provisions of E.O. 12866 and 13563, MSHA has prepared a Regulatory Economic Analysis (REA) for this final rule. The REA contains supporting data and explanations for the summary presented in this preamble section, including the types of mines covered by the final rule, the costs and benefits of the final rule, the economic feasibility of the final rule, the impact of the final rule on small businesses, and the paperwork burden of the final rule on the affected sectors of the mining industry. The REA can be accessed electronically at *http://www.msha.gov/rea.htm* or *http://www.regulations.gov*. A copy of the REA can be obtained from MSHA by request to Sheila McConnell at *mcconnell.sheila.a@dol.gov*, by phone request to 202–693–9440, or by facsimile to 202–693–9441.

Under E.O. 12866, MSHA must determine whether a regulatory action is ''significant'' and subject to review by the Office of Management and Budget (OMB). Section 3(f) of E.O. 12866 defines a ''significant regulatory action'' as an action that is likely to result in a rule: (1) Having an annual effect on the economy of $100 million or more, or adversely and materially affecting a sector of the economy, productivity, competition, jobs, the environment, public health or safety or state local or tribal governments or communities (also referred to as ''economically significant''); (2) creating serious inconsistency or otherwise interfering with an action taken or planned by another agency; (3) materially altering the budgetary impacts of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or (4) raising novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

MSHA has determined that the final rule may have an effect of $100 million or more on the economy in at least one year, and is therefore an ''economically significant'' regulatory action in accordance with § 3(f) of E.O. 12866 and is subject to OMB review.

A. Population at Risk

The final rule applies to all underground coal mines, surface coal mines, and surface areas of underground coal mines in the United States. For the 12 months ending January 2010, there were an average of 424 active underground coal mines employing approximately 47,000 miners and contractors (excluding office workers) and 1,123 active surface coal mines employing approximately 56,000 miners and contractors (excluding office workers).

B. Benefits

The final rule significantly improves health protections for coal miners by reducing their occupational exposure to respirable coal mine dust and lowering the risk that they will suffer material impairment of health or functional capacity over their working lives. The primary benefit of the final rule is the reduction of ''black lung'' disease among coal miners by improving MSHA's existing standards for respirable coal mine dust, thereby reducing miners' exposure to respirable

coal mine dust. Chronic exposure to respirable coal mine dust causes lung diseases including coal workers' pneumoconiosis (CWP), emphysema, silicosis, and chronic bronchitis, known collectively as ''black lung.'' These diseases are debilitating and can result in disability and premature death.

The REA benefits chapter provides a detailed description of how MSHA used the estimated risk reduction in the QRA for the final rule to calculate benefits. For the proposed rule, MSHA based its estimate of the benefits on the QRA for the proposed rule, which focused on the effects of the proposed lowering of the standard to 1.0 mg/m^3 for most miners (0.5 mg/m^3 for part 90 miners) and the proposed use of single shift samples to determine noncompliance.

The final rule lowers the existing 2.0 mg/m^3 standard to 1.5 mg/m^3, rather than to the 1.0 mg/m^3 standard in the proposed rule. The QRA for the final rule uses the same methodology that was used in the QRA for the proposed rule but with the final standard.

As in the QRA for the proposed rule, MSHA's QRA for the final rule compares the risks for two hypothetical cohorts of miners with the same occupation/coal rank. One cohort, designed to characterize risks to the current workforce, was assigned 45-year lifetime exposures based on current sampling data. The comparison cohort was assigned 45-year lifetime exposures designed to represent risks associated with two provisions of the final rule (i.e., lowering the existing standard from 2.0 mg/m^3 to 1.5 mg/m^3, and basing noncompliance determinations on a single MSHA inspector sample rather than the average of 5 samples under the existing dust standard). Since the two cohorts compared are independent, there are two caveats: (1) No benefits were projected for delaying or stopping the progression of disease among the population that has experienced respirable coal mine dust exposures during their working lifetime; and (2) due to the latency between exposure and disease, especially for severe emphysema, a large portion of the benefits estimated by this analysis are not expected to accrue for many years.

Using this analysis, MSHA estimates that the two provisions of the final rule considered in the QRA (i.e., lowering the standard from 2.0 mg/m^3 to 1.5 mg/m^3, and basing determinations of noncompliance on single inspector samples rather than the average of 5 samples) will result in the prevention of the adverse health effects shown in Table V–1.

TABLE V–1—ESTIMATED NUMBER OF ADVERSE HEALTH EFFECTS PREVENTED, AS OF AGE 73, 45-YEAR WORKING LIFETIME, TWO PROVISIONS OF THE FINAL RULE

[Lowering the standard from 2.0 mg/m^3 to 1.5 mg/m^3 and basing determinations of noncompliance on single inspector samples]

	CWP 1+	CWP 2+	PMF	Severe emphysema	Deaths from NMRD
Number of Cases Prevented Over a 45-Year Work Life	593	473	319	248	26

For the proposed rule, MSHA assumed additional reductions in adverse health effects from converting respirable coal mine dust samples to an equivalent 8-hour concentration for work shifts longer than eight hours, and from the final definition of normal production shift. After considering comments and relevant data, MSHA is no longer requiring adjustments for shifts longer than 8 hours in the final rule; therefore, the reductions in adverse health effects associated with this provision are no longer assumed.

MSHA continues to assume additional reductions in cases of CWP, PMF, severe emphysema, and NMRD from the revised definition of normal production shift. If the requirement for the revised definition of normal production shift had been in effect in 2009, the amount of dust on the samples would have been higher due the higher levels of production during sampling. Lowering respirable coal mine dust exposures from these higher levels to the levels in the final rule will result in additional benefits beyond those associated with the recorded sampling results. MSHA used additional data from the feasibility assessment to extrapolate the further impact of this provision.

TABLE V–2—ESTIMATED NUMBER OF ADVERSE HEALTH EFFECTS PREVENTED, AS OF AGE 73, 45-YEAR WORKING LIFETIME, THREE PROVISIONS OF THE FINAL RULE

[Lowering the standard from 2.0 mg/m^3 to 1.5 mg/m^3, basing noncompliance on a single inspector sample and the revised definition of normal production shift]

	CWP 1+	CWP 2+	PMF	Severe emphysema	Deaths from NMRD
Number of Cases Prevented Over a 45-Year Work Life	869	655	433	374	65

MSHA also projects that the final rule will result in additional reductions in cases of other adverse health effects beyond those being quantified even after making the adjustment for the revised definition of normal production. While MSHA did not quantify the benefits associated with full-shift sampling as well as several other provisions of the final rule, MSHA believes that these provisions will significantly reduce coal mine dust exposures and reduce the incidences of disease.

To estimate the monetary values of the reductions in cases of CWP 1+, CWP 2+, PMF, severe emphysema, and deaths from non-malignant respiratory disease (NMRD) for the proposed rule, MSHA analyzed the imputed value of illnesses and fatalities avoided based on a willingness-to-pay approach. In the final rule, MSHA continues to use the willingness-to-pay approach to estimate the Agency's preferred dollar values of disease and death. However, in the final rule, MSHA estimated benefits using a range of disease values. These values and the resulting benefit estimates are discussed more fully in Chapter V of the REA.

The total undiscounted benefits are between $2.9 billion and $4.1 billion. However, using the Agency's preferred dollar values for disease, total undiscounted benefits are $3.4 billion

over a 65-year period. The total net benefit at 65 years, with a 3 percent discount rate, is $344.0 million, and the annualized net benefit is $12.1 million. At a 7 percent discount rate, the total net benefit is −$114.7 million and the annualized net benefit is −$8.1 million.

For the proposed rule, MSHA monetized the reduction in the number of deaths from NMRD using a study by Viscusi and Aldy (2003). MSHA retained this approach for the final rule. Viscusi and Aldy (2003) conducted an analysis of studies that use a willingness-to-pay approach to estimate the imputed value of life-saving programs (i.e., meta-analysis) and found that each fatality avoided was valued at approximately $7 million. Using the GDP Deflator (U.S. Bureau of Economic Analysis, 2010), the inflation-adjusted estimates are $8.7 million for each fatality avoided in 2010 dollars. This value of a statistical life (VSL) estimate is within the range of the majority of estimates in the literature ($1 million to $10 million per statistical life), as discussed in OMB Circular A–4 (OMB, 2003).

MSHA emphasizes that, although VSL is a useful statistical concept for monetizing benefits, it does not represent the value of a life. Rather, it represents a measurement related to risk reduction so that various options can be compared.

Coal Workers' Pneumoconiosis (CWP) is an occupational lung disease typically not incurred by the general population. When coal dust particles enter the lungs, they irritate the delicate lung tissue and eventually form massive impenetrable fibrous tissue that significantly restricts the lung's functions and causes scarring, which can lead to lung failure and death. Once CWP develops, it cannot be reversed and, in many cases, the condition will get progressively worse even after exposure of the harmful coal dust has stopped. In this way, or through continued exposure, CWP can progress to total disability in the form of PMF and severe emphysema and can cause premature death.

Valuation of Avoided Cases of CWP 1+ and CWP 2+

Research has shown that lung-function decreases and the degree of impairment increases with the transition from CWP 1+ to CWP 2+. NIOSH defines impairment of lung function as a forced expiratory volume (FEV_1) less than 80 percent of predicted normal values. Miners with simple pneumoconiosis (CWP 1+ and CWP 2+) or chronic bronchitis exhibit an FEV_1 of 80 percent or less of predicted normal values. For the proposed rule, MSHA monetized the reduction in cases of CWP 1+ and CWP 2+ using the study by Viscusi and Aldy (2003) that valued each lost work-day injury at approximately $50,000 in 2000 dollars. Using the GDP deflator, the inflation-adjusted estimate was $62,000 for each injury avoided in 2010 dollars.

In the final rule, MSHA's preferred dollar value for avoiding a case of CWP 1+ continues to be based on the Viscusi and Aldy (2003) lost-time injury willingness-to-pay estimate used in the proposed rule. MSHA's preferred value for avoiding a case of CWP 2+ is $431,000. The value for CWP 2+ is based on an Environmental Protection Agency (EPA) final rule that estimated an avoided case of chronic bronchitis at $410,000 in 2007 dollars (U.S. Environmental Protection Agency, Office of Air and Radiation, 2011). MSHA revised the Agency's preferred dollar values for CWP 2+ after reviewing literature, considering EPA's assumption that the cases due to environmental causes were less severe than occupational sources, and determining that CWP 2+ and chronic bronchitis are similar. These diseases are similar in that, at early stages, they cause minimal damage to lung tissue, and if further exposure is prevented, progression to more serious forms of disease may be avoided. Like chronic bronchitis, CWP 2+, while a material impairment of health, is not disabling.

Valuation of Progressive Massive Fibrosis (PMF) and Severe Emphysema

As noted in the QRA, miners with PMF qualify as being presumptively totally disabled under the Department of Labor criteria in 20 CFR 718.304(a). The Social Security Administration (SSA) also recognizes PMF as a presumptively disabling condition (*http://www.ssa.gov*). Miners with PMF are unable to work.

PMF is identified on chest x-rays by large lesions (nodular masses) greater than 1 cm in diameter and often multiple and bilateral, represent coalescence of smaller nodules. Disability is caused by destruction of lung tissue that is incorporated into the nodules (Rubin's Pathology, 2011). As PMF worsens, adjacent lung tissue retracts towards the lesions, typically in the upper airways. Alveoli and blood vessels are destroyed and airways become distorted and inflexible as lung function is lost (Wade, 2011). PMF causes a mixed obstructive and restrictive lung function pattern. Distortion of the airways results in irreversible obstructive changes; the large masses of fibrous tissue reduce the useful volume of the lung. Abnormally low concentration of oxygen in the blood (hypoxemia), pulmonary heart disease (cor pulmonale), and terminal respiratory failure may occur in persons with PMF (Lyons and Campbell, 1981; Attfield and Wagner, 1992; Miller and Jacobsen, 1985; West, 2011). The NIOSH Respiratory Disease Research Program documented that PMF is a disabling and life-threatening condition (NIOSH, 2007; Castranova and Vallyathan, 2000). PMF is progressive, totally disabling, and incurable, and causes premature death.

Severe emphysema also is progressive, disabling, and incurable, and causes premature death (*http://www.nhlbi.nih.gov, http://www.ssa.gov*). The QRA characterizes severe emphysema as a disabling loss of respiratory function. Miners with severe emphysema are unable to work. NIOSH defines a severe and disabling decrement in lung function as a FEV_1 of less than 65 percent of expected normal values. A person with severe emphysema will have a lung function, as measured by FEV_1 numbers for severe emphysema reveal between 49 and 30 percent of normal lung function (FEV_1/FVC <49–30 percent).

According to the National Heart, Lung, and Blood Institute, HHS (*http://www.nhlbi.nih.gov*), although emphysema develops slowly, a person's symptoms often worsen over time and can impair the ability to perform any normal daily activity. Flare-ups (exacerbations) from the disease become more frequent. These flare-ups can become increasingly serious, even deadly, with FEV_1 numbers during these episodes revealing less than 30 percent of normal lung function (FEV_1/FVC <30 percent). Respiratory failure can occur, which may also lead to effects on the heart such as right heart failure (cor pulmonale).

For the final rule, MSHA reviewed the work of Magat, Viscusi and Huber (1996), which measured willingness-to-pay values for reducing the probability of contracting nerve disease (peripheral neuropathy) and two forms of lymphoma (cancer of the lymph system). This study found that the median amount persons would be willing to pay to avoid nerve disease was 40 percent of what they would pay to avoid death in a car crash, and was 58.3 percent to avoid non-fatal lymphoma.

MSHA also reviewed the work of Viscusi, Magat, and Huber (1991). This earlier study laid the groundwork for the methodology used in Magat et al. (1996). Viscusi et al. (1991) measured a willingness-to-pay value for reducing

the probability of contracting chronic bronchitis. The study found that the median amount persons would be willing to pay to avoid chronic bronchitis was 32 percent of what they would pay to avoid death in a car crash, although it found that the mean (average) amount was 68 percent.

In developing the estimates for the final rule, MSHA used both Viscusi et al. 1991 and Magat et al. 1996, although MSHA believes that the willingness-to-pay values in the Magat et al. 1996 study are more closely related to those for PMF and severe emphysema. MSHA reevaluated the diseases in the Magat et al. (1996) study and determined that peripheral neuropathy (nerve disease) is a disabling disease like PMF and severe emphysema and causes a more comparable degree of disability than curable lymphoma.

The health consequences of nerve disease as described in this study include, among other things, weakness, inability to move, constant pain, depression, inability to work. Nerve disease also is incurable. These health consequences of nerve disease, as described, are similar to the health effects of PMF and severe emphysema discussed above. One difference is that the end point of PMF and severe emphysema is the probability of premature death; the authors stated that nerve disease ''is nonfatal in most cases.'' For this reason, it is possible that subjects may be willing to pay more to avoid PMF and severe emphysema than to avoid nerve disease.

Viscusi et al. (1991), on the other hand, measured a willingness-to-pay value for reducing the probability of contracting chronic bronchitis. Although chronic bronchitis is a respiratory disease, it is a fundamentally different disease than PMF or severe emphysema in terms of health effects. Generally, chronic bronchitis does not progress if exposure is halted. The health implications listed by Viscusi et al. (1991), while serious, are not totally disabling. Early diagnosis and treatment can improve a person's quality of life (*http://www.nhlbi.nih.gov*). Chronic bronchitis may or may not cause airway obstruction such as scarring or destruction of lung tissue. The health implications of chronic bronchitis identified by Viscusi et al. (1991) also did not include premature death, a well-known outcome of PMF and severe emphysema. For these reasons MSHA concluded that the symptoms expressed in Magat et al. (1996) are more comparable to the disabling consequences and long-term health effects of PMF and severe emphysema.

However, both studies are methodologically imperfect. The authors in Viscusi et al. 1991 stated that due to the need for further research into the potential biases of their method, ''much further research is needed before applying the methodology to give estimates precise enough to be used in regulatory analyses.'' Specifically, the authors identified that sensitivity analyses was needed to determine the degree of familiarity persons must have with the health benefit being valued. The authors in Magat et al. 1996 stated that their methodology was limited and only valued one form of nerve disease and two forms of lymphoma. The authors stated that ''specific results for nerve disease and lymphoma cannot be directly used for the valuation of other diseases.'' Moreover, although they described their 1991 study as ''elicit[ing] values for avoiding short term health risks'', their 1991 study described itself as focusing on ''the most severe chronic morbidity effects of chronic bronchitis''.

MSHA evaluated both studies and for its benefit calculation and concluded that the value of avoiding PMF and severe emphysema is in a range between 32 percent of VSL (Viscusi et al. 1991) and 40 percent of VSL (Magat et al. 1996); thus, MSHA chose (36 percent), the average of the two, for the Agency's preferred value for PMF and severe emphysema. Using this approach, the value for avoiding a case of PMF or severe emphysema is $3.15 million (36.0 percent of $8.7 million) for a total estimated value of $2.5 billion. This is an appropriate approach in estimating the value of avoiding PMF and severe emphysema given the methodological limitations of both studies.

MSHA monetized the total benefit estimates by multiplying the number of adverse health effects in Tables V–1 and V–2 by the monetized value of each adverse health effect. For example, MSHA estimates a benefit of $221.5 million (as of age 73, 45-year working lifetime) for avoided deaths based on: (1) Reducing the respirable dust standard; and (2) basing determinations of noncompliance on single MSHA inspector samples. MSHA multiplied the 25.5 deaths from NMRD (the estimates in Tables V–1 and V–2 were rounded to the nearest whole number) by the $8.7 million per death prevented. Based on this analysis, MSHA projects that an estimated $2.2 billion in adverse health effects will be prevented as of age 73 (45-year working lifetime) due to reducing the respirable coal mine dust standards and basing determinations of noncompliance on single MSHA inspector samples. MSHA also projects that the final rule will result in an estimated $3.4 billion in adverse health effects prevented as of age 73 (45-year working lifetime) due to these two requirements plus the revised definition of normal production shift. The net benefits and benefits sections of the REA include additional details to explain the final steps in the benefit calculation.

In the preamble to the proposed rule, MSHA noted several limitations of the benefits analysis in the Preliminary Regulatory Economic Analysis (PREA). The benefits analysis in the PREA was based on the QRA for the proposed rule. As a result of comments received on the QRA for the proposed rule and discussed in Section III.B. of this preamble, MSHA revised the QRA for the final rule as follows:

- The QRA for the proposed rule did not account for uncertainties related to sampling error or the assumption that single-shift exposures currently above the proposed limits of 1.0 mg/m^3 (or 0.5 mg/m^3 for part 90 miners) would be reduced no further than necessary to achieve compliance with the proposed limits on each shift. MSHA's QRA for the final rule contains an analysis of uncertainty with respect to sampling error and a sensitivity analysis of MSHA's exposure estimates.
- MSHA's QRA for the proposed rule did not account for measures that operators may take to avoid having exposures on any shift exceed the proposed standard. The QRA for the final rule uses expected reduction factors to project the impact that the final rule will have on exposures at or below 1.5 mg/m^3, or 0.5 mg/m^3 for part 90 miners.

Some limitations in the benefits analysis in the REA may result in underestimating the benefits for the final rule.

- MSHA does not have data or quantitative models to quantify the benefits associated with several provisions of the final rule (e.g., full-shift sampling, quarterly sampling of designated occupations (DOs), other designated occupations (ODOs), and part 90 miners using the CPDM; periodic medical surveillance examinations; and extending the part 90 option to surface coal miners). The Agency expects that these provisions will reduce the respirable dust levels and further protect miners from the debilitating effects of occupational respiratory disease. If the required data and quantitative models were available, MSHA believes that the combined effect of these provisions, particularly the requirements for full-shift sampling, and requiring more frequent sampling of

selected occupations and locations using the CPDM in underground coal mines would produce risk reductions beyond those projected in Table 28 of the QRA as well as an increase in the quantified benefits reported in the REA.

- As shown in Table 28 of the QRA for the final rule, since MSHA does not have data on the smoking status of the mining population specific to occupation and work location, the Agency assumed that all miners were non-smokers when calculating the number of cases of severe emphysema that would be reduced. Overall, Kuempel et al. (2009a) established that exposure to coal mine dust can produce clinically important levels of emphysema in coal miners regardless of smoking status. Furthermore, Attfield and Seixas (1995) tested the effects of smoking and CWP incidence and found that smoking contributed substantially less to the incidence of disease than age.
- In the REA, MSHA estimated the number of adverse health effects prevented by multiplying the estimated risk reductions presented in Table 28 of the QRA for the final rule by the current number of coal miners in each occupation estimated to be directly involved in or in the vicinity of operations that generate respirable coal mine dust. However, because MSHA does not have the racial composition of the mining population specific to occupation and work location, the Agency applied the risk factor for whites to all miners when calculating the number of cases of severe emphysema that would be prevented. Results are summarized in Table V–2 of the REA. On average, benefits would be underestimated for non-whites because the reduction in excess risk for non-whites is greater than that for whites for 17 of the 19 underground occupations, part 90 miners, and 11 of the 14 surface occupations (See Table 28 of the QRA).

On the other hand, in both the PREA and the REA, MSHA assumed a 45-year working life which may yield larger estimates of the number of cases of pneumoconiosis and possibly overestimate the benefits for the final rule. MSHA's longstanding practice to use a 45-year working life assumption for health standards is not based on empirical data that most miners are exposed to respirable coal mine dust for 45 years. Rather, it is based on the Mine Act's statutory directive that no miner suffer material impairment of health or functional capacity even if such miner is exposed to the hazard for the period of his or her working life. To the extent that miners' careers are shorter than 45 years, the actual benefits may be lower. In order to compare the estimate of benefits with the estimate of costs, it is necessary to project the timing of the benefits. Risk assessments in the occupational environment are generally designed to estimate the risk of an occupationally related illness over the course of an individual worker's lifetime. The estimate of benefits is calculated by comparing the number of cases at the current occupational exposure level of 2.0 mg/m^3 to the projected number of cases at the final dust level of 1.5 mg/m^3. Current respirable coal mine dust occupational exposure estimates were constructed from samples collected during the 2008 fiscal year. The number of projected cases anticipated under compliance with the final dust standard was estimated by reducing any 2008 fiscal year dust samples that were reported above the final dust standard to 1.5 mg/m^3. In order to annualize the benefits for the period of time after the final rule takes effect, it is necessary to create a timeline of benefits for an entire active workforce over that period.

While there are various approaches that could be used for modeling the workforce, there are two extremes. At one extreme, one could assume that none of the benefits occur until after the current workforce retires. Under this approach, workers with minimal cumulative exposure (both in terms of years of exposure and levels of exposure) would be assumed not to benefit from the revised standard. At the other extreme, one could assume that the benefits occur immediately. However, based on the various risk models, which reflect real-world experience with development of disease over an extended period of time, neither extreme is appropriate. MSHA estimated net benefits based on a 45-year working lifetime as used in the QRA for the proposed and final rule.

In the proposed rule, MSHA estimated the timeline for benefits in two different ways. First, benefits would begin immediately and annual benefits equal lifetime benefits divided by 45 years; benefits would begin to accrue in the first year after the provisions are put into effect. Second, no benefits would occur for the first 10 years and the annualized benefit for each of the next 35 years would be equal to the projected benefits divided by 35 years. MSHA preferred the second estimation method. In both methods under the proposed rule, MSHA estimated that it would take 45 years to reach the benefits calculated for the 45-year working lifetime.

For the final rule, net benefits are based on a single probability distribution (Poisson distribution with mean of 20 years) that represents the combined effects of worker turnover, disease progression, and uncertainty. The use of a single probability distribution to model the combined effects of employee turnover and the progression of disease and morbidity creates a smooth benefit stream rather than a discontinuous stream such as the one used for the proposed rule, where annual benefits abruptly jumped from zero to 1/35th of the total benefits in year 11. Under this approach, it would take 65 years to reach the benefits calculated for the 45 year working lifetime.

C. Compliance Costs

This section presents a summary of MSHA's estimate of costs that will be incurred by operators of underground coal mines and surface coal mines to comply with the final rule. These costs are based on MSHA's assessment of the most likely actions that would be necessary to comply with the final rule. Detailed analysis is provided in the cost chapter (Chapter 4) of the REA. Several different discounting streams are also presented in the net benefits chapter (Chapter 3).

MSHA estimates that the first year cost of the final rule will be $61 million and the annualized cost of the final rule at a 7 percent discount rate will be $28.1 million.

The estimated first year cost of the final rule for underground coal mine operators will be $52.7 million. Costs associated with the final requirement to use CPDMs ($34.1 million) and upgrading and maintaining engineering controls and work practices ($10.7 million) represent the most significant estimated first year costs for underground coal operators.

The first year cost of the final rule for surface coal mine operators will be $8.3 million. The part 90 option represents the most significant estimated first year cost for surface operators ($3.9 million).

MSHA estimates that, at a 7% discount rate, the annualized cost of the final rule for underground coal mine operators will be $26.2 million. Costs associated with the use of CPDMs ($14.6 million) and upgrading and maintaining engineering controls and work practices ($5.1 million) represent the most significant estimated annualized costs for underground coal operators.

MSHA estimates that the annualized cost of the rule for surface coal operators will be $4.0 million. Costs associated with the use of CMDPSUs (gravimetric samplers) ($1.1 million) and the extension of the part 90 option ($1.1 million) represent the most significant annualized estimated costs for surface coal miners.

D. Net Benefits

Net benefits are benefits minus costs. The long period to reach full benefits requires consideration of inter-generational impacts with discount rates such as 3 percent. MSHA estimates that the net benefits of the final rule are positive, with annualized net benefits of $12.1 million at a discount rate of 3 percent, and negative with annualized net benefits of −$8.1 million at a discount rate of 7 percent. Under the Mine Act, MSHA is not required to use estimates of net benefits as the basis for its regulatory decisions. The net benefits at both the 3 and 7 percent discount rates do not include the benefits associated with sampling over a full-shift using the CPDM as well as several other provisions (e.g. quarterly sampling of designated occupations, other designated occupations, and part 90 miners using the CPDM; periodic medical surveillance examinations; and extending the part 90 option to surface coal miners) of the final rule. These provisions, although not quantified, will significantly reduce coal mine dust exposures and the incidences of other lung disease, and significantly increase benefits. Congress realized that there ''is an urgent need to provide more effective means and measures for improving the working conditions and practices in the Nation's coal or other mines in order to prevent death and serious physical harm, and in order to prevent occupational diseases originating in such mines.'' 30 U.S.C. 801(c). In promulgating mandatory standards dealing with toxic materials or harmful physical agents, Section 101(a)(1)(A) of the Mine Act (30 U.S.C. 811(a)(6)(A)) requires MSHA to set standards ''which most adequately assure on the basis of the best available evidence that no miner will suffer material impairment of health . . . even if such miner has regular exposure to the hazards dealt with by such standard for the period of his working life.'' It further requires that to attain the highest degree of health and safety protection for the miner, other considerations in setting such standards shall be ''the latest available scientific data in the field, the feasibility of the standards, and experience gained under this and other health and safety laws.'' In adopting the language of Section 101(a)(6)(A), the Senate Committee on Human Resources emphasized that ''it rejects the view that cost benefit ratios alone may be the basis for depriving miners of the health protection which the law intended to insure.'' S. Rep. No. 95–181, 95th Cong. 1st Sess. 21 (1977).

VI. Regulatory Flexibility Act and Small Business Regulatory Enforcement Fairness Act

In accordance with the Regulatory Flexibility Act (RFA) of 1980, as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA), MSHA has analyzed the compliance cost impact of the final rule on small entities. Based on that analysis, MSHA has determined and certifies that the final rule will not have a significant economic impact on a substantial number of small entities.

The factual basis for this certification is presented in full in Chapter VI of the REA and in summary form below.

A. Definition of a Small Mine

Under the RFA, in analyzing the impact of a rule on small entities, MSHA must use the Small Business Administration's (SBA's) definition of a small entity, or after consultation with the SBA Office of Advocacy, establish an alternative definition for the mining industry by publishing that definition in the **Federal Register** for notice and comment. MSHA has not established an alternative definition and is required to use SBA's definition. The SBA defines a small entity in the mining industry as an establishment with 500 or fewer employees. There are 412 underground mines and 1,119 surface mines that meet the SBA definition.

MSHA has also examined the impact of the final rule on mines with fewer than 20 employees, which MSHA and the mining community have traditionally referred to as ''small mines.'' There are 81 underground mines and 620 surface mines that meet this criterion as a small mine. These small mines differ from larger mines not only in the number of employees, but also in economies of scale in material produced, in the type and amount of production equipment, and in supply inventory. Therefore, their costs of complying with MSHA's rules and the impact of the agency's rules on them will also tend to be different. This analysis complies with the requirements of the RFA for an analysis of the impact on ''small entities'' while continuing MSHA's traditional definition of ''small mines.''

B. Factual Basis for Certification

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

Estimated revenue for underground and surface coal mines is derived from data on coal prices and tonnage. The 2010 price of coal was $60.73 per ton for underground coal and $24.13 per ton for surface coal.[63]

Throughout the economic analysis, MSHA used 2009 mine production to remain consistent with the data used in the QRA for the final rule and the output of the QRA used for the analysis of the benefits in the REA. In addition, 2010 coal pricing was used to be consistent with wage rates and costs used in the cost analysis. Overall coal production tonnage did not vary significantly from 2009 to 2010.

For underground coal mines with 1–19 employees, coal production in 2009 was approximately 5.036 million tons. Multiplying the tonnage from these small mines by the $60.73 price per ton in 2010 results in estimated revenues of $305.8 million. The annualized cost of the final rule, including penalty payments, for these mines is approximately $1.5 million. Dividing estimated costs for the final rule by estimated revenues results in 0.5 percent of annual revenues. The average compliance cost for an underground mine with 1–19 employees is $18,450 ($1.5 million divided by 81 mines).

For underground coal mines with 1–500 employees, coal production in 2009 was approximately 241.6 million tons. Multiplying this tonnage by the $60.73 price per ton in 2010 results in estimated revenues of $14.7 billion. The annualized cost of the final rule, including penalty payments, for these mines is approximately $24.7 million. Dividing estimated costs for the rule by estimated revenues results in 0.2 percent of annual revenues. The average compliance cost for an underground mine with 1–500 employees is $59,950 ($24.7 million divided by 412 mines).

For surface coal mines with 1–19 employees, coal production in 2009 was approximately 19.7 million tons. Multiplying this tonnage by the $24.13 price per ton in 2010 results in estimated revenues of $475.7 million. The annualized cost of the final rule, including penalty payments, for these mines is approximately $1.0 million.

[63] U.S. DOE, EIA, ''Annual Coal Report 2010,'' Table 28, *http://www.eia.gov/coal/annual/archive/05842010.pdf.*

Dividing estimated costs by estimated revenues results in 0.2 percent of annual revenues. The average compliance cost for a surface mine with 1–19 employees is $1,625 ($1.0 million divided by 620 mines).

For surface coal mines with 1–500 employees, coal production in 2009 was approximately 494.8 million tons. Multiplying this tonnage by the $24.13 price per ton in 2010 results in estimated revenues of $11.9 billion. The annualized cost of the final rule, including penalty payment, for these mines is approximately $3.7 million. Dividing estimated costs into estimated revenues results in 0.03 percent of annual revenues. The average compliance cost for a surface mine with 1–500 employees is $3,300 ($3.7 million divided by 1,119 mines).

Based on all analyses, the annualized costs of the final rule are less than one percent of annual revenue for both small underground and surface coal mines, as defined by SBA. Therefore, MSHA certifies that the final rule will not have a significant impact on a substantial number of small mining entities. Chapter VI of the REA to the final rule contains a complete analysis of the cost impact on small mines.

VII. Paperwork Reduction Act of 1995

A. Summary

The Paperwork Reduction Act (PRA) provides for the Federal government's collection, use, and dissemination of information. The goals of the PRA include minimizing paperwork and reporting burdens and ensuring the maximum possible utility from the information that is collected under 5 CFR part 1320. There are provisions of this final rule that take effect at different times after the final rule is effective and there are provisions that have different burden hours, burden costs, and responses each year. Because of this, MSHA shows the estimates of burden hours, burden costs and responses in three separate years.

In the first year that the final rule is in effect, the mining community will incur 181,955 burden hours with related hour burden costs of approximately $9,722,897 and 3,991,079 responses related to the information collection.

In the second year that the final rule is in effect, the mining community will incur 175,101 burden hours with related burden costs of approximately $9,413,180 and 3,924,609 responses related to the information collection.

In the third year that the final rule is in effect, the mining community will incur 171,908 burden hours with related burden costs of approximately $9,324,041 and 3,874097 responses related to the information collection.

B. Procedural Details

The Department will, concurrent with publication of this rule, submit the information collections contained in this final rule to the Office of Management and Budget (OMB) for review under the PRA, as part of a request for a new control number (Information Collection Review (ICR) Reference No: 201012–1219–003) and will begin revisions to Control Numbers 1219–0088, 1219–0011, 1219–0009. The Department will publish an additional Notice on OMB's action on the ICR and when the information collection requirements will take effect. The regulated community is not required to respond to any collection of information unless it displays a current, valid, OMB control number. MSHA displays the OMB control numbers for the ICR in its regulations in 30 CFR part 3. The total information collection burden is summarized as follows:

Title of Collection: Ventilation Plans, Tests, and Examinations in Underground Mines; OMB Control Number: 1219–0088.

Title of Collection: Mine Operator Dust Data Cards; OMB Control Number: 1219–0011.

Title of Collection: Respirator Program Records; OMB Control Number: 1219–0009.

Title of Collection: Medical Surveillance; OMB Control Number: 1219–0NEW.

Affected Public: Private sector-businesses or other for-profits.

Estimated Number of Respondents: 1,547 respondents.

Estimated Number of Responses: 3,991,079 responses in the first year; 3,924,609 responses in the second year; and 3,874,097 responses in the third year.

Estimated Number of Burden Hours: 181,955 hours in the first year; 175,101 hours in the second year; and 171,908 hours in the third year.

Estimated Hour Burden Costs: $9,722,897 in the first year; $9,413,180 in the second year and $9,324,041 in the third year.

Estimated Capital Costs Related to the Information Collection Package: $69,931 in the first year; $52,547 in the second year; and $39,523 in the third year.

MSHA received comments on the information collection requirements contained in the proposed rule. These comments are addressed in applicable sections of Section IV, Section-by-Section Analysis, of this preamble and in the Supporting Statement for the information collection requirements for this final rule. The Information Collection Supporting Statement is available at *http://www.reginfo.gov/public/do/PRAMain,* on MSHA's Web site at *http://www.msha.gov/regs/fedreg/informationcollection/informationcollection.asp,* and at *http://www.regulations.gov*. A copy of the Statement is also available from MSHA by request to Sheila McConnell at *mcconnell.sheila.a@dol.gov,* by phone request to 202–693–9440, or by facsimile to 202–693–9441.

VIII. Other Regulatory Considerations

A. National Environmental Policy Act (NEPA)

The National Environmental Policy Act (NEPA) of 1969 (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. The final respirable coal mine dust rule has been reviewed in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321 et seq.), the regulations of the Council of Environmental Quality (CEQ) (40 CFR part 1500) and the Department of Labor's NEPA compliance procedures (29 CFR part 11). In the **Federal Register** of October 19, 2010 (75 FR 64412), MSHA made a preliminary determination that the proposed respirable coal mine dust rule was of a type that does not have a significant impact on the human environment. MSHA's preliminary determination was based on its environmental assessment which considered the factors set forth in 29 CFR 11.11(c). MSHA has complied with the requirements of the NEPA, including the Department of Labor's compliance procedures and the regulations of the Council on Environmental Quality. The Agency has not received any new information or comments that would affect its previous determination. As a result of the Agency's review of the final respirable coal mine dust rule, MSHA has concluded that the rule will not have significant environmental impacts, and therefore an environmental impact statement is not required.

B. The Unfunded Mandates Reform Act of 1995

MSHA has reviewed the final rule under the Unfunded Mandates Reform Act of 1995 (2 U.S.C. 1501 et seq.). MSHA has determined that this final rule does not include any federal mandate that may result in increased

expenditures by State, local, or tribal governments; nor will it increase private sector expenditures by more than $100 million (adjusted for inflation) in any one year or significantly or uniquely affect small governments. Accordingly, the Unfunded Mandates Reform Act of 1995 (2 U.S.C. 1501 et seq.) requires no further Agency action or analysis.

C. 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) requires agencies to assess the impact of Agency action on family well-being. MSHA has determined that the final rule will have no effect on family stability or safety, marital commitment, parental rights and authority, or income or poverty of families and children. The final rule impacts the coal mine industry. Accordingly, MSHA certifies that the final rule will not impact family well-being.

D. Executive Order 12630: Government Actions and Interference With Constitutionally Protected Property Rights

This final rule does not implement a policy with takings implications. Accordingly, under E.O. 12630, no further Agency action or analysis is required.

E. Executive Order 12988: Civil Justice Reform

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

F. Executive Order 13045: Protection of Children From Environmental Health Risks and Safety Risks

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

G. Executive Order 13132: Federalism

The final rule does not have ''federalism implications'' because it does not ''have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.'' Accordingly, under E.O. 13132, no further Agency action or analysis is required.

H. Executive Order 13175: Consultation and Coordination With Indian Tribal Governments

The final rule does not have ''tribal implications'' because it does not ''have substantial direct effects on one or more Indian tribes, on the relationship between the Federal government and Indian tribes, or on the distribution of power and responsibilities between the Federal government and Indian tribes.'' Accordingly, under E.O. 13175, no further Agency action or analysis is required.

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

Executive Order 13211 requires agencies to publish a statement of energy effects when a rule has a significant energy action that adversely affects energy supply, distribution or use. The final rule has been reviewed for its impact on the supply, distribution, and use of energy because it applies to the coal mining industry. Insofar as MSHA estimates that the final rule will result in annualized costs of $27.1 million (includes costs to underground coal mine operators and penalty costs) for the underground coal industry relative to annual revenues of $20 billion in 2010 dollars and annualized costs of $4.0 million (includes costs to surface coal mine operators and penalty costs) for the surface coal industry relative to annual revenue of $17.9 billion in 2010 dollars, it is not a ''significant energy action'' because it is not ''likely to have a significant adverse effect on the supply, distribution, or use of energy * * * (including a shortfall in supply, price increases, and increased use of foreign supplies).'' Accordingly, Executive Order 13211 requires no further Agency action or analysis.

J. Executive Order 13272: Proper Consideration of Small Entities in Agency Rulemaking

MSHA has thoroughly reviewed the final rule to assess and take appropriate account of its potential impact on small businesses, small governmental jurisdictions, and small organizations. MSHA has determined and certified that the final rule does not have a significant economic impact on a substantial number of small entities.

IX. References

Ahmad, D., W.K.C. Morgan, N.L. Lapp, R. Reger, J.J. Renn III. 2002. Correspondence: Letter To the Editor, Meretricious Effects of Coal Dust, re: Beeckman, et al. (2001), Am J Respir Crit Care Med., 165(4):552–553.

Alli, B.O. 2008. Fundamental Principles of Occupational Health and Safety, Second ed. International Labour Office, Geneva, Switzerland.

American Iron and Steel Institute and Bethlehem Steel Corporation, et al. v. Occupational Safety and Health Administration and U.S. Department of Labor, et al., 939 F.2d 975 (D.C. Cir. 1991).

American Mining Congress v. Secretary of Labor, 671 F.2d 1251 (10th Cir. 1982).

Antao, V.C. dos S., E.L. Petsonk, L.Z. Sokolow, A.L. Wolfe, G.A. Pinheiro, J.M. Hale, and M.D. Attfield. 2005. Rapidly Progressive Coal Workers' Pneumoconiosis in the United States: Geographic Clustering and Other Factors. Occup Environ Med., 62(10):670–674.

Antao, V.C., E.L. Petsonk, and M.D. Attfield. 2006. Advanced Cases Of Coal Workers' Pneumoconiosis, Two Counties, Virginia. Morbidity and Mortality Weekly Report, 55(33):909–913.

Attfield, M.D., and T.K. Hodous. 1992. Pulmonary Function of U.S. Coal Miners Related to Dust Exposure Estimates. American Review of Respiratory Disease, 145:605–609.

Attfield, M.D., and K. Morring. 1992a. The Derivation Of Estimated Dust Exposures For U.S. Coal Miners Working Before 1970. Am Ind Hyg Assoc J, 53:248–255.

Attfield, M.D., and K. Morring. 1992b. An Investigation Into The Relationship Between Coal Workers' Pneumoconiosis And Dust Exposure In U.S. Coal Miners. Am Ind Hyg Assoc J, 53:486–492.

Attfield, M.D., and N.S. Seixas. 1995. Prevalence of Pneumoconiosis and Its Relationship to Dust Exposure in a Cohort of U.S. Bituminous Coal Miners and Ex-Miners. Am J Ind Med., 27:137–151.

Attfield, M.D., E. Kuempel, and G. Wagner. 1997.

Exposure-response for Coal Workers' Pneumoconiosis In Underground Coal Miners: A Discussion Of Issues And Findings. Annals of Occupational Hygiene, Vol. 41, Supplement 1: 341–345.

Attfield, M.D., and E.D. Kuempel. 2003. Commentary—Pneumoconiosis, Coalmine Dust, and the PFR. The Annals of Occupational Hygiene, 47(7):525–529.

Attfield, M.D., G. Wagner, 1992. Respiratory Disease In Coal Miners. Rom, W.N. 2nd ed. Environmental and Occupational Medicine, Little, Brown, Boston, pp 325–344.

Attfield, M.D., V. Castranova, and G. Wagner. 2007. Respiratory Disease in Coal Miners. Rom, W.N., ed. Environmental and Occupational Medicine, 4th ed., Chapter 22.

Attfield, M.D., and E.L. Petsonk. 2007. Advanced Pneumoconiosis Among Working Underground Coal Miners—Eastern Kentucky and Southwestern Virginia. 2006. Morbidity and Mortality Weekly Report, 56(26):652–655.

Attfield, M.D., and E.D. Kuempel. 2008. Mortality among U.S. Underground Coal Miners, A 23-Year Follow-Up. Am J Ind Med, 51(4):231–245.

Attfield, M.D., and E. Kuempel. 2010. Erratum to Mortality Among U.S. Underground Coal Miners; A 23-Year Follow-Up. Letter to Editor. Am J Ind Med, 53(5):550.

Attfield, M.D., K.M. Bang, E.L. Petsonk, P.L. Schleiff, and J.M. Mazurek. 2009. Trends in Pneumoconiosis Mortality and Morbidity for the United States, 1968–2005, and Relationship With Indicators of Extent of Exposure. Proceedings of Inhaled Particles X, Manchester, UK. Journal of Physics: Conference Series 151, 012051, September 23–25, 2008. doi:10.1088/1742–6596/151/1/012051.

Bailer, A.J., L.T. Stayner, R.J. Smith, E.D. Kuempel, M.M. Prince. 1997. Estimating Benchmark Concentrations and Other Noncancer Endpoints in Epidemiology Studies. Risk Analysis, 17(6):771–780.

Bang, K., R. Althouse, J. Kim, and S. Game. 1999. Recent Trends of Age-Specific Pneumoconiosis Mortality Rates in the United States, 1985–1996: Coal Workers' Pneumoconiosis, Asbestosis, and Silicosis. International Journal of Occupational and Environmental Health, 5:251–255.

Beeckman, L.A., M.L. Wang, E.L. Petsonk, and G.R. Wagner. 2001. Rapid Declines in FEV_1 and Subsequent Respiratory Symptoms, Illnesses, and Mortality in Coal Miners in the United States. Am J Respir Crit Care Med, 163(3):633–639.

Beeckman, L.F., M.L. Wang, E.L. Petsonk, and G.R. Wagner. 2002. Correspondence: Response from the Authors, re: Ahmad, et al., Letter to Editor (2002), Am J Respir Crit Care Med, 165(4):553.

Boden, L. 1986. Evaluating Dust Exposure Using Operator-Reported Data. Ann Am Conf Gov Ind Hyg, 14:521–526.

Box, G.E.P., and D.R. Cox. 1964. An Analysis of Transformations. Journal of the Royal Statistical Society, Series B, 26:211–252.

Brower, P.S., and M.D. Attfield. 1998. Reliability of Reported Occupational History Information for U.S. Coal Miners, 1969–1977. Am J Epidemiol, 148(9):920–926.

Castranova, V., and V. Vallyathan. 2000. Silicosis and Coal Workers' Pneumoconiosis. Environmental Health Perspectives 2000, August 108 (Supplement 4) 675–684.

Cohen, R.A., A. Patel, and F.H. Green. 2008. Lung Disease Caused By Exposure to Coal Mine and Silica Dust. Seminars in Respiratory and Critical Care Medicine, Volume 29(6):651–661. Epub. Feb 16, 2009.

Colinet, J.F., J.P. Rider, J.M. Listak, J.A. Organiscak, and A.L. Wolfe. 2010. Best Practices for Dust Control in Coal Mining, U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. DHHS (NIOSH) Publication No. 2010–110, Information Circular 9517, Jan. 2010.

Cowie, H.A., B.G. Miller, and C.A. Soutar. 2006. Dust Related Risks Of Clinically Relevant Lung Functional Deficits. Occup Environ Med, 63(5):320–325.

Dempsey, P.G., M.M. Ayoub, T.M. Bernard, M.R. Endsley, W. Karwowski, C.L. Lin, and J.L. Smith. 1996. Ergonomic Investigation Of Letter-Carrier Satchels: Part I: Field study. Applied Ergonomics, 27(5):303–313.

Federal Coal Mine Health and Safety Act (1969), House Report No. 91–563, October 13, 1969, pp. 12–13.

Goddard, B., K. Bower, and D. Mitchell. 1973. Control of Harmful Dust In Coal Mines. National Coal Board, 6–12.

Goodwin, S., and M. Attfield. 1998. Temporal Trends in Coal Workers' Pneumoconiosis Prevalence. Validating the National Coal Study Results. J Occup Environ Med, 40(12):1065–71.

Gray, D., and M. Tillery. 1981. Cyclone Vibration Effects. Summary Reports. Industrial Hygiene Association, (42):685–688.

Grayson, R.L. 1999a. Letter, National Institute for Occupational Safety and Health, to Dr. Carol J. Jones, Acting Director, Office of Standards, Regulations and Variances, U.S. Department of Labor, Mine Safety and Health Administration. August 19, 1999.

Grayson, R.L. 1999b. Letter, National Institute for Occupational Safety and Health, to Dr. Carol J. Jones, Acting Director, Office of Standards, Regulations and Variances, U.S. Department of Labor, Mine Safety and Health Administration. September 27, 1999.

Green, Francis H.Y., P.L. Brower, V. Vallyathan, and M. Attfield. 1998a. Coal Mine Dust Exposure and Type of Pulmonary Emphysema in Coal Workers. In: Chiyotani, K., Y. Hosoda, Y. Aizawa, eds. Advances in the Prevention of Occupational Respiratory Diseases: Proceedings of the 9th International Conference on Occupational Respiratory Diseases. Kyoto, Japan: October 13–16, 1997, 948–953.

Henneberger, P.K., and M.D. Attfield. 1997. Respiratory Symptoms and Spirometry in Experienced Coal Miners: Effects of Both Distant and Recent Coal Mine Dust Exposures. Am J of Ind Med, 32(3):268–274.

Hintermann, B., A. Alberini, and A. Markandya. 2010. Estimating the Value of Safety With Labour Market Data: Are The Results Trustworthy? Applied Economics, 42(9): 1085–1100.

Huang, X., W. Li, M.D. Attfield, A. Nadas, K. Frenkel, and R.B. Finkelman. 2005. Mapping and Prediction of Coal Workers' Pneumoconiosis with Bioavailable Iron Content in The Bituminous Coals. Environmental Health Perspectives, 113(8):964–968.

International Council on Mining & Metals Good Practice Guidance on Occupational Health Risk Assessment. 2009. London, United Kingdom.

International Labour Office. 2011. Guidelines for the Use of the ILO International Classification Of Radiographs Of Pneumoconioses, 2011 edition. Geneva, Switzerland, 2011 (Occupational Safety and Health Series No. 22 (rev. 2011)).

Kennecott Greens Creek Mining Company v. MSHA and Secretary of Labor, 476 F.3d 946 (D.C. Cir. 2007).

Kennedy, E.R., T.J. Fischbach, R. Song, P.M. Eller, and S.A. Shulman. 1995. Guidelines for Air Sampling and Analytical Method Development and Evaluation, DHHS (NIOSH) Publication No. 95–117, May 1995.

Kogut, J., T.F. Tomb, M.B. Gareis, P.S. Parobeck, and A.J. Gero. 1999. Variability in Weight Gain of Unexposed Filter Capsules within Batches of Filter Capsules Used in MSHA's Respirable Coal Mine Dust Enforcement Program, Internal MSHA Report, 1999.

Kogut, J., T.F. Tomb, P.S. Parobeck, A.J. Gero, and K.L. Suppers. 1997. Measurement Precision With The Coal Mine Dust Personal Sampler. App Occ Environ Hyg, 12:999–1006.

Kogut, J. 1994. Memorandum of September 6, 1994, from Jon Kogut, Mathematical Statistician, Denver Safety and Health Technology Center, MSHA, to Ronald J. Schell, Chief, Division of Health, Coal Mine Safety and Health, MSHA, Subject: Coal Mine Respirable Dust Standard Noncompliance Determinations.

Kuempel, E.D., V. Vallyathan, and F.H.Y. Green. 2009a. Emphysema and Pulmonary Impairment in Coal Miners: Quantitative Relationship with Dust Exposure and Cigarette Smoking. Inhaled Particles X, (September 23–25, 2008, Manchester, UK). Journal of Physics: Conference Series, 151 (2009) 012014, doi:10.1088/1742–6596/151/1/012024.

Kuempel, E.D., M. Wheeler, R.J. Smith, V. Vallyathan, and F.H.Y Green. 2009b. Contributions of Dust Exposure and Cigarette Smoking to Emphysema Severity in Coal Miners in the United States. Am J Respir Crit Care Med, 180(3): 257–264.

Kuempel, E.D., E.J. O'Flaherty, L.T. Stayner, M.D. Attfield, F.H.Y. Green, and V. Vallyathan. 1997a. Relationships between Lung Dust Burden, Pathology And Lifetime Exposure In An Autopsy Study of U.S. Coal Miners. Ann Occup Hyg, Vol. 41, Supp. 1:384–389.

Kuempel E.D., R.J. Smith, M.D. Attfield, L.T. Stayner. 1997b. Risks of Occupational Respiratory Diseases Among U.S. Coal Miners. App Occup Environ Hyg, 12(12):823–831.

Laney, A., and M. Attfield. 2010. Coal Workers' Pneumoconiosis and Progressive Massive Fibrosis Are Increasingly More Prevalent Among Workers in Small Underground Coal Mines in the United States. Occup and Env Med, 67:428–431.doi:10.1136/oem.2009.050757.

Laney, A., E. Petsonk, and M. Attfield. 2009. Pneumoconiosis among Underground Bituminous Coal Miners in the United States: Is Silicosis Becoming More Frequent? Occup Environ Med; Online First, published on September 22, 2009 as 10.1136/oem.2009.047126; Occup Environ Med; 2010, 67:652–656.

Last, John M., ed. 2001. A Dictionary Of Epidemiology. Fourth Edition. New York: Oxford University Press, Inc.

Leidel, N., K. Busch, and J. Lynch. 1977. Occupational Exposure Sampling Strategy Manual. DHEW (NIOSH) Publication No. 77–173. U.S. Department of Health, Education, and Welfare, Public Health Service, Center for Disease Control, National Institute for Occupational Safety and Health. Cincinnati, OH 45226, January 1977.

Leigh, J., T.R. Driscoll, B.D. Cole, R.W. Beck, B.P. Hull, J. Yang. 1994. Quantitative Relation between Emphysema and Lung Mineral Content in Coal Workers, Occ and Env Med, 51(6):400–407.

Lin, C.J., P.G. Dempsey, and J.L. Smith, M.M. Ayoub, and T.M. Bernard. 1996. Ergonomic Investigation Of Letter-Carrier Satchels: Part II. Biomechanical Laboratory Study. Applied Ergonomics, 27(5):315–320.

Lippman, M., and R.E. Albert. 1969. The Effect Of Particle Size On The Regional Deposition Of Inhaled Aerosols In The Human Respiratory Tract. Am Ind Hyg Assoc J, 30:257–275.

Lyons J.P., Campbell H. 1981. Relation between Progressive Massive Fibrosis, Emphysema, And Pulmonary Dysfunction In Coalworkers' Pneumoconiosis. Br J Ind Med, 38:125–129.

MacCalman, L. and B. Miller. 2009. Mortality in an Extended Follow-Up of British Coal Workers. Inhaled Particles X, (September 23–25, 2008, Manchester, UK). Journal of Physics: Conference Series 151 (2009) 012050, doi:10.1088/1742–6596/151/1/012050.

Magat, W., W. Viscusi, and J. Huber. 1996. A Reference Lottery Metric For Valuing Health. *Management Science,* 42(8): 1118–1130.

Mazurek, J.M., A.S. Laney, and J.M. Wood. 2009. Coal Workers' Pneumoconiosis-Related Years Of Potential Life Lost Before Age 65 Years—United States, 1968–2006. Morbidity and Mortality Weekly Report, 58(50):1412–1416.

McCunney, R., P. Morfeld, and S. Payne. 2009. What Component Of Coal Causes Coal Workers Pneumoconiosis? J Occup Environ Med, 51(4):462–471.

Miller, B.G., and M. Jacobsen. 1985. Dust Exposure, Pneumoconiosis, and Mortality of Coalminers. British Journal of Industrial Medicine, 42(11)723–733.

Miller, B.G., L. MacCalman, and P. Hutchison. 2007. Mortality Over An Extended Follow-Up Period In Coal Workers Exposed To Respirable Dust And Quartz. Institute of Occupational Medicine, Research Report TM/07/06.

Miller, B.G., S. Hagen, R.G. Love, H.A. Cowie, M.W. Kidd, S. Lorenzo, ELJP Tielemans, A. Robertson, C.A. Soutar. 1995. Historical Research Report, A Follow-Up Study Of Miners Exposed To Unusual Concentrations Of Quartz Research Report TM/95/03:164. Edinburgh: Institute of Occupational Medicine.

Naidoo, R.N., T.G. Robins, A. Solomon, N. White, and A. Franzblau. 2004. Radiographic Outcomes among South African Coal Miners. International Archives of Occupational and Environmental Health, 77(7):471–81.

Naidoo, R.N., T.G. Robins, N. Seixas, U.G. Lalloo, and M. Becklake. 2005. Differential Respirable Dust Related Lung Function Effects Between Current And Former South African Coal Miners. International Archives of Occupational and Environmental Health, 78(4):293–302.

Naidoo, R.N., T.G. Robins, N. Seixas, U.G. Lalloo, and M. Becklake. 2006. Respirable Coal Dust Exposure And Respiratory Symptoms in South-African Coal Miners: A Comparison Of Current And Ex-Miners. J Occup Environ Med, 48(6):581–90.

National Mining Association (NMA) et al. v. Secretary of Labor, et al. 153 F.3d 1264 (11th Cir. 1998).

Neter, J., M.H. Kutner, C. Nachtsheim, and W. Wasserman. 1996. Applied Linear Statistical Models, 4th ed. Boston: WBC-McGraw-Hill.

Page, S., J. Volkwein, R. Vinson, G. Joy, S. Mischler, D. Tuchman, and L. McWilliams. 2008. Equivalency of a Personal Dust Monitor To The Current United States Coal Mine Respirable Dust Sampler. Journal of Environmental Monitoring, 10(1):96–101.

Parobeck, P.S., J. Kogut, T. Tomb, and L. Raymond. 1997. Investigation of Weighing Variability between MSHA and Mine Safety Appliances Co. Laboratories MSA. Internal MSHA Report.

Peters, R.H., C. Vaught, E. Hall, and J. Volkwein. 2008. Miners' Views About Personal Dust Monitors. Information Circular 9501, Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health.

Peters, R.H., B. Fotta, L.G. Mallett. 2001. The Influence Of Seam Height On Lost-Time Injury And Fatality Rates At Small Underground Bituminous Coal Mines. Appl Occup Environ Hyg, 16(11):1028–34.

Pollock, D., J. Potts, and G. Joy. 2010. Investigation into Dust Exposures And Mining Practices in the Southern Appalachian region. Mining Engineering, 62:44–9.

Rider, J.P. and J.F. Colinet. 2011. Benchmarking Longwall Dust Technology And Practices. Min Eng, 63(9):74–80, (U.S. DHHS, CDC, NIOSHTIC2 Number 20039782).

Rubin, R. 2011. Rubin's Pathology: Clinicopathologic Foundations of Medicine. Lippincott Williams and Wilkins, February 2011.

Scarisbrick, D.A., and R.M. Quinlan, 2002. Health Surveillance For Coal Workers' Pneumoconiosis in the United Kingdom 1998–2000. Ann Occup Hyg, 46(Supplement 1):254–256.

Seixas, N.S., T.G. Robins, M.D. Attfield, and L.H. Moulton. 1993. Longitudinal and Cross Sectional Analyses Of Exposure To Coal Mine Dust Pulmonary Function In New Miners. British Journal of Industrial Medicine, 50(10):929–937.

Seixas, N.S., L.H. Moulton, T.G. Robins, C.H. Rice, M.D., Attfield, and E.T. Zellers. 1991. Estimation of Cumulative Exposures for the National Study of Coal Workers' Pneumoconiosis. App Occ Environ Hyg, 6:1032–1041.

Senate Report Number 95–181. 95th Cong., 1st Sess. 21 (1977).

Soutar, C.A, J.F. Hurley, B.G. Miller, H.A. Cowie, and D. Buchanan. 2004. Dust Concentrations and Respiratory Risks In Coalminers: Key Risk Estimates From the British Pneumoconiosis Field Research. Occup Environ Med, 61(6):477–481.

Soutar, C.A., and J.F. Hurley. 1986. Relation between Dust Exposure And Lung Function In Miners And Ex-Miners. British Journal of Industrial Medicine, 43: 307–320.

State of West Virginia. 2011. Report to the Governor, Governor's Independent Investigation Panel, Upper Big Branch. The April 5, 2010, Explosion: A Failure Of Basic Coal Mine Safety Practices. May 2011.

Suarthana, E., A.S. Laney, E. Storey, J.M. Hale, M.D. Attfield. 2011. Coal Workers' Pneumoconiosis In The United States: Regional Differences 40 Years after Implementation of the 1969 Federal Coal Mine Health and Safety Act. Occup Environ Med, doi: 10.1136/oem.2010.063594. Epub 2011 May 19.

Sunstein, C. 2004. Valuing Life: A Plea For Disaggregation. Duke Law Journal, 54: 385–445.

Taylor, D.G., R.E. Kupel, and J.M. Bryant. 1977. Documentation of the NIOSH Validation Tests, U.S. Department of Health, Education, and Welfare, Public Health Service, Center for Disease Control, NIOSH, DHEW (NIOSH) Publication No. 77–185, April 1977, pp. 1–5.

Tomb, T.F. 1981. Memorandum from Thomas F. Tomb, Chief, Dust Division, Pittsburgh Health Technology Center, MSHA, to William Sutherland, Chief, Division of Health, Coal Mine Safety and Health, MSHA, Subject: Evaluation of Criterion Used To Select Respirable Coal Mine Dust Samples For Examination For Oversize Particles. August 31, 1981.

Tomb, T.F. 1994. Memorandum from Thomas F. Tomb, Chief, Dust Division, Pittsburgh Safety and Health Technology Center, MSHA, to Ronald J. Schell, Chief, Division of Health, Coal Mine Safety and Health, MSHA, Subject: Determination of the Precision Of Setting The Rotameter Ball To A Calibration Mark On Personal Respirable Dust Sampling Pumps. September 1, 1994.

Treaftis, H.N. and T.F. Tomb. 1974. Effect of Orientation On Cyclone Penetration Characteristics. Am Ind Hyg Assoc J, 35(10):598–602.

U.S. Bureau of Economic Analysis. 2010. National Income and Product Accounts Table: Table 1.1.9. Implicit Price Deflators for Gross Domestic Product [Index numbers, 2005=100]. Revised May 27, 2010.

U.S. Department of Defense. 2000. Test Method Standard for Environmental Engineering Considerations and Laboratory Tests, MIL–STD–810F, (Superseded MIL–STD–810E, 14 July 1989), January 1, 2000.

U.S. Department of Energy, U.S. Energy Information Administration, Office of Oil, Gas, and Coal Supply Statistics. Annual Coal Report 2010. Table 28: Average Sales Price of Coal by State and Mine Type, 2010, 2009: Average Sales Price of Coal by State and Coal Rank, 2010. DOE/EIA–0584 (2010) at: *http://www.eia.gov/coal/annual/archive/05842010.pdf.*

U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, letter from Steven E. Mischler et al. to Alan Matta, Product Manager, Air Quality Instruments, Thermo Fisher Scientific, Inc., re: Approval of the Model PDM 3600 TEOM instrument, dated September 6, 2011.

U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. 2011a. Current Intelligence Bulletin 64, Coal Mine Dust Exposure and Associated Health Outcomes, A Review of Information Published Since 1995, DHHS Publication No. 2011–72.

U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. 2011b. Coal Workers' Health Surveillance Program (CWHSP), Statistics for Underground Miners Working In MSHA Districts 01 to 11, from Data Queries: February 13, 2011.

U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health (NIOSH). 2010. Engineering Controls—NIOSH Workplace Safety and Health Topic. *http://www.cdc.gov/niosh/topics/engcontrols,* June 25, 2010.

U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health (NIOSH). 2008. Work-related Lung Disease Surveillance Report 2007. Volume 1. NIOSH Publication No. 2008–143a. Morgantown, WV. On the web: *http://www.cdc.gov/niosh/docs/2008–143/*

U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health (NIOSH). 2007: NIOSH Respiratory Diseases Research Program Evidence Package for the National Academies' Review 2006–2007. *http://www.cdc.gov/niosh/nas/rdrp/ch3.1a.htm.*

U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. 1995. Criteria for a Recommended Standard: Occupational Exposure to Coal Mine Dust.

U.S. Department of Labor, Mine Safety and Health Administration. 1992. Report of the Coal Mine Respirable Dust Task Group. Review of the Program to Control Respirable Coal Mine Dust in the United States.

U.S. Department of Labor, Mine Safety and Health Administration. 1993. Report of the Statistical Task Team of the Coal Mine Respirable Dust Task Group.

U.S. Department of Labor, Mine Safety and Health Administration. 1996. Report of the Secretary of Labor's Advisory Committee on the Elimination of Pneumoconiosis Among Coal Mine Workers. Washington, DC. October 1996.

U.S. Department of Labor and U.S. Department of Health and Human Services. 1998. Mine Shift Atmospheric Conditions; Respirable Dust Sample, Final notice of joint finding. **Federal Register** Notice, 63 FR 5664, February 3, 1998.

U.S. Department of Labor and U.S. Department of Health and Human Services. 2003. Proposed rule, reopening of record, request for comments, notice of public hearings, correction, close of record. Determination of Concentration of Respirable Coal Mine Dust. **Federal Register** Notice, 68 FR 10940, March 6, 2003.

U.S. Department of Labor, Division of Coal Mine Workers' Compensation, Black Lung Program Statistics. 2012. Black Lung Program Benefit Payment Totals by Year, 1970–2011. *http://www.dol.gov/owcp/dcmwc/statistics/TotalBenefitsPayment.htm.*

U.S. Department of Labor, Mine Safety and Health Administration. 1981. MSHA Policy Memorandum No. 81–17 C, Final Policy Statements for 30 CFR 70 (Respirable Dust), June 3, 1981.

U.S. Department of Labor, Mine Safety and Health Administration. 1994. Notice. Coal Mine Respirable Dust Standard Noncompliance Determinations. **Federal Register** Notice, 59 FR 8356, February 18, 1994.

U.S. Department of Labor, Mine Safety and Health Administration. 1994. Notice. Mine Safety and Health Administration, Labor, National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, HHS. 59 FR 8357, February 18, 1994.

U.S. Department of Labor, Mine Safety and Health Administration. 1997. Response to Advisory Committee recommendations. 62 FR 3717, January 24, 1997.

U.S. Department of Labor, Mine Safety and Health Administration. 1998. Coal Mine Respirable Dust Standard Noncompliance Determinations. 63 FR 5687, February 3, 1998.

U.S. Department of Labor, Mine Safety and Health Administration. 2000. Proposed rule; notice of hearings. Determination of Concentration of Respirable Coal Mine Dust. **Federal Register** Notice, 65 FR 42068, July 7, 2000.

U.S. Department of Labor, Mine Safety and Health Administration. 2000. Proposed rule; notice of hearings. Verification of Underground Coal Mine Operators' Dust Control Plans and Compliance Sampling for Respirable Dust (Plan Verification). **Federal Register** Notice, 65 FR 42122, July 7, 2000.

U.S. Department of Labor, Mine Safety and Health Administration. 2003. Proposed rule; notice of public hearings; close of record. Verification of Underground Coal Mine Operators' Dust Control Plans and Compliance Sampling for Respirable Dust. **Federal Register** Notice, 68 FR 10784, March 6, 2003.

U.S. Department of Labor, Mine Safety and Health Administration. 2009. Respirable Coal Mine Dust: Continuous Personal Dust Monitor (CPDM), Request for Information. **Federal Register** Notice, 74 FR 52708, October 14, 2009.

U.S. Department of Labor, Mine Safety and Health Administration. 1996. Response to National Institute for Occupational Safety and Health (NIOSH) Criteria Document. **Federal Register** Notice, 61 FR 18308, April 25, 1996.

U.S. Department of Labor, Mine Safety and Health Administration, Pittsburgh Safety and Health Technology Center. 2011. Infrared Determination of Quartz in Respirable Coal Mine Dust, MSHA Method P–7, Sept. 2011.

U.S. Department of Labor, Mine Safety and Health Administration. 2011. Memorandum for the Record: E-Mail from Michael Attfield to MSHA contractor (Jon Kogut) Re: Standard Errors Of Estimated Coefficients Related To Cumulative Respirable Coal Mine Dust Exposure in Attfield-Kuempel NMRD Mortality Model for Anthracite, East Appalachia, West Appalachia, and Midwest Regions, December 21, 2011.

U.S. Department of Labor, Mine Safety and Health Administration, Coal Division of Health. 2012a. CY 2009 Operator Dust Sample Count by Void Code, March 20, 2012.

U.S. Department of Labor, Mine Safety and Health Administration, Coal Health Division. 2012b. MSHA Longwall Surveys with Adjusted Concentrations of 1.5 mg/m^3 Dust Controls, Oct–Dec 2009, April 17, 2012.

U.S. Department of Labor, Mine Safety and Health Administration, Coal Health Division. 2012c. MSHA Random Non-Longwall Surveys with Adjusted Concentrations of 1.5 mg/m^3 Dust Controls, Oct–Dec 2009, April 17, 2012.

U.S. Department of Labor, Mine Safety and Health Administration. 2012. Program Policy Letter No. P12–V–01. Reissue of P09–V–08—Procedures for Revoking MSHA Certifications To Take Respirable Dust Samples Or To Maintain And Calibrate Approved Dust Sampling Devices, 3/8/2012.

U.S. Department of Labor, Mine Safety and Health Administration, Pittsburgh Safety and Health Technology Center. 2012. Gravimetric Determination of Mine Dust Collected on Tared Filter Cassettes. MSHA Method No. P–19. November 2012.

U.S. Department of Labor, Mine Safety and Health Administration. 2009. Program Information Bulletin No. P09–31, Operator Respirable Dust Sampling Requirements, August 25, 2009.

U.S. Department of Labor, Mine Safety and Health Administration. 2010.

Quantitative Risk Assessment in Support of Proposed Respirable Coal Mine Dust Rule. Jon Kogut, Statistical Methods and Analysis, MSHA Contract DOLJ094R22516, September 2010.
U.S. Department of Labor, Mine Safety and Health Administration. 2010. Quantitative Risk Assessment, Dust Data Files, InspSamp.txt, InspSamp.zip, OpSamp.txt and OpSamp.zip, March 2010.
U.S. Department of Labor, Mine Safety and Health Administration. 2013. Quantitative Risk Assessment in Support of Final Respirable Coal Mine Dust Rule, 2013. December 2013.
U.S. Department of Labor, Mine Safety and Health Administration. 2014. Regulatory Economic Analysis for Lowering Miners' Exposure to Respirable Coal Mine Dust Including Continuous Personal Dust Monitors Final Rule, March 2014.
U.S. Environmental Protection Agency, Office of Air and Radiation. 2011. Regulatory Impact Analysis for the Federal Implementation Plans to Reduce Interstate Transport of Fine Particulate Matter and Ozone in 27 States; Correction of SIP Approvals for 22 States. **Federal Register** Notice, June 2011, *http://www.epa.gov/airtransport/pdfs/FinalRIA.pdf.*
U.S. Office of Management and Budget. 2002. Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies. **Federal Register** Notice, 36 FR 8452, February 22, 2002.
U.S. Office of Management and Budget. 2003. Subject: Circular A–4, Subject: Regulatory Analysis. September 17, 2003.
United Steelworkers of America, AFL–CIO–CLC v. F. Ray Marshall, Secretary of Labor, U.S. Department of Labor et al., 647 F.2d 1189 (D.C. Cir. 1981).
Vallyathan, V., F. Green, P. Brower, and M. Attfield. 1997. The Role of Coal Mine Dust Exposure in the Development of Pulmonary Emphysema. Ann Occup Hyg 41(Suppl 1): 352–357.
Viscusi, W. and J. Aldy. 2003. The Value Of A Statistical Life: A Critical Review Of Market Estimates Throughout The World. Journal of Risk and Uncertainty, 27(1):5–76.
Viscusi, W.K., W.A. Magat, and J. Huber. 1991. Pricing Environmental Health Risks: Survey Assessments of Risk—Risk and Risk—Dollar Trade-Offs for Chronic Bronchitis. Journal of Environmental Economics and Management. 21: 32–51.
Volkwein, J.C. 2008. Analysis of Particulate Contamination In Personal Dust Monitor Sampling. Proceedings of the 12th U.S./North American Mine Ventilation Symposium, Reno, Nevada, June 9–11, 2008. Wallace, Jr. K.G. ed., Reno, NV: University of Nevada-Reno, 2008; pp 353–358.
Volkwein, J.C., R.P. Vinson, L.J. McWilliams, D.P. Tuchman, and S.E. Mischler. June 2004. Performance of a New Personal Respirable Dust Monitor For Mine Use. CDC Report of Investigation 9663.
Volkwein, J.C., V.P. Vinson, S.J. Page, L.J. McWilliams, G.J. Joy, S.E. Mischler, and D.P. Tuchman. September 2006. Laboratory and Field Performance Of A Continuously Measuring Personal Respirable Dust Monitor. DHHS (NIOSH) Publication No. 2006–145, CDC Report of Investigations 9669.
Wade, W.A., E.L. Petsonk, B. Young, and I. Mogri. 2011. Severe Occupational Pneumoconiosis among West Virginia Coal Miners: 138 Cases of Progressive Massive Fibrosis Compensated Between 2000 and 2009, Chest, 2011 Jun, 139(6):1458–62; Epub 2010 Sep 30, 2010.
Wagner, G.R. 1997. Letter from Gregory R. Wagner, M.D., Acting Associate Director for Mining, National Institute for Occupational Safety and Health, to Ronald J. Schell, Chief, Division of Health, MSHA. Subject: Updated Analysis of the Accuracy of MSHA's Improved Inspector Sampling and Analytical Method of Respirable Coal Mine Dust. May 28, 1997.
Wagner, G.R. 1995. Letter from Gregory R. Wagner, M.D., National Institute for Occupational Safety and Health, to Ronald J. Schell, Chief, Division of Health, Mine Safety and Health Administration. Subject: Precision and Accuracy of Coal Mine Dust Personal Sampler Unit. October 13, 1995.
Wagner, G.R., M.D. Attfield, R.D. Kennedy, J.E. Parker. 1992. The NIOSH B Reader Certification Program. An Update Report. Journal of Medicine, 34(9):879–884.
Wang, M.L., E.L. Petsonk, L.A. Beeckman, and G.R. Wagner. 1999. Clinically Important FEV_1 Declines Among Coal Miners: An Exploration Of Previously Unrecognized Determinants. Occup Environ Med, 56(12):837–844.
West, J.B. 2011. Pulmonary Pathophysiology: The Essentials. Lippincott Williams & Wilkins, Nov 2011.
State of West Virginia. 2011. Report to the Governor, Governor's Independent Investigation Panel, Upper Big Branch. The April 5, 2010, Explosion: A Failure Of Basic Coal Mine Safety Practices. May 2011.
Zhang, Q. and X. Huang. 2005. Addition of Calcite Reduces Iron's Bioavailability In The Pennsylvania Coals—Potential Use Of Calcite For The Prevention Of Coal Workers' Lung Diseases. Journal of Toxicology and Environmental Health Part A, 68(19):1663–79.
Zhang, Q., J. Dai, A. Ali, L. Chen, and X. Huang. 2002. Roles of Bioavailable Iron And Calcium In Coal Dust-Induced Oxidative Stress: Possible Implications In Coal Workers' Lung Disease. Free Radical Research, 36(3):285–94.

X. Appendix A—Excessive Concentration Values

The Excessive Concentration Value (ECV) tables ensure that noncompliance is cited only when there is a 95-percent level of confidence that the applicable respirable dust standard has actually been exceeded. All measurements of respirable coal mine dust concentrations, whether taken using an approved CMDPSU or CPDM, are subject to sampling and analytical (weighing) error. Such errors cause individual concentration measurements to deviate above or below the true concentration value in the mine atmosphere. Therefore, when determining noncompliance, MSHA must ensure that the applicable standard has actually been exceeded.

The final rule provides for a margin of error in each measurement to reduce the risk of finding that a mine operator is in noncompliance when the applicable standard was not exceeded. The ECV tables in the final rule include this margin of error.

For example, when using a CMDPSU to sample an entity on a 2.0 mg/m^3 standard, a single-shift measurement of 2.14 mg/m^3 would not, according to Table 70–1, indicate noncompliance at a 95-percent confidence level. Rather, this measurement indicates that the MMU was probably out of compliance. However, because there is a small chance that the measurement exceeded the respirable dust standard only because of possible measurement error, a citation would not be issued. Similarly, a single-shift measurement of 1.92 mg/m^3 may not indicate compliance at a 95-percent confidence level under a 2.0 mg/m^3 standard.

Furthermore, even if a single-shift measurement showed that the mine atmosphere was in compliance, at a 95-percent confidence level, at the sampling location on a given shift, additional measurements would be required to demonstrate compliance on each shift. For example, if S = 2.0 mg/m^3, then a valid measurement of 1.65 mg/m^3 demonstrates compliance on the particular shift and at the particular location sampled. It would not, however, demonstrate compliance on other shifts or at other locations.

In the final rule, the ECVs for a single, full-shift concentration measurement are similar to the proposed rule except that the tables are combined to be more user-friendly. The proposed ECV tables that were based on CMDPSU sampling (proposed Tables 70–1, 71–1 and 90–1) and the proposed ECV tables that were based on CPDM sampling (proposed Tables 70–2, 71–2 and 90–2) are combined into one table in each part in the final rule. For example, Table 70–1 in the final rule combines proposed Table 70–1, which established the ECVs based on single-shift measurements taken with a CMDPSU, with proposed Table 70–2, which established the ECVs based on single-shift measurements taken with a CPDM. In addition, in response to comments, MSHA has established ECVs based on the average of multiple samples. These ECVs are

included in final Tables 70–2, 71–2, and 90–2.

Each ECV, whether based on a single-shift CMDPSU or CPDM measurement or on the average of multiple, full-shift CMDPSU or CPDM concentration measurements, was calculated so that if the ECV is met or exceeded, it can be inferred with at least 95-percent confidence that the applicable standard has been exceeded on the particular shift sampled or at the sampled occupation or location during the period sampled.

The ECV tables do not depend on how the applicable standard was established, or on any measurement uncertainties in the process of setting the applicable standard.

Derivation of Final Tables 70–1, 71–1, and 90–1 Based on Single Full-Shift Concentration Measurements

Dust concentration measurements vary partly because of measurement error and partly because of differences in the dust concentration being measured. Therefore, in deriving the ECVs, MSHA distinguished between variability due to measurement (sampling and weighing) error and variability due to actual differences in dust concentration. The distinction between measurement error and variation in the true dust concentration is more easily explained by defining some notational abbreviations.

Dust samples are collected in the same MMU or other mine area on a particular shift. Since it is necessary to distinguish between different samples in the same MMU, let X_i represent the equivalent MRE dust concentration measurement obtained from the ith sample. The quantity being measured is the true, single-shift average dust concentration at the ith sampling location and is denoted by μ_i. Because of potential measurement errors, μ_i can never be known with complete certainty. A ''sample,'' ''measurement,'' or ''observation'' always refers to an instance of X_i rather than μ_i.

The overall measurement error associated with an individual measurement is the difference between the measurement (X_i) and the quantity being measured (μ_i). Therefore, this error can be represented as

$$\varepsilon_i = X_i - \mu_i.$$

Equivalently, any measurement can be regarded as the true concentration in the atmosphere sampled, with a measurement error added on:

$$X_i = \mu_i + \varepsilon_i.$$

For two different measurements (X_1 and X_2), it follows that X_1 may differ from X_2 because of the combined effects of ε_1 and ε_2, and because μ_1 differs from μ_2.

The probability distribution of X_i around μ_i depends only on the probability distribution of ε_i and should not be confused with the statistical distribution of μ_i, which arises from spatial and/or temporal variability in dust concentration. This variability (i.e., among μ_i for different values of *i*) is not associated with inadequacies of the measurement system, but real variation in exposures due to the fact that contaminant generation rates vary in time and contaminants are heterogeneously distributed in workplace air.

If noncompliance determinations are made relative to individual sampling locations on a shift, derivation of the tables require no assumptions or inferences about the spatial or temporal pattern of atmospheric dust concentrations—i.e., the statistical distribution of μ_i. MSHA is not evaluating dust concentrations averaged across the different occupational sampling locations. Therefore, the degree and pattern of variability observed among different measurements obtained during MSHA sampling are not used in establishing any ECV. Instead, the ECV for each applicable dust standard (S) is based entirely on the distribution of measurement errors (ε_i) expected for the maximum dust concentration in compliance with that standard—i.e., a concentration equal to S itself.

If control filters are used to eliminate potential biases as when sampling using an approved CMDPSU, then each ε_i arises from a combination of four weighing errors (pre- and post-exposure for both the control and exposed filter capsule) and a continuous summation of instantaneous measurement errors accumulated over the course of the full shift. Since the full shift being sampled can be subdivided into an arbitrarily large number of sub-intervals, and some fraction of ε_i is associated with each sub-interval, ε_i can be represented as comprising the sum of an arbitrarily large number of sub-interval errors. By the Central Limit Theorem, such a summation tends to be normally distributed, regardless of the distribution of sub-interval errors. This does not depend on the distribution of μ_i, which is generally represented as being lognormal.

Any systematic error or bias in the weighing process attributable to the laboratory is mathematically canceled out by subtraction. Any bias that may be associated with day-to-day changes in laboratory conditions or introduced during storage and handling of the filter capsules is also mathematically canceled out. Elimination of the sources of systematic errors identified above, together with the fact that the concentration of respirable dust is defined by section 202(e) of the Mine Act to mean the average concentration of respirable dust measured by an approved sampler unit, indicates that the measurements are unbiased. This means that ε_i is equally likely to be positive or negative and, on average, equal to zero.

Therefore, each ε_i is assumed to be normally distributed, with a mean value of zero and a degree of variability represented by its standard deviation:

$$\sigma_i = \mu_i \cdot CV_{total}$$

Since $X_i = \mu_i + \varepsilon_i$, it follows that for a given value of μ_i, X_i is normally distributed with expected value equal to μ_i and standard deviation equal to σ_i. CV_{total}, is the coefficient of variation in measurements corresponding to a given value of μ_i. CV_{total} relates entirely to variability due to measurement errors and not at all to variability in actual dust concentrations.

The procedure for determining noncompliance with applicable standards based on Tables 70–1, 71–1, and 90–1 consists of formally testing a presumption of compliance at every location sampled. Compliance with the applicable dust standard at the *ith* sampling location is expressed by the relation $\mu_i \leq S$. Max$\{\mu_i\}$ denotes the maximum dust concentration, among all of the sampling locations within an MMU. Therefore, if Max$\{\mu_i\} \leq S$, none of the sampling devices in the MMU were exposed to excessive dust concentrations. Since MSHA must establish that the applicable standard has been exceeded, the hypothesis being tested (called the *null hypothesis,* or H_0,) is that the concentration at every location sampled is in compliance with the applicable standard. It follows that for an MMU, the null hypothesis (H_0) is that max$\{\mu_i\} \leq S$. In other areas, where only one, full-shift measurement is made, the null hypothesis is simply that $\mu_i \leq S$.

The test consists of evaluating the likelihood of measurements under the assumption that H_0 is true. Since $X_i = \mu_i + \varepsilon_i$, X_i (or max$\{X_i\}$ in the case of an MMU) can exceed S even under that assumption. However, based on the normal distribution of measurement errors, it is possible to calculate the probability that a measurement error would be large enough to account for the measurement's exceeding the standard. The greater the amount by which X_i exceeds S, the less likely it is that this would be due to measurement

error alone. If, under H_0, this probability is less than five percent, then H_0 can be rejected at a 95-percent confidence level and a finding of noncompliance with the applicable standard is warranted. For an MMU, rejecting H_0 (and therefore issuing a finding of noncompliance) is equivalent to determining that $\mu_i > S$ for at least one value of *i*.

Each ECV listed was calculated to ensure that, if the ECV is met or exceeded, it can be inferred with at least 95-percent confidence that the applicable standard has been exceeded. As described in MSHA's February 1994 notice, Coal Mine Respirable Dust Standard Noncompliance Determinations (59 FR 8356, February 18, 1994) and explained further by Kogut (Kogut, 1994), the tabled CMDPSU ECVs corresponding to each S were calculated on the assumption that, at each sampling location:

$$CV_{Total} \leq CV_{ECV} = \sqrt{\left(\frac{0.14\ mg/m^3}{\mu_i\ mg/m^3} \cdot 100\%\right)^2 + (5\%)^2 + (5\%)^2}$$

In July 2000, MSHA and NIOSH proposed a joint finding, ''Determination of Concentration of Respirable Coal Mine Dust'' (65 FR 42068, July 7, 2000). The joint finding stated that for valid measurements made with an approved CMDPSU, CV_{total} is, in fact, less than CV_{CTV} [64] at all dust concentrations (μ_i).

The circumstance in which measurement error is most likely to cause an erroneous noncompliance determination is the hypothetical case of $\mu_i = S$ for either a single-shift sample measurement or for all of the occupational measurements made in the same MMU. In that borderline situation—i.e., the worst case consistent with H_0—the standard deviation is identical for all measurement errors. Therefore, the value of σ used in constructing the CMDPSU ECV table is the product of S and CV_{ECV} evaluated for a dust concentration equal to S:

$$\sigma = S\sqrt{\left(\frac{0.14}{S}\right)^2 + (0.05)^2 + (0.05)^2}$$

Assuming a normal distribution of measurement errors as explained above, it follows that the probability a single measurement would equal or exceed the critical value

$c = S + 1.645 \cdot \sigma$

is five percent under H_0 when $CV_{total} = CV_{ECV}$. The tabled CMDPSU ECV corresponding to S is derived by raising the critical value c up to the next exact multiple of 0.01 mg/m³.

For example, at a dust concentration (μ_i) just meeting the applicable dust standard of S = 2 mg/m³, CV_{ECV} is 9.95 percent for a CMDPSU measurement. Therefore, the calculated value of c is 2.326 and the ECV is 2.33 mg/m³. Any valid single-shift measurement at or above this ECV is unlikely to be this large simply because of measurement error. Therefore, any such measurement should result in MSHA finding the operator to be in noncompliance with the applicable standard.

The probability that a measurement exceeds the ECV is even smaller if $\mu_i < S$ for any *i*. Furthermore, to the extent that CV_{total} is actually less than CV_{ECV}, σ is actually less than $S \cdot CV_{ECV}$. This results in a lower probability that the critical value would be exceeded under the null hypothesis. Consequently, if any single-shift measurement equals or exceeds c, then H_0 can be rejected at confidence level of at least 95-percent. Since rejection of H_0 implies that $\mu_i > S$ for at least one value of *i,* this should result in a finding of noncompliance.

When each of several measurements is separately compared to the ECV table, the probability that at least one ε_i will be large enough to force $X_i \geq$ ECV when $\mu_i \leq S$ is greater than the probability when only a single comparison is made. For example (still assuming S = 2 mg/m³), if CV_{total} is actually 6.6%, then the standard deviation of ε_i is 6.6% of 2.0 mg/m³, or 0.132 mg/m³, when $\mu_i = S$. Using properties of the normal distribution, the probability that any single measurement would exceed the ECV in this borderline situation is calculated to be 0.62%. However, the probability that at least one of five such measurements results in a citation is $1 - (0.9938)^5 = 3.1\%$. Therefore, the confidence level at which a citation can be issued, based on the maximum of five measurements made in the same MMU on a given shift, is 97%.

The constant 1.645 used in calculating the ECV is a 1-tailed 95-percent confidence coefficient and is derived from the standard normal probability distribution. Since the purpose of the ECV tables is to provide criteria for determining that the true dust concentration strictly exceeds the applicable dust standard and such a determination can occur only when a single-shift measurement is sufficiently high, there is exactly zero probability of erroneously finding an operator to be in noncompliance when a measurement falls below the lower confidence limit. Consequently, the total probability of erroneously finding an operator to be in noncompliance with the applicable standard equals the probability that a standard normal random variable exceeds 1.645, which is 5 percent.

The same statistical theory underlying the derivation of the CMDPSU ECVs applies in constructing the CPDM ECVs listed in Tables 70–1, 71–1, and 90–1 in the final rule. The initial step in the derivation process involves addressing uncertainty due to potential measurement errors. Measurement imprecision is quantified by the total coefficient of variation for overall measurement error, or CV_{total}, also sometimes called relative standard deviation (RSD). CV_{total} corresponding to the CPDM has been estimated by NIOSH to be 7.8 percent based on in-mine studies and is documented by Volkwein et al. (NIOSH RI 9669, 2006). The uncertainty due to measurement error is addressed by applying a margin of error before issuing a finding that the applicable standard was exceeded.

[64] The term ''Concentration Threshold Value'' (CTV) used in the July 7, 2000 Joint Finding was renamed the Excessive Concentration Value (ECV) in the October 19, 2010 proposed rule (75 FR 64412).

Applying this margin of error ensures that noncompliance determinations are made only when there is at least 95-percent confidence that the applicable standard has been exceeded. To achieve this confidence level, the applicable margin of error is constructed by applying an *error factor* appropriate for the measurement being considered. The *error factor* is calculated as:

$EF = 1 + (1.645 \times CV_{total})$

Therefore, when CV_{total} = 7.8 percent, the calculated value of *EF* is 1.128. If, for example, the sampled occupation is on a 1.5 mg/m³ standard, the operator would be in violation of the applicable standard if a single, full-shift MRE-equivalent concentration measurement times the *EF* exceeds 1.692 mg/m³ [1.5 × 1.128]. The ECV corresponding to each applicable standard is derived by simply raising the calculated ECV to the next exact multiple of 0.01 mg/m³. Therefore, the ECV corresponding to the applicable standard of 1.5 mg/m³ is 1.70 mg/m³. Since it is unlikely that any valid CPDM end-of shift equivalent concentration is this large simply because of measurement error, it can be inferred with at least 95-percent confidence that the applicable standard has been exceeded. The same procedures were followed in calculating ECVs corresponding to other applicable standards.

Derivation of Final Tables 70–2, 71–2, and 90–2 Based on Average of Concentration Measurements

The ECVs in final Tables 70–2, 71–2 and 90–2 apply to the average of all operators' valid representative samples. The ECVs in final Tables 70–2, 71–2 and 90–2, like final Tables 70–1, 71–1 and 90–1, provide a margin of error to address uncertainty due to measurement error. When the ECV that corresponds to the applicable standard, the particular sampling device used, and appropriate sample size is met or exceeded, it can be inferred with at least 95-percent confidence that the applicable standard has been exceeded at the particular MMU, or at the sampled occupation or location, during the period sampled.

Tables 70–2, 71–2 and 90–2 in the final rule were developed in response to commenters' concerns that MSHA failed to address measurement errors when evaluating compliance with the proposed weekly permissible accumulated exposure (WPAE) limit. The final rule does not include the proposed WPAE approach. It includes an alternative method of making a compliance determination based on the average of all samples.

Under the final rule, the ECVs for 5 and 15 full-shift average equivalent concentration measurements were calculated taking into consideration measurement variability (σ) and the probability (95-percent confidence level) of not being in error when determining noncompliance based on the multi-shift average. For both the CMDPSU and CPDM, the measurement variabilities used were the same as those previously estimated by the standard propagation-of-errors formula to construct the single-sample ECVs in the proposal. These estimates of measurement variability for the average of the respirable dust concentration measurements just meeting the applicable standard were then substituted into the following equation:

$$c = S + 1.645\left(\frac{\sigma}{\sqrt{n}}\right)$$

Where *c* represents the Critical Value or quantity to be met or exceeded to establish that the average of the respirable dust concentration measurements exceeds the applicable standard.

S is the Applicable Standard; 1.645 is the 1-tailed 95-percent confidence coefficient obtained from the standard normal probability distribution; σ is the appropriate measurement variability; and *n* is the number of full-shift measurements included. The ECV corresponding to *S* is derived by raising the critical value *c* up to the next exact multiple of 0.01 mg/m³.

The following discussion illustrates when the 15-sample CMDPSU average concentration exceeds the applicable standard of 2.0 mg/m³ standard. Assuming the average concentration is meeting the applicable standard S = 2 mg/m³, which corresponds to a CV_{ECV} of 9.95 percent for a single, full-shift measurement, the value of measurement variability σ used in constructing the ECV tables is the product of S and CV_{ECV} evaluated for an average concentration equal to S:

$$\sigma = S\sqrt{\left(\frac{0.14}{S}\right)^2 + (0.05)^2 + (0.05)^2}$$

Substituting the appropriate value for σ in this example which equals 0.199 mg/m³ (2.0 mg/m³ × 9.95%) into the equation:

$$c = S + 1.645\left(\frac{\sigma}{\sqrt{n}}\right)$$

yields the calculated value of c or 2.085 mg/m³. Therefore, a 15-sample average CMDPSU concentration at or above 2.09 mg/m³ is unlikely to be this large because of measurement error. If the average concentration of the 15 CMDPSU samples meets or exceeds 2.09 mg/m³, then the 2.0 mg/m³ standard is exceeded.

The following example illustrates when a 5-sample CPDM average concentration exceeds the applicable standard for a part 90 miner on a 1.0 mg/m³ dust standard. For respirable dust levels that are approximately 1.0 mg/m³, the estimate of measurement error σ is 0.078 mg/m³. When substituted in the above equation, the calculated value of *c* is 1.057 mg/m³ and the ECV is 1.06 mg/m³. If the average concentration of the 5 CPDM samples meets or exceeds 1.06 mg/m³, then the 1.0 mg/m³ standard is exceeded.

List of Subjects

30 CFR Part 70

Coal, Incorporation by reference, Mine safety and health, Reporting and recordkeeping requirements, Respirable dust, Underground coal mines.

30 CFR Part 71

Coal, Incorporation by reference, Mine safety and heath, Reporting and recordkeeping requirements, Surface coal mines, Underground coal mines.

30 CFR Part 72

Coal, Health standards, Mine safety and health, training, Underground mines.

30 CFR Part 75

Coal, Mine safety and health, Reporting and recordkeeping requirements, Underground coal mines, Ventilation.

30 CFR Part 90

Coal, Incorporation by reference, Mine safety and health.

Joseph A. Main,

Assistant Secretary of Labor for Mine Safety and Health.

For the reasons discussed in the preamble, the Mine Safety and Health Administration is amending 30 CFR parts 70, 71, 72, 75 and 90 as follows:

PART 70—MANDATORY HEALTH STANDARDS FOR UNDERGROUND COAL MINES

■ 1. The authority citation for part 70 continues to read as follows:

Authority: 30 U.S.C. 811, 813(h), 957.

■ 2. Subpart A to part 70 is revised to read as follows:

Subpart A—General

Sec.

70.1 Scope.
70.2 Definitions.

Subpart A—General

§ 70.1 Scope.

This part 70 sets forth mandatory health standards for each underground coal mine subject to the Federal Mine Safety and Health Act of 1977, as amended.

§ 70.2 Definitions.

The following definitions apply in this part.

Act. The Federal Mine Safety and Health Act of 1977, Public Law 91–173, as amended by Public Law 95–164 and Public Law 109–236.

Active workings. Any place in a coal mine where miners are normally required to work or travel.

Approved sampling device. A sampling device approved by the Secretary and Secretary of Health and Human Services (HHS) under part 74 of this title.

Certified person. An individual certified by the Secretary in accordance with § 70.202 to take respirable dust samples required by this part or certified in accordance with § 70.203 to perform the maintenance and calibration of respirable dust sampling equipment as required by this part.

Coal mine dust personal sampler unit (CMDPSU). A personal sampling device approved under part 74, subpart B, of this title.

Concentration. A measure of the amount of a substance contained per unit volume of air.

Continuous personal dust monitor (CPDM). A personal sampling device approved under part 74, subpart C of this title.

Designated area (DA). A specific location in the mine identified by the operator in the mine ventilation plan under § 75.371(t) of this title where samples will be collected to measure respirable dust generation sources in the active workings; approved by the District Manager; and assigned a four-digit identification number by MSHA.

Designated occupation (DO). The occupation on a mechanized mining unit (MMU) that has been determined by results of respirable dust samples to have the greatest respirable dust concentration.

District Manager. The manager of the Coal Mine Safety and Health District in which the mine is located.

Equivalent concentration. The concentration of respirable coal mine dust, including quartz, expressed in milligrams per cubic meter of air (mg/m^3) as measured with an approved sampling device, determined by dividing the weight of dust in milligrams collected on the filter of an approved sampling device by the volume of air in cubic meters passing through the filter (sampling time in minutes (t) times the sampling airflow rate in cubic meters per minute), and then converting that concentration to an equivalent concentration as measured by the Mining Research Establishment (MRE) instrument. When the approved sampling device is:

(1) The CMDPSU, the equivalent concentration is determined by multiplying the concentration of respirable coal mine dust by the constant factor prescribed by the Secretary.

(2) The CPDM, the device shall be programmed to automatically report end-of-shift concentration measurements as equivalent concentrations.

Mechanized mining unit (MMU). A unit of mining equipment including hand loading equipment used for the production of material; or a specialized unit which uses mining equipment other than specified in § 70.206(b) or in § 70.208(b) of this part. Each MMU will be assigned a four-digit identification number by MSHA, which is retained by the MMU regardless of where the unit relocates within the mine. However, when:

(1) Two sets of mining equipment are used in a series of working places within the same working section and only one production crew is employed at any given time on either set of mining equipment, the two sets of equipment shall be identified as a single MMU.

(2) Two or more sets of mining equipment are simultaneously engaged in cutting, mining, or loading coal or rock from working places within the same working section, each set of mining equipment shall be identified as a separate MMU.

MRE instrument. The gravimetric dust sampler with a four channel horizontal elutriator developed by the Mining Research Establishment of the National Coal Board, London, England.

MSHA. The Mine Safety and Health Administration of the U.S. Department of Labor.

Normal production shift. A production shift during which the amount of material produced by an MMU is at least equal to 80 percent of the average production recorded by the operator for the most recent 30 production shifts or for all production shifts if fewer than 30 shifts of production data are available.

Other designated occupation (ODO). Other occupation on an MMU that is designated for sampling required by this part in addition to the DO. Each ODO shall be identified by a four-digit identification number assigned by MSHA.

Production shift. With regard to an MMU, a shift during which material is produced; with regard to a DA of a mine, a shift during which material is produced and routine day-to-day activities are occurring in the DA.

Quartz. Crystalline silicon dioxide (SiO_2) not chemically combined with other substances and having a distinctive physical structure.

Representative sample. A respirable dust sample, expressed as an equivalent concentration, that reflects typical dust concentration levels and with regard to an MMU, normal mining activities in the active workings during which the amount of material produced is equivalent to a normal production shift; or with regard to a DA, material is produced and routine-day-to-day activities are occurring.

Respirable dust. Dust collected with a sampling device approved by the Secretary and the Secretary of HHS in accordance with part 74 (Coal Mine Dust Sampling Devices) of this title.

Secretary. The Secretary of Labor or a delegate.

Valid respirable dust sample. A respirable dust sample collected and submitted as required by this part, including any sample for which the data were electronically transmitted to MSHA, and not voided by MSHA.

■ 3. Subpart B to part 70 is revised to read as follows:

Subpart B—Dust Standards

Sec.
70.100 Respirable dust standards.
70.101 Respirable dust standard when quartz is present.

Subpart B—Dust Standards

§ 70.100 Respirable dust standards.

(a) Each operator shall continuously maintain the average concentration of respirable dust in the mine atmosphere during each shift to which each miner in the active workings of each mine is exposed, as measured with an approved sampling device and expressed in terms of an equivalent concentration, at or below:

(1) 2.0 milligrams of respirable dust per cubic meter of air (mg/m^3).

(2) 1.5 mg/m^3 as of August 1, 2016.

(b) Each operator shall continuously maintain the average concentration of respirable dust within 200 feet outby the working faces of each section in the intake airways as measured with an approved sampling device and

expressed in terms of an equivalent concentration at or below:

(1) 1.0 mg/m³.

(2) 0.5 mg/m³ as of August 1, 2016.

§ 70.101 Respirable dust standard when quartz is present.

(a) Each operator shall continuously maintain the average concentration of respirable quartz dust in the mine atmosphere during each shift to which each miner in the active workings of each mine is exposed at or below 0.1 mg/m³ (100 micrograms per cubic meter or μg/m³) as measured with an approved sampling device and expressed in terms of an equivalent concentration.

(b) When the equivalent concentration of respirable quartz dust exceeds 100 μg/m³, the operator shall continuously maintain the average concentration of respirable dust in the mine atmosphere during each shift to which each miner in the active workings is exposed as measured with an approved sampling device and expressed in terms of an equivalent concentration at or below the applicable dust standard. The applicable dust standard is computed by dividing the percent of quartz into the number 10. The application of this formula shall not result in an applicable dust standard that exceeds the standard established by § 70.100(a).

Example: Assume the sampled MMU or DA is on a 1.5-mg/m³ dust standard. Suppose a valid representative dust sample with an equivalent concentration of 1.12 mg/m³ contains 12.3% of quartz dust, which corresponds to a quartz concentration of 138 μg/m³. Therefore, the average concentration of respirable dust in the mine atmosphere associated with that MMU or DA shall be maintained on each shift at or below 0.8 mg/m³ (10/12.3% = 0.8 mg/m³).

■ 4. Subpart C to part 70 is revised to read as follows:

Subpart C—Sampling Procedures

Sec.
70.201 Sampling; general and technical requirements.
70.202 Certified person; sampling.
70.203 Certified person; maintenance and calibration.
70.204 Approved sampling devices; maintenance and calibration.
70.205 Approved sampling devices; operation; air flowrate.
70.206 Bimonthly sampling; mechanized mining units.
70.207 Bimonthly sampling; designated areas.
70.208 Quarterly sampling; mechanized mining units.
70.209 Quarterly sampling; designated areas.
70.210 Respirable dust samples; transmission by operator.
70.211 Respirable dust samples; report to operator; posting.
70.212 Status change reports.

Tables to Subpart C
Table 70–1 Excessive Concentration Values (ECV) Based on Single, Full-Shift CMDPSU/CPDM Concentration Measurements
Table 70–2 Excessive Concentration Values (ECV) Based on the Average of 5 or 15 Full-Shift CMDPSU/CPDM Concentration Measurements

Subpart C—Sampling Procedures

§ 70.201 Sampling; general and technical requirements.

(a) Only an approved coal mine dust personal sampler unit (CMDPSU) shall be used to take bimonthly samples of the concentration of respirable coal mine dust from the designated occupation (DO) in each MMU as required by this part until Janaury 31, 2016. On February 1, 2016, DOs in each MMU shall be sampled quarterly with an approved CPDM as required by this part and an approved CMDPSU shall not be used, unless notified by the Secretary to continue to use an approved CMDPSU to conduct quarterly sampling.

(b) Only an approved CMDPSU shall be used to take bimonthly samples of the concentration of respirable coal mine dust from each designated area (DA) as required by this part until January 31, 2016. On February 1, 2016:

(1) DAs associated with an MMU shall be redesignated as Other Designated Occupations (ODO). ODOs shall be sampled quarterly with an approved CPDM as required by this part and an approved CMDPSU shall not be used, unless notified by the Secretary to continue to use an approved CMDPSU to conduct quarterly sampling.

(2) DAs identified by the operator under § 75.371(t) of this chapter shall be sampled quarterly with an approved CMDPSU as required by this part, unless the operator notifies the District Manager in writing that only an approved CPDM will be used for all DA sampling at the mine. The notification must be received at least 90 days before the beginning of the quarter in which CPDMs will be used to collect the DA samples.

(c) Sampling devices shall be worn or carried directly to the MMU or DA to be sampled and from the MMU or DA sampled and shall be operated portal-to-portal. Sampling devices shall remain with the occupation or DA being sampled and shall be operational during the entire shift, which includes the total time spent in the MMU or DA and while traveling to and from the mining section or area being sampled. If the work shift to be sampled is longer than 12 hours and the sampling device is:

(1) A CMDPSU, the operator shall switch-out the unit's sampling pump prior to the 13th-hour of operation.

(2) A CPDM, the operator shall switch-out the CPDM with a fully charged device prior to the 13th-hour of operation.

(d) If using a CMDPSU, one control filter shall be used for each shift of sampling. Each control filter shall:

(1) Have the same pre-weight date (noted on the dust data card) as the filters used for sampling;

(2) Remain plugged at all times;

(3) Be used for the same amount of time, and exposed to the same temperature and handling conditions as the filters used for sampling;

(4) Be kept with the exposed samples after sampling and in the same mailing container when transmitted to MSHA.

(e) Records showing the length of each production shift for each MMU shall be made and retained for at least six months and shall be made available for inspection by authorized representatives of the Secretary and the representative of miners, and submitted to the District Manager when requested in writing.

(f) Upon request from the District Manager, the operator shall submit the date and time any respirable dust sampling required by this part will begin. This information shall be submitted at least 48 hours prior to the scheduled sampling.

(g) To establish a normal production shift, the operator shall record the amount of run-of-mine material produced by each MMU during each shift to determine the average production for the most recent 30 production shifts, or for all production shifts if fewer than 30 shifts of production data are available. Production records shall be retained for at least six months and shall be made available for inspection by authorized representatives of the Secretary and the representative of miners.

(h) Operators using CPDMs shall provide training to all miners expected to wear a CPDM. The training shall be completed prior to a miner wearing a CPDM and then every 12 months thereafter. The training shall include:

(1) The importance of monitoring dust concentrations and properly wearing the CPDM.

(2) Explaining the basic features and capabilities of the CPDM;

(3) Discussing the various types of information displayed by the CPDM and how to access that information; and

(4) How to start and stop a short-term sample run during compliance sampling.

(i) An operator shall keep a record of the CPDM training at the mine site for 24 months after completion of the training. An operator may keep the record elsewhere if the record is immediately accessible from the mine site by electronic transmission. Upon request from an authorized representative of the Secretary, Secretary of HHS, or representative of miners, the operator shall promptly provide access to any such training records. The record shall include:

(1) The date of training;

(2) The names of miners trained; and

(3) The subjects included in the training.

(j) An anthracite mine using the full box, open breast, or slant breast mining method may use either a CPDM or a CMDPSU to conduct the required sampling. The mine operator shall notify the District Manager in writing of its decision to not use a CPDM.

(k) MSHA approval of the dust control portion of the operator's mine ventilation plan may be revoked based on samples taken by MSHA or in accordance with this part 70.

§ 70.202 Certified person; sampling.

(a) The respirable dust sampling required by this part shall be performed by a certified person.

(b) To be certified, a person shall complete the applicable MSHA course of instruction and pass the MSHA examination demonstrating competency in sampling procedures. Persons not certified in sampling, and those certified only in maintenance and calibration procedures in accordance with § 70.203(b), are not permitted to collect respirable dust samples required by this part or handle approved sampling devices when being used in sampling.

(c) To maintain certification, a person must pass the MSHA examination demonstrating competency in sampling procedures every three years.

(d) MSHA may revoke a person's certification for failing to properly carry out the required sampling procedures.

§ 70.203 Certified person; maintenance and calibration.

(a) Approved sampling devices shall be maintained and calibrated by a certified person.

(b) To be certified, a person shall complete the applicable MSHA course of instruction and pass the MSHA examination demonstrating competency in maintenance and calibration procedures for approved sampling devices. Necessary maintenance of the sampling head assembly of a CMDPSU, or the cyclone assembly of a CPDM, can be performed by persons certified in sampling or in maintenance and calibration.

(c) To maintain certification, a person must pass the MSHA examination demonstrating competency in maintenance and calibration procedures every three years.

(d) MSHA may revoke a person's certification for failing to properly carry out the required maintenance and calibration procedures.

§ 70.204 Approved sampling devices; maintenance and calibration.

(a) Approved sampling devices shall be maintained as approved under part 74 of this title and calibrated in accordance with MSHA Informational Report IR 1240 (1996) ''Calibration and Maintenance Procedures for Coal Mine Respirable Dust Samplers'' or in accordance with the manufacturer's recommendations, if using a CPDM. Only persons certified in maintenance and calibration can perform maintenance work on the CPDM or the pump unit of the CMDPSU.

(b) Sampling devices shall be calibrated at the flowrate of 2.0 liters of air per minute (L/min) if using a CMDPSU; at 2.2 L/min if using a CPDM; or at a different flowrate recommended by the manufacturer, before they are put into service and, thereafter, at time intervals recommended by the manufacturer or prescribed by the Secretary or Secretary of HHS.

(c) If using a CMDPSU, each sampling device shall be examined and tested by a person certified in sampling or in maintenance and calibration within 3 hours before the start of the shift on which the approved sampling devices will be used to collect respirable dust samples. This is to assure that the sampling devices are clean and in proper working condition. This examination and testing shall include the following:

(1) Examination of all components of the cyclone assembly to assure that they are clean and free of dust and dirt. This includes examining the interior of the connector barrel (located between the cassette assembly and vortex finder), vortex finder, cyclone body, and grit pot;

(2) Examination of the inner surface of the cyclone body to assure that it is free of scoring or scratch marks on the inner surface of the cyclone where the air flow is directed by the vortex finder into the cyclone body;

(3) Examination of the external hose connecting the pump unit to the sampling head assembly to assure that it is clean and free of leaks; and

(4) Examination of the clamping and positioning of the cyclone body, vortex finder, and cassette to assure that they are rigid, in alignment, firmly in contact, and airtight.

(5) Testing the voltage of each battery while under actual load to assure the battery is fully charged. This requires that a fully assembled and examined sampling head assembly be attached to the pump inlet with the pump unit running when the voltage check is made. The voltage for the batteries used in the CMDPSU shall not be lower than the product of the number of cells in the battery multiplied by the manufacturer's nominal voltage per cell value.

(d) If using a CPDM, the certified person in sampling or in maintenance and calibration shall:

(1) Follow the pre-operational examinations, testing, and set-up procedures, and perform necessary external maintenance recommended by the manufacturer to assure the operational readiness of each CPDM within 3 hours before the start of the shift on which the sampling devices will be used to collect respirable dust samples; and

(2) Perform other required scheduled examinations and maintenance procedures recommended by the manufacturer.

(e) You must proceed in accordance with ''Calibration and Maintenance Procedures for Coal Mine Respirable Dust Samplers,'' MSHA Informational Report IR 1240 (1996) referenced in paragraph (a) of this section. The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may obtain a copy from the MSHA Web site at *http://www.msha.gov* and you may inspect or obtain a copy at MSHA, Coal Mine Safety and Health, 1100 Wilson Blvd., Room 2424, Arlington, Virginia 22209–3939 and at each MSHA Coal Mine Safety and Health District Office, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.*

§ 70.205 Approved sampling devices; operation; air flowrate.

(a) Approved sampling devices shall be operated at the flowrate of 2.0 L/min if using a CMDPSU; at 2.2 L/min if using a CPDM; or at a different flowrate recommended by the manufacturer.

(b) If using a CMDPSU, each approved sampling device shall be examined each shift by a person certified in sampling during:

(1) The second hour after being put into operation to assure it is in the proper location, operating properly, and at the proper flowrate. If the proper flowrate is not maintained, necessary adjustments shall be made by the certified person. This examination is not required if the sampling device is being operated in an anthracite coal mine using the full box, open breast, or slant breast mining method.

(2) The last hour of operation to assure that the sampling device is operating properly and at the proper flowrate. If the proper flowrate is not maintained, the respirable dust sample shall be transmitted to MSHA with a notation by the certified person on the back of the dust data card stating that the proper flowrate was not maintained. Other events occurring during the collection of respirable dust samples that may affect the validity of the sample, such as dropping of the sampling head assembly onto the mine floor, shall be noted on the back of the dust data card.

(c) If using a CPDM, the person certified in sampling shall monitor the dust concentrations and the sampling status conditions being reported by the sampling device at mid-shift or more frequently as specified in the approved mine ventilation plan to assure: The sampling device is in the proper location and operating properly; and the work environment of the occupation or DA being sampled remains in compliance with the applicable standard at the end of the shift. This monitoring is not required if the sampling device is being operated in an anthracite coal mine using the full box, open breast, or slant breast mining method.

§ 70.206 Bimonthly sampling; mechanized mining units.

Until January 31, 2016:

(a) Each operator shall take five valid representative samples from the designated occupation (DO) in each mechanized mining unit (MMU) during each bimonthly period. DO samples shall be collected on consecutive normal production shifts or normal production shifts each of which is worked on consecutive days. The bimonthly periods are:

January 1–February 28 (29)
March 1–April 30
May 1–June 30
July 1–August 31
September 1–October 31
November 1–December 31

(b) Unless otherwise directed by the District Manager, the DO samples shall be taken by placing the approved sampling device as specified in paragraphs (b)(1) through (b)(10) of this section.

(1) *Conventional section using cutting machine.* On the cutting machine operator or on the cutting machine within 36 inches inby the normal working position;

(2) *Conventional section blasting off the solid.* On the loading machine operator or on the loading machine within 36 inches inby the normal working position;

(3) *Continuous mining section other than auger-type.* On the continuous mining machine operator or on the continuous mining machine within 36 inches inby the normal working position;

(4) *Continuous mining machine; auger-type.* On the jacksetter who works nearest the working face on the return air side of the continuous mining machine or at a location that represents the maximum concentration of dust to which the miner is exposed;

(5) *Scoop section using cutting machine.* On the cutting machine operator or on the cutting machine within 36 inches inby the normal working position;

(6) *Scoop section, blasting off the solid.* On the coal drill operator or on the coal drill within 36 inches inby the normal working position;

(7) *Longwall section.* On the miner who works nearest the return air side of the longwall working face or along the working face on the return side within 48 inches of the corner;

(8) *Hand loading section with a cutting machine.* On the cutting machine operator or on the cutting machine within 36 inches inby the normal working position;

(9) *Hand loading section blasting off the solid.* On the hand loader exposed to the greatest dust concentration or at a location that represents the maximum concentration of dust to which the miner is exposed;

(10) *Anthracite mine sections.* On the hand loader exposed to the greatest dust concentration or at a location that represents the maximum concentration of dust to which the miner is exposed.

(c) When the respirable dust standard is changed in accordance with § 70.101, the new applicable standard shall become effective 7 calendar days after the date of the notification of the change by MSHA.

(d) If a normal production shift is not achieved, the DO sample for that shift may be voided by MSHA. However, any sample, regardless of production, that exceeds the applicable standard by at least 0.1 mg/m^3 shall be used in the determination of the equivalent concentration for that MMU.

(e) When a valid representative sample taken in accordance with this section meets or exceeds the excessive concentration value (ECV) in Table 70–1 that corresponds to the applicable standard and particular sampling device used, the operator shall:

(1) Make approved respiratory equipment available to affected miners in accordance with § 72.700 of this chapter;

(2) Immediately take corrective action to lower the concentration of respirable dust to at or below the applicable respirable dust standard; and

(3) Make a record of the corrective actions taken. The record shall be certified by the mine foreman or equivalent mine official, no later than the end of the mine foreman's or equivalent official's next regularly scheduled working shift. The record shall be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration. Such records shall be retained at a surface location at the mine for at least 1 year and shall be made available for inspection by authorized representatives of the Secretary and the representative of miners.

(f) Noncompliance with the applicable standard is demonstrated during the sampling period when:

(1) Two or more valid representative samples meet or exceed the ECV in Table 70–1 that corresponds to the applicable standard and particular sampling device used; or

(2) The average for all valid representative samples meets or exceeds the ECV in Table 70–2 that corresponds to the applicable standard and particular sampling device used.

(g) Unless otherwise directed by the District Manager, upon issuance of a citation for a violation of the applicable standard involving a DO in an MMU, paragraph (a) of this section shall not apply to that MMU until the violation is abated and the citation is terminated in accordance with paragraphs (h) and (i) of this section.

(h) Upon issuance of a citation for violation of the applicable standard, the operator shall take the following actions sequentially:

(1) Make approved respiratory equipment available to affected miners in accordance with § 72.700 of this chapter;

(2) Immediately take corrective action to lower the concentration of respirable coal mine dust to at or below the applicable standard; and

(3) Make a record of the corrective actions taken. The record shall be certified by the mine foreman or

equivalent mine official, no later than the end of the mine foreman's or equivalent official's next regularly scheduled working shift. The record shall be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration. Such records shall be retained at a surface location at the mine for at least 1 year and shall be made available for inspection by authorized representatives of the Secretary and the representative of miners.

(4) Begin sampling, within 8 calendar days after the date the citation is issued, the environment of the affected occupation in the MMU on consecutive normal production shifts until five valid representative samples are taken.

(i) A citation for a violation of the applicable standard shall be terminated by MSHA when:

(1) Each of the five valid representative samples is at or below the applicable standard; and

(2) The operator has submitted to the District Manager revised dust control parameters as part of the mine ventilation plan applicable to the MMU in the citation, and the changes have been approved by the District Manager. The revised parameters shall reflect the control measures used by the operator to abate the violation.

§ 70.207 Bimonthly sampling; designated areas.

Until January 31, 2016:

(a) Each operator shall take one valid representative sample from each designated area (DA) on a production shift during each bimonthly period. The bimonthly periods are:

February 1–March 31
April 1–May 31
June 1–July 31
August 1–September 30
October 1–November 30
December 1–January 31.

(b) When the respirable dust standard is changed in accordance with § 70.101, the new applicable standard shall become effective 7 calendar days after the date of the notification of the change by MSHA.

(c) Upon notification from MSHA that any valid sample taken from a DA to meet the requirements of paragraph (a) of this section exceeds the applicable standard, the operator shall take five valid representative samples from that DA within 15 calendar days. The operator shall begin such sampling on the first day on which there is a production shift following the day of receipt of notification.

(d) When a valid representative sample taken in accordance with this section meets or exceeds the ECV in Table 70–1 that corresponds to the applicable standard and particular sampling device used, the operator shall:

(1) Make approved respiratory equipment available to affected miners in accordance with § 72.700 of this chapter;

(2) Immediately take corrective action to lower the concentration of respirable coal mine dust to at or below the applicable standard; and

(3) Make a record of the corrective actions taken. The record shall be certified by the mine foreman or equivalent mine official, no later than the end of the mine foreman's or equivalent official's next regularly scheduled working shift. The record shall be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration. Such records shall be retained at a surface location at the mine for at least 1 year and shall be made available for inspection by authorized representatives of the Secretary and the representative of miners.

(e) Noncompliance with the applicable standard is demonstrated during the sampling period when:

(1) Two or more valid representative samples meet or exceed the ECV in Table 70–1 that corresponds to the applicable standard and the particular sampling device used; or

(2) The average for all valid representative samples meets or exceeds the ECV in Table 70–2 that corresponds to the applicable standard and the particular sampling device used.

(f) Unless otherwise directed by the District Manager, upon issuance of a citation for a violation of the applicable standard, paragraph (a) of this section shall not apply to that DA until the violation is abated and the citation is terminated in accordance with paragraphs (g) and (h) of this section.

(g) Upon issuance of a citation for violation of the applicable standard, the operator shall take the following actions sequentially:

(1) Make approved respiratory equipment available to affected miners in accordance with § 72.700 of this chapter;

(2) Immediately take corrective action to lower the concentration of respirable coal mine dust to at or below the applicable standard; and

(3) Make a record of the corrective actions taken. The record shall be certified by the mine foreman or equivalent mine official, no later than the end of the mine foreman's or equivalent official's next regularly scheduled working shift. The record shall be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration. Such records shall be retained at a surface location at the mine for at least 1 year and shall be made available for inspection by authorized representatives of the Secretary and the representative of miners.

(4) Begin sampling, within 8 calendar days after the date the citation is issued, the environment of the affected DA on consecutive normal production shifts until five valid representative samples are taken.

(h) A citation for a violation of the applicable standard shall be terminated by MSHA when:

(1) Each of the five valid representative samples is at or below the applicable standard; and

(2) The operator has submitted to the District Manager revised dust control parameters as part of the mine ventilation plan applicable to the DA in the citation, and the changes have been approved by the District Manager. The revised parameters shall reflect the control measures used by the operator to abate the violation.

§ 70.208 Quarterly sampling; mechanized mining units.

On February 1, 2016:

(a) The operator shall sample each calendar quarter:

(1) The designated occupation (DO) in each MMU on consecutive normal production shifts until 15 valid representative samples are taken. The District Manager may require additional groups of 15 valid representative samples when information indicates the operator has not followed the approved ventilation plan for any MMU.

(2) Each other designated occupation (ODO) specified in paragraphs (b)(1) through (b)(10) of this section in each MMU or specified by the District Manager and identified in the approved mine ventilation plan on consecutive normal production shifts until 15 valid representative samples are taken. Sampling of each ODO type shall begin after fulfilling the sampling requirements of paragraph (a)(1) of this section. When required to sample more than one ODO type, each ODO type must be sampled over separate time periods during the calendar quarter.

(3) The quarterly periods are:

January 1–March 31
April 1–June 30
July 1–September 30
October 1–December 31.

(b) Unless otherwise directed by the District Manager, the approved

sampling device shall be worn by the miner assigned to perform the duties of the DO or ODO specified in paragraphs (b)(1) through (b)(10) of this section or by the District Manager for each type of MMU.

(1) *Conventional section using cutting machine.* DO—The cutting machine operator;

(2) *Conventional section blasting off the solid.* DO—The loading machine operator;

(3) *Continuous mining section other than auger-type.* DO—The continuous mining (CM) machine operator or mobile bridge operator when using continuous haulage; ODO—The roof bolting machine operator who works nearest the working face on the return air side of the continuous mining machine; the face haulage operators on MMUs using blowing face ventilation; the face haulage operators on MMUs ventilated by split intake air (''fishtail ventilation'') as part of a super-section; and face haulage operators where two continuous mining machines are operated on an MMU.

(4) *Continuous mining section using auger-type machine.* DO—The jacksetter who works nearest the working face on the return air side of the continuous mining machine;

(5) *Scoop section using cutting machine.* DO—The cutting machine operator;

(6) *Scoop section, blasting off the solid.* DO—The coal drill operator;

(7) *Longwall section.* DO—The longwall operator working on the tailgate side of the longwall mining machine; ODO—The jacksetter who works nearest the return air side of the longwall working face, and the mechanic;

(8) *Hand loading section with a cutting machine.* DO—The cutting machine operator;

(9) *Hand loading section blasting off the solid.* DO—The hand loader exposed to the greatest dust concentration; and

(10) *Anthracite mine sections.* DO—The hand loader exposed to the greatest dust concentration.

(c) When the respirable dust standard is changed in accordance with § 70.101, the new applicable standard shall become effective 7 calendar days after the date of notification of the change by MSHA.

(d) If a normal production shift is not achieved, the DO or ODO sample for that shift may be voided by MSHA. However, any sample, regardless of production, that exceeds the applicable standard by at least 0.1 mg/m^3 shall be used in the determination of the equivalent concentration for that occupation.

(e) When a valid representative sample taken in accordance with this section meets or exceeds the ECV in Table 70–1 that corresponds to the applicable standard and particular sampling device used, the operator shall:

(1) Make approved respiratory equipment available to affected miners in accordance with § 72.700 of this chapter;

(2) Immediately take corrective action to lower the concentration of respirable dust to at or below the applicable respirable dust standard; and

(3) Make a record of the corrective actions taken. The record shall be certified by the mine foreman or equivalent mine official, no later than the end of the mine foreman's or equivalent official's next regularly scheduled working shift. The record shall be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration. Such records shall be retained at a surface location at the mine for at least 1 year and shall be made available for inspection by authorized representatives of the Secretary and the representative of miners.

(f) Noncompliance with the applicable standard is demonstrated during the sampling period when:

(1) Three or more valid representative samples meet or exceed the ECV in Table 70–1 that corresponds to the applicable standard and the particular sampling device used; or

(2) The average for all valid representative samples meets or exceeds the ECV in Table 70–2 that corresponds to the applicable standard and the particular sampling device used.

(g)(1) Unless otherwise directed by the District Manager, upon issuance of a citation for a violation of the applicable standard involving a DO in an MMU, paragraph (a)(1) shall not apply to the DO in that MMU until the violation is abated and the citation is terminated in accordance with paragraphs (h) and (i) of this section.

(2) Unless otherwise directed by the District Manager, upon issuance of a citation for a violation of the applicable standard involving a type of ODO in an MMU, paragraph (a)(2) shall not apply to that ODO type in that MMU until the violation is abated and the citation is terminated in accordance with paragraphs (h) and (i) of this section.

(h) Upon issuance of a citation for violation of the applicable standard, the operator shall take the following actions sequentially:

(1) Make approved respiratory equipment available to affected miners in accordance with § 72.700 of this chapter;

(2) Immediately take corrective action to lower the concentration of respirable coal mine dust to at or below the applicable standard; and

(3) Make a record of the corrective actions taken. The record shall be certified by the mine foreman or equivalent mine official, no later than the end of the mine foreman's or equivalent official's next regularly scheduled working shift. The record shall be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration. Such records shall be retained at a surface location at the mine for at least 1 year and shall be made available for inspection by authorized representatives of the Secretary and the representative of miners.

(4) Begin sampling, within 8 calendar days after the date the citation is issued, the environment of the affected occupation in the MMU on consecutive normal production shifts until five valid representative samples are taken.

(i) A citation for violation of the applicable standard shall be terminated by MSHA when:

(1) Each of the five valid representative samples is at or below the applicable standard; and

(2) The operator has submitted to the District Manager revised dust control parameters as part of the mine ventilation plan applicable to the MMU in the citation and the changes have been approved by the District Manager. The revised parameters shall reflect the control measures used by the operator to abate the violation.

§ 70.209 Quarterly sampling; designated areas.

On February 1, 2016:

(a) The operator shall sample quarterly each designated area (DA) on consecutive production shifts until five valid representative samples are taken. The quarterly periods are:

January 1–March 31
April 1–June 30
July 1–September 30
October 1–December 31.

(b) When the respirable dust standard is changed in accordance with § 70.101, the new applicable standard shall become effective 7 calendar days after the date of the notification of the change by MSHA.

(c) When a valid representative sample taken in accordance with this section meets or exceeds the ECV in Table 70–1 that corresponds to the applicable standard and particular

sampling device used, the operator shall:

(1) Make approved respiratory equipment available to affected miners in accordance with § 72.700 of this chapter;

(2) Immediately take corrective action to lower the concentration of respirable dust to at or below the applicable respirable dust standard; and

(3) Make a record of the corrective actions taken. The record shall be certified by the mine foreman or equivalent mine official, no later than the end of the mine foreman's or equivalent official's next regularly scheduled working shift. The record shall be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration. Such records shall be retained at a surface location at the mine for at least 1 year and shall be made available for inspection by authorized representatives of the Secretary and the representative of miners.

(d) Noncompliance with the applicable standard is demonstrated during the sampling period when:

(1) Two or more valid representative samples meet or exceed the ECV in Table 70–1 that corresponds to the applicable standard and the particular sampling device used; or

(2) The average for all valid representative samples meets or exceeds the ECV in Table 70–2 that corresponds to the applicable standard and particular sampling device used.

(e) Unless otherwise directed by the District Manager, upon issuance of a citation for a violation of the applicable standard, paragraph (a) of this section shall not apply to that DA until the violation is abated and the citation is terminated in accordance with paragraphs (f) and (g) of this section.

(f) Upon issuance of a citation for a violation of the applicable standard, the operator shall take the following actions sequentially:

(1) Make approved respiratory equipment available to affected miners in accordance with § 72.700 of this chapter;

(2) Immediately take corrective action to lower the concentration of respirable coal mine dust to at or below the applicable standard; and

(3) Make a record of the corrective actions taken. The record shall be certified by the mine foreman or equivalent mine official, no later than the end of the mine foreman's or equivalent official's next regularly scheduled working shift. The record shall be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration. Such records shall be retained at a surface location at the mine for at least 1 year and shall be made available for inspection by authorized representatives of the Secretary and the representative of miners.

(4) Begin sampling, within 8 calendar days after the date the citation is issued, the environment of the affected DA on consecutive normal production shifts until five valid representative samples are taken.

(g) A citation for a violation of the applicable standard shall be terminated by MSHA when:

(1) Each of the five valid representative samples is at or below the applicable standard; and

(2) The operator has submitted to the District Manager revised dust control parameters as part of the mine ventilation plan applicable to the DA in the citation, and the changes have been approved by the District Manager. The revised parameters shall reflect the control measures used by the operator to abate the violation.

§ 70.210 Respirable dust samples; transmission by operator.

(a) If using a CMDPSU, the operator shall transmit within 24 hours after the end of the sampling shift all samples collected to fulfill the requirements of this part, including control filters, in containers provided by the manufacturer of the filter cassette to: Respirable Dust Processing Laboratory, Pittsburgh Safety and Health Technology Center, Cochrans Mill Road, Building 38, P.O. Box 18179, Pittsburgh, Pennsylvania 15236–0179, or to any other address designated by the District Manager.

(b) The operator shall not open or tamper with the seal of any filter cassette or alter the weight of any filter cassette before or after it is used to fulfill the requirements of this part.

(c) A person certified in sampling shall properly complete the dust data card that is provided by the manufacturer for each filter cassette. The card shall have an identification number identical to that on the cassette used to take the sample and be submitted to MSHA with the sample. Each card shall be signed by the certified person who actually performed the required examinations under 70.205(b) of this part during the sampling shift and shall include that person's MSHA Individual Identification Number (MIIN). Respirable dust samples with data cards not properly completed may be voided by MSHA.

(d) All respirable dust samples collected by the operator shall be considered taken to fulfill the sampling requirements of part 70, 71, or 90 of this title, unless the sample has been identified in writing by the operator to the District Manager, prior to the intended sampling shift, as a sample to be used for purposes other than required by part 70, 71, or 90 of this title.

(e) Respirable dust samples received by MSHA in excess of those required by this part shall be considered invalid samples.

(f) If using a CPDM, the person certified in sampling shall (1) validate, certify, and transmit electronically to MSHA within 24 hours after the end of each sampling shift all sample data file information collected and stored in the CPDM, including the sampling status conditions encountered when sampling; and (2) not tamper with the CPDM or its components in any way before, during, or after it is used to fulfill the requirements of this part, or alter any sample data files. All CPDM data files transmitted electronically to MSHA shall be maintained by the operator for at least 12 months.

§ 70.211 Respirable dust samples; report to operator; posting.

(a) MSHA shall provide the operator, as soon as practicable, a report with the following data on respirable dust samples submitted or whose results were transmitted electronically, if using a CPDM, in accordance with this part:

(1) The mine identification number;

(2) The locations within the mine from which the samples were taken;

(3) The concentration of respirable dust, expressed as an equivalent concentration for each valid sample;

(4) The average equivalent concentration of respirable dust for all valid samples;

(5) The occupation code, where applicable; and

(6) The reason for voiding any sample.

(b) Upon receipt, the operator shall post this data for at least 31 days on the mine bulletin board.

(c) If using a CPDM, the person certified in sampling shall, within 12 hours after the end of each sampling shift, print, sign, and post on the mine bulletin board a paper record (Dust Data Card) of the sample run. This hard-copy record shall include the data entered when the sample run was first programmed, and the following:

(1) The mine identification number;

(2) The locations within the mine from which the samples were taken;

(3) The concentration of respirable dust, expressed as an equivalent concentration reported and stored for each sample;

(4) The sampling status conditions encountered for each sample; and

(5) The shift length.

(d) The information required by paragraph (c) of this section shall remain posted until receipt of the MSHA report covering these respirable dust samples.

§ 70.212 Status change reports.

(a) If there is a change in operational status that affects the respirable dust sampling requirements of this part, the operator shall report the change in operational status of the mine, mechanized mining unit, or designated area to the MSHA District Office or to any other MSHA office designated by the District Manager. Status changes shall be reported in writing or electronically within 3 working days after the status change has occurred.

(b) Each specific operational status is defined as follows:

(1) Underground mine:

(i) *Producing*—has at least one MMU unit producing material.

(ii) *Nonproducing*—no material is being produced.

(iii) *Abandoned*—the work of all miners has been terminated and production activity has ceased.

(2) MMU:

(i) *Producing*—producing material from a working section.

(ii) *Nonproducing*—temporarily ceased production of material.

(iii) *Abandoned*—permanently ceased production of material.

(3) DA:

(i) *Producing*—activity is occurring.

(ii) *Nonproducing*—activity has ceased.

(iii) *Abandoned*—the dust generating source has been withdrawn and activity has ceased.

Tables to Subpart C

TABLE 70–1—EXCESSIVE CONCENTRATION VALUES (ECV) BASED ON SINGLE, FULL-SHIFT CMDPSU/CPDM CONCENTRATION MEASUREMENTS

Applicable standard (mg/m³)	ECV (mg/m³)	
	CMDPSU	CPDM
2.0	2.33	2.26

TABLE 70–1—EXCESSIVE CONCENTRATION VALUES (ECV) BASED ON SINGLE, FULL-SHIFT CMDPSU/CPDM CONCENTRATION MEASUREMENTS—Continued

Applicable standard (mg/m³)	ECV (mg/m³)	
	CMDPSU	CPDM
1.9	2.22	2.15
1.8	2.12	2.04
1.7	2.01	1.92
1.6	1.90	1.81
1.5	1.79	1.70
1.4	1.69	1.58
1.3	1.59	1.47
1.2	1.47	1.36
1.1	1.37	1.25
1.0	1.26	1.13
0.9	1.16	1.02
0.8	1.05	0.91
0.7	0.95	0.79
0.6	0.85	0.68
0.5	0.74	0.57
0.4	0.65	0.46
0.3	0.54	0.34
0.2	0.44	0.23

TABLE 70–2—EXCESSIVE CONCENTRATION VALUES (ECV) BASED ON THE AVERAGE OF 5 OR 15 FULL-SHIFT CMDPSU/CPDM CONCENTRATION MEASUREMENTS

Applicable standard (mg/m³)	ECV (mg/m³) based on 5-sample average		ECV (mg/m³) based on 15-sample average	
	CMDPSU	CPDM	CMDPSU	CPDM
2.0	2.15	2.12	2.09	2.07
1.9	2.05	2.01	1.99	1.97
1.8	1.94	1.91	1.89	1.87
1.7	1.84	1.80	1.78	1.76
1.6	1.74	1.70	1.68	1.66
1.5	1.63	1.59	1.58	1.56
1.4	1.53	1.49	1.48	1.45
1.3	1.43	1.38	1.38	1.35
1.2	1.33	1.27	1.28	1.25
1.1	1.22	1.17	1.17	1.14
1.0	1.12	1.06	1.07	1.04
0.9	1.02	0.96	0.97	0.94
0.8	0.92	0.85	0.87	0.83
0.7	0.81	0.75	0.77	0.73
0.6	0.71	0.64	0.67	0.63
0.5	0.61	0.53	0.57	0.52
0.4	0.51	0.43	0.47	0.42
0.3	0.41	0.32	0.37	0.32
0.2	0.31	0.22	0.27	0.21

Subpart D—[Removed and Reserved]

■ 5. Subpart D to part 70 is removed and reserved.

PART 71—MANDATORY HEALTH STANDARDS FOR SURFACE COAL MINES AND SURFACE WORK AREAS OF UNDERGROUND COAL MINES

■ 6. The authority citation for part 71 is revised to read as follows:

Authority: 30 U.S.C. 811, 813(h), 957.

■ 7. Subpart A to part 71 is revised to read as follows:

Subpart A—General

Sec.
71.1 Scope.
71.2 Definitions.

Subpart A—General

§ 71.1 Scope.

This part 71 sets forth mandatory health standards for each surface coal mine and for the surface work areas of each underground coal mine subject to the Federal Mine Safety and Health Act of 1977, as amended.

§ 71.2 Definitions.

The following definitions apply in this part.

Act. The Federal Mine Safety and Health Act of 1977, Public Law 91–173, as amended by Public Law 95–164 and Public Law 109–236.

Active workings. Any place in a surface coal mine or the surface work area of an underground coal mine where miners are normally required to work or travel.

Approved sampling device. A sampling device approved by the Secretary and Secretary of Health and Human Services (HHS) under part 74 of this title.

Certified person. An individual certified by the Secretary in accordance with § 71.202 to take respirable dust samples required by this part or certified in accordance with § 71.203 to perform maintenance and calibration of respirable dust sampling equipment as required by this part.

Coal mine dust personal sampler unit (CMDPSU). A personal sampling device approved under part 74, subpart B, of this title.

Concentration. A measure of the amount of a substance contained per unit volume of air.

Continuous personal dust monitor (CPDM). A personal sampling device approved under part 74, subpart C, of this title.

Designated work position (DWP). A work position in a surface coal mine and surface work area of an underground coal mine designated for sampling to measure respirable dust generation sources in the active workings. Each DWP will be assigned a four-digit number assigned by MSHA identifying the specific physical portion of the mine that is affected, followed by a three-digit MSHA coal mining occupation code describing the location to which a miner is assigned in the performance of his or her regular duties.

District Manager. The manager of the Coal Mine Safety and Health District in which the mine is located.

Equivalent concentration. The concentration of respirable coal mine dust, including quartz, expressed in milligrams per cubic meter of air (mg/m^3) as measured with an approved sampling device, determined by dividing the weight of dust in milligrams collected on the filter of an approved sampling device by the volume of air in cubic meters passing through the filter (sampling time in minutes (t) times the sampling airflow rate in cubic meters per minute), and then converting that concentration to an equivalent concentration as measured by the Mining Research Establishment (MRE) instrument. When the approved sampling device is:

(1) The CMDPSU, the equivalent concentration is determined by multiplying the concentration of respirable coal mine dust by the constant factor prescribed by the Secretary.

(2) The CPDM, the device shall be programmed to automatically report end-of-shift concentration measurements as equivalent concentrations.

MRE instrument. The gravimetric dust sampler with a four channel horizontal elutriator developed by the Mining Research Establishment of the National Coal Board, London, England.

MSHA. The Mine Safety and Health Administration of the U.S. Department of Labor.

Normal work shift. (1) A shift during which the regular duties of the DWP are performed while routine day-to-day mining activities are occurring in the rest of the mine and

(2) A shift during which there is no rain, or, if rain occurs, the rain does not suppress the respirable dust to the extent that sampling results will be measurably lower, in the judgment of the person certified under this part to conduct sampling.

Quartz. Crystalline silicon dioxide (SiO_2) not chemically combined with other substances and having a distinctive physical structure.

Representative sample. A respirable dust sample, expressed as an equivalent concentration, that reflects typical dust concentration levels in the working environment of the DWP when performing normal duties.

Respirable dust. Dust collected with a sampling device approved by the Secretary and the Secretary of HHS in accordance with part 74 (Coal Mine Dust Sampling Devices) of this title.

Secretary. The Secretary of Labor or a delegate.

Surface area. A specific physical portion of a surface coal mine or surface area of an underground coal mine. These areas are assigned a four-digit identification number by MSHA.

Surface coal mine. A surface area of land and all structures, facilities, machinery, tools, equipment, excavations, and other property, real or personal, placed upon or above the surface of such land by any person, used in, or to be used in, or resulting from, the work of extracting in such area bituminous coal, lignite, or anthracite from its natural deposits in the earth by any means or method, and the work of preparing the coal so extracted, including custom coal preparation facilities.

Surface installation. Any structure in which miners work at a surface coal mine or surface work area of an underground coal mine.

Surface work area of an underground mine. The surface areas of land and all structures, facilities, machinery, tools, equipment, shafts, slopes, excavations, and other property, real or personal, placed in, upon or above the surface of such land by any person, used in, or to be used in, or resulting from, the work of extracting bituminous coal, lignite, or anthracite from its natural deposits underground by any means or method, and the work of preparing the coal so extracted, including custom coal preparation facilities.

Surface worksite. Any area in which miners work at a surface coal mine or surface work area of an underground coal mine.

Valid respirable dust sample. A respirable dust sample collected and submitted as required by this part, including any sample for which the data were electronically transmitted to MSHA, and not voided by MSHA.

Work position. An occupation identified by an MSHA three-digit code number describing a location to which a miner is assigned in the performance of his or her normal duties.

■ 8. Subpart B to part 71 is revised to read as follows:

Subpart B—Dust Standards

Sec.
71.100 Respirable dust standard.
71.101 Respirable dust standard when quartz is present.

Subpart B—Dust Standards

§ 71.100 Respirable dust standard.

Each operator shall continuously maintain the average concentration of respirable dust in the mine atmosphere during each shift to which each miner in the active workings of each mine is exposed, as measured with an approved sampling device and expressed in terms of an equivalent concentration, at or below:

(a) 2.0 milligrams of respirable dust per cubic meter of air (mg/m^3).

(b) 1.5 mg/m^3 as of August 1, 2016.

§ 71.101 Respirable dust standard when quartz is present.

(a) Each operator shall continuously maintain the average concentration of respirable quartz dust in the mine atmosphere during each shift to which each miner in the active workings of each mine is exposed at or below 0.1 mg/m^3 (100 micrograms per cubic meter or μg/m^3) as measured with an approved sampling device and expressed in terms of an equivalent concentration.

(b) When the equivalent concentration of respirable quartz dust exceeds 100

μg/m³, the operator shall continuously maintain the average concentration of respirable dust in the mine atmosphere during each shift to which each miner in the active workings is exposed as measured with an approved sampling device and expressed in terms of an equivalent concentration at or below the applicable standard. The applicable standard is computed by dividing the percent of quartz into the number 10. The application of this formula shall not result in the applicable standard that exceeds the standard established by § 71.100(a) of this section.

Example: Assume the sampled DWP is on a 1.5-mg/m³ dust standard. Suppose a valid representative dust sample with an equivalent concentration of 1.09 mg/m³ contains 16.7% of quartz dust, which corresponds to a quartz concentration of 182 μg/m³. Therefore, the average concentration of respirable dust in the mine atmosphere associated with that DWP shall be maintained on each shift at or below 0.6 mg/m³ (10/16.7% = 0.6 mg/m³).

■ 9. Subpart C to part 71 is revised to read as follows:

Subpart C—Sampling Procedures

Sec.
71.201 Sampling; general and technical requirements.
71.202 Certified person; sampling.
71.203 Certified person; maintenance and calibration.
71.204 Approved sampling devices; maintenance and calibration.
71.205 Approved sampling devices; operation; air flowrate.
71.206 Quarterly sampling; designated work positions.
71.207 Respirable dust samples; transmission by operator.
71.208 Respirable dust samples; report to operator; posting.
71.209 Status change reports.

Subpart C—Sampling Procedures

§ 71.201 Sampling; general and technical requirements.

(a) Each operator shall take representative samples of the concentration of respirable dust in the active workings of the mine as required by this part only with an approved CMDPSU. On February 1, 2016, the operator may use an approved CPDM if the operator notifies the District Manager in writing that only an approved CPDM will be used for all DWP sampling at the mine. The notification must be received at least 90 days before the beginning of the quarter in which CPDMs will be used to collect the DWP samples.

(b) Sampling devices shall be worn or carried directly to and from the DWP to be sampled. Sampling devices shall remain with the DWP and shall be operational during the entire shift, which includes the total time spent in the DWP and while traveling to and from the DWP being sampled. If the work shift to be sampled is longer than 12 hours and the sampling device is:

(1) A CMDPSU, the operator shall switch-out the unit's sampling pump prior to the 13th-hour of operation.

(2) A CPDM, the operator shall switch-out the CPDM with a fully charged device prior to the 13th-hour of operation.

(c) If using a CMDPSU, one control filter shall be used for each shift of sampling. Each control filter shall:

(1) Have the same pre-weight data (noted on the dust data card) as the filters used for sampling;

(2) Remain plugged at all times;

(3) Be used for the same amount of time, and exposed to the same temperature and handling conditions as the filters used for sampling; and

(4) Be kept with the exposed samples after sampling and in the same mailing container when transmitted to MSHA.

(d) Records showing the length of each normal work shift for each DWP shall be made and retained for at least six months and shall be made available for inspection by authorized representatives of the Secretary and the representative of miners, and submitted to the District Manager when requested in writing.

(e) Upon request from the District Manager, the operator shall submit the date and time any respirable dust sampling required by this part will begin. This information shall be submitted at least 48 hours prior to scheduled sampling.

(f) Upon written request by the operator, the District Manager may waive the rain restriction for a normal work shift as defined in § 71.2 for a period not to exceed two months, if the District Manager determines that:

(1) The operator will not have reasonable opportunity to complete the respirable dust sampling required by this part without the waiver because of the frequency of rain; and

(2) The operator did not have reasonable opportunity to complete the respirable dust sampling required by this part prior to requesting the waiver.

(g) Operators using CPDMs shall provide training to all miners expected to wear the CPDM. The training shall be completed prior to a miner wearing the CPDM and then every 12 months thereafter. The training shall include:

(1) The importance of monitoring dust concentrations and properly wearing the CPDM;

(2) Explaining the basic features and capabilities of the CPDM;

(3) Discussing the various types of information displayed by the CPDM and how to access that information; and

(4) How to start and stop a short-term sample run during compliance sampling.

(h) An operator shall keep a record of the CPDM training at the mine site for 24 months after completion of the training. An operator may keep the record elsewhere if the record is immediately accessible from the mine site by electronic transmission. Upon request from an authorized representative of the Secretary, Secretary of HHS, or representative of miners, the operator shall promptly provide access to any such training records. The record shall include:

(1) The date of training;

(2) The names of miners trained; and

(3) The subjects included in the training.

§ 71.202 Certified person; sampling.

(a) The respirable dust sampling required by this part shall be performed by a certified person.

(b) To be certified, a person shall complete the applicable MSHA course of instruction and pass the MSHA examination demonstrating competency in sampling procedures. Persons not certified in sampling, and those certified only in maintenance and calibration procedures in accordance with § 71.203(b), are not permitted to collect respirable dust samples required by this part or handle approved sampling devices when being used in sampling.

(c) To maintain certification, a person must pass the MSHA examination demonstrating competency in sampling procedures every three years.

(d) MSHA may revoke a person's certification for failing to properly carry out the required sampling procedures.

§ 71.203 Certified person; maintenance and calibration.

(a) Approved sampling devices shall be maintained and calibrated by a certified person.

(b) To be certified, a person shall complete the applicable MSHA course of instruction and pass the MSHA examination demonstrating competency in maintenance and calibration procedures for approved sampling devices. Necessary maintenance of the sampling head assembly of a CMDPSU, or the cyclone assembly of a CPDM, can be performed by persons certified in sampling or maintenance and calibration.

(c) To maintain certification, a person must pass the MSHA examination demonstrating competency in maintenance and calibration procedures every three years.

(d) MSHA may revoke a person's certification for failing to properly carry out the required maintenance and calibration procedures.

§ 71.204 Approved sampling devices; maintenance and calibration.

(a) Approved sampling devices shall be maintained as approved under part 74 of this chapter and calibrated in accordance with MSHA Informational Report IR 1240 (1996) ''Calibration and Maintenance Procedures for Coal Mine Respirable Dust Samplers'' or in accordance with the manufacturer's recommendations if using a CPDM. Only persons certified in maintenance and calibration can perform maintenance work on the CPDM or on the pump unit of the CMDPSU.

(b) Sampling devices shall be calibrated at the flowrate of 2.0 liters of air per minute (L/min) if using a CMDPSU, or at 2.2 L/min if using a CPDM, or at a different flowrate recommended by the manufacturer, before they are put into service and, thereafter, at time intervals recommended by the manufacturer or prescribed by the Secretary or Secretary of HHS.

(c) If using a CMDPSU, sampling devices shall be examined and tested by a person certified in sampling or in maintenance and calibration within 3 hours before the start of the shift on which the approved sampling devices will be used to collect respirable dust samples. This is to assure that the sampling devices are clean and in proper working condition. This examination and testing shall include the following:

(1) Examination of all components of the cyclone assembly to assure that they are clean and free of dust and dirt. This includes examining the interior of the connector barrel (located between the cassette assembly and vortex finder), vortex finder, cyclone body, and grit pot;

(2) Examination of the inner surface of the cyclone body to assure that it is free of scoring or scratch marks on the inner surface of the cyclone where the air flow is directed by the vortex finder into the cyclone body;

(3) Examination of the external hose connecting the pump unit to the sampling head assembly to assure that it is clean and free of leaks; and

(4) Examination of the clamping and positioning of the cyclone body, vortex finder, and cassette to assure that they are rigid, in alignment, firmly in contact, and airtight.

(5) Testing the voltage of each battery while under actual load to assure the battery is fully charged. This requires that a fully assembled and examined sampling head assembly be attached to the pump inlet with the pump unit running when the voltage check is made. The voltage for the batteries used in the CMDPSU shall not be lower than the product of the number of cells in the battery multiplied by the manufacturer's nominal voltage per cell value.

(d) If using a CPDM, the certified person in sampling or in maintenance and calibration shall:

(1) Follow the pre-operational examinations, testing, and set-up procedures, and perform necessary external maintenance recommended by the manufacturer to assure the operational readiness of the CPDM within 3 hours before the start of the shift on which the sampling devices will be used to collect respirable dust samples; and

(2) Perform other required scheduled examinations and maintenance procedures recommended by the manufacturer.

(e) You must proceed in accordance with ''Calibration and Maintenance Procedures for Coal Mine Respirable Dust Samplers,'' MSHA Informational Report IR 1240 (1996) referenced in paragraph (a) of this section. The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may obtain a copy from the MSHA Web site at *http://www.msha.gov* and you may inspect or obtain a copy at MSHA, Coal Mine Safety and Health, 1100 Wilson Blvd., Room 2424, Arlington, Virginia 22209–3939 and at each MSHA Coal Mine Safety and Health District Office, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.*

§ 71.205 Approved sampling devices; operation; air flowrate.

(a) Approved sampling devices shall be operated at the flowrate of 2.0 L/min, if using a CMDPSU; at 2.2 L/min, if using a CPDM; or at a different flowrate recommended by the manufacturer.

(b) If using a CMDPSU, each sampling device shall be examined each shift by a person certified in sampling during:

(1) The second hour after being put into operation to assure it is in the proper location, operating properly, and at the proper flowrate. If the proper flowrate is not maintained, necessary adjustments shall be made by the certified person.

(2) The last hour of operation to assure that it is operating properly and at the proper flowrate. If the proper flowrate is not maintained, the respirable dust sample shall be transmitted to MSHA with a notation by the certified person on the back of the dust data card stating that the proper flowrate was not maintained. Other events occurring during the collection of respirable dust samples that may affect the validity of the sample, such as dropping of the sampling head assembly onto the mine floor, shall be noted on the back of the dust data card.

(c) If using a CPDM, the person certified in sampling shall monitor the dust concentrations and the sampling status conditions being reported by the sampling device at mid-shift or more frequently as specified in the approved respirable dust control plan, if applicable, to assure: The sampling device is in the proper location and operating properly; and the work environment of the occupation being sampled remains in compliance with the applicable standard at the end of the shift.

§ 71.206 Quarterly sampling; designated work positions.

(a) Each operator shall take one valid representative sample from the DWP during each quarterly period. The quarterly periods are:

January 1–March 31
April 1–June 30
July 1–September 30
October 1–December 31.

(b) When the respirable dust standard is changed in accordance with § 71.101, the new applicable standard shall become effective 7 calendar days after the date of the notification of the change by MSHA.

(c) Designated work position samples shall be collected at locations to measure respirable dust generation sources in the active workings. The specific work positions at each mine where DWP samples shall be collected include:

(1) Each highwall drill operator (MSHA occupation code 384);

(2) Bulldozer operators (MSHA occupation code 368); and

(3) Other work positions designated by the District Manager for sampling in accordance with § 71.206(m).

(d) Operators with multiple work positions specified in paragraph (c)(2) and (c)(3) of this section shall sample the DWP exposed to the greatest respirable dust concentration in each work position performing the same activity or task at the same location at the mine and exposed to the same dust generation source. Each operator shall

provide the District Manager with a list identifying the specific work positions where DWP samples will be collected for:

(1) Active mines—by October 1, 2014.

(2) New mines—Within 30 calendar days of mine opening.

(3) DWPs with a change in operational status that increases or reduces the number of active DWPs—within 7 calendar days of the change in status.

(e) Each DWP sample shall be taken on a normal work shift. If a normal work shift is not achieved, the respirable dust sample shall be transmitted to MSHA with a notation by the person certified in sampling on the back of the dust data card stating that the sample was not taken on a normal work shift. When a normal work shift is not achieved, the sample for that shift may be voided by MSHA. However, any sample, regardless of whether a normal work shift was achieved, that exceeds the applicable standard by at least 0.1 mg/m^3 shall be used in the determination of the equivalent concentration for that occupation.

(f) Unless otherwise directed by the District Manager, DWP samples shall be taken by placing the sampling device as follows:

(1) *Equipment operator:* On the equipment operator or on the equipment within 36 inches of the operator's normal working position.

(2) *Non-equipment operators:* On the miner assigned to the DWP or at a location that represents the maximum concentration of dust to which the miner is exposed.

(g) Upon notification from MSHA that any valid representative sample taken from a DWP to meet the requirements of paragraph (a) of this section exceeds the applicable standard, the operator shall, within 15 calendar days of notification, sample that DWP each normal work shift until five valid representative samples are taken. The operator shall begin sampling on the first normal work shift following receipt of notification.

(h) When a valid representative sample taken in accordance with this section meets or exceeds the excessive concentration value (ECV) in Table 71–1 that corresponds to the applicable standard and particular sampling device used, the operator shall:

(1) Make approved respiratory equipment available to affected miners in accordance with § 72.700 of this chapter;

(2) Immediately take corrective action to lower the concentration of respirable coal mine dust to at or below the applicable standard; and

(3) Make a record of the corrective actions taken. The record shall be certified by the mine foreman or equivalent mine official, no later than the end of the mine foreman's or equivalent official's next regularly scheduled working shift. The record shall be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration. Such records shall be retained at a surface location at the mine for at least 1 year and shall be made available for inspection by authorized representatives of the Secretary and the representative of miners.

(i) Noncompliance with the applicable standard is demonstrated during the sampling period when:

(1) Two or more valid representative samples meet or exceed the ECV in Table 71–1 that corresponds to the applicable standard and the particular sampling device used; or

(2) The average for all valid representative samples meets or exceeds the ECV in Table 71–2 that corresponds to the applicable standard and the particular sampling device used.

(j) Unless otherwise directed by the District Manager, upon issuance of a citation for a violation of the applicable standard, paragraph (a) of this section shall not apply to that DWP until the violation is abated and the citation is terminated in accordance with paragraphs (k) and (l) of this section.

(k) Upon issuance of a citation for violation of the applicable standard, the operator shall take the following actions sequentially:

(1) Make approved respiratory equipment available to affected miners in accordance with § 72.700 of this chapter;

(2) Immediately take corrective action to lower the concentration of respirable coal mine dust to at or below the applicable standard; and

(3) Make a record of the corrective actions taken. The record shall be certified by the mine foreman or equivalent mine official, no later than the end of the mine foreman's or equivalent official's next regularly scheduled working shift. The record shall be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration. Such records shall be retained at a surface location at the mine for at least 1 year and shall be made available for inspection by authorized representatives of the Secretary and the representative of miners.

(4) Begin sampling, within 8 calendar days after the date the citation is issued, the environment of the affected DWP on consecutive normal work shifts until five valid representative samples are taken.

(l) A citation for violation of the applicable standard shall be terminated by MSHA when the equivalent concentration of each of the five valid representative samples is at or below the applicable standard.

TABLE 71–1—EXCESSIVE CONCENTRATION VALUES (ECV) BASED ON SINGLE, FULL-SHIFT CMDPSU/CPDM CONCENTRATION MEASUREMENTS

Applicable standard (mg/m^3)	ECV (mg/m^3)	
	CMDPSU	CPDM
2.0	2.33	2.26
1.9	2.22	2.15
1.8	2.12	2.04
1.7	2.01	1.92
1.6	1.90	1.81
1.5	1.79	1.70
1.4	1.69	1.58
1.3	1.59	1.47
1.2	1.47	1.36
1.1	1.37	1.25
1.0	1.26	1.13
0.9	1.16	1.02
0.8	1.05	0.91
0.7	0.95	0.79
0.6	0.85	0.68
0.5	0.74	0.57
0.4	0.65	0.46
0.3	0.54	0.34
0.2	0.44	0.23

TABLE 71–2—EXCESSIVE CONCENTRATION VALUES (ECV) BASED ON THE AVERAGE OF 5 FULL-SHIFT CMDPSU/CPDM CONCENTRATION MEASUREMENTS

Applicable standard (mg/m^3)	ECV (mg/m^3)	
	CMDPSU	CPDM
2.0	2.15	2.12
1.9	2.05	2.01
1.8	1.94	1.91
1.7	1.84	1.80
1.6	1.74	1.70
1.5	1.63	1.59
1.4	1.53	1.49
1.3	1.43	1.38
1.2	1.33	1.27
1.1	1.22	1.17
1.0	1.12	1.06
0.9	1.02	0.96
0.8	0.92	0.85
0.7	0.81	0.75
0.6	0.71	0.64
0.5	0.61	0.53
0.4	0.51	0.43
0.3	0.41	0.32
0.2	0.31	0.22

(m) The District Manager may designate for sampling under this section additional work positions at a

surface coal mine and at a surface work area of an underground coal mine where a concentration of respirable dust exceeding 50 percent of the standard in effect at the time the sample is taken, or a concentration of respirable dust exceeding 50 percent of the standard established in accordance with § 71.101, has been measured by one or more MSHA valid representative samples.

(n) The District Manager may withdraw from sampling any DWP designated for sampling under paragraph (m) of this section upon finding that the operator is able to maintain continuing compliance with the applicable standard. This finding shall be based on the results of MSHA and operator valid representative samples taken during at least a 12-month period.

§ 71.207 Respirable dust samples; transmission by operator.

(a) If using a CMDPSU, the operator shall transmit within 24 hours after the end of the sampling shift all samples collected to fulfill the requirements of this part, including control filters, in containers provided by the manufacturer of the filter cassette to: Respirable Dust Processing Laboratory, Pittsburgh Safety and Health Technology Center, Cochrans Mill Road, Building 38, P.O. Box 18179, Pittsburgh, Pennsylvania 15236–0179, or to any other address designated by the District Manager.

(b) The operator shall not open or tamper with the seal of any filter cassette or alter the weight of any filter cassette before or after it is used to fulfill the requirements of this part.

(c) A person certified in sampling shall properly complete the dust data card that is provided by the manufacturer for each filter cassette. The card shall have an identification number identical to that on the cassette used to take the sample and be submitted to MSHA with the sample. Each card shall be signed by the certified person who actually performed the required examinations under 71.205(b) of this part during the sampling shift and shall include that person's MSHA Individual Identification Number (MIIN). Respirable dust samples with data cards not properly completed may be voided by MSHA.

(d) All respirable dust samples collected by the operator shall be considered taken to fulfill the sampling requirements of part 70, 71, or 90 of this title, unless the sample has been identified in writing by the operator to the District Manager, prior to the intended sampling shift, as a sample to be used for purposes other than required by part 70, 71, or 90 of this title.

(e) Respirable dust samples received by MSHA in excess of those required by this part shall be considered invalid samples.

(f) If using a CPDM, the person certified in sampling shall (1) validate, certify, and transmit electronically to MSHA within 24 hours after the end of each sampling shift all sample data file information collected and stored in the CPDM, including the sampling status conditions encountered when sampling each DWP; and (2) not tamper with the CPDM or its components in any way before, during, or after it is used to fulfill the requirements of this part, or alter any sample data files. All CPDM data files transmitted electronically to MSHA shall be maintained by the operator for at least 12 months.

§ 71.208 Respirable dust samples; report to operator; posting.

(a) MSHA shall provide the operator, as soon as practicable, a report with the following data on respirable dust samples submitted or whose results were transmitted electronically, if using a CPDM, in accordance with this part:

(1) The mine identification number;

(2) The DWP at the mine from which the samples were taken;

(3) The concentration of respirable dust, expressed as an equivalent concentration for each valid sample;

(4) The average equivalent concentration of respirable dust for all valid samples;

(5) The occupation code; and

(6) The reason for voiding any sample.

(b) Upon receipt, the operator shall post this data for at least 31 days on the mine bulletin board.

(c) If using a CPDM, the person certified in sampling shall, within 12 hours after the end of each sampling shift, print, sign, and post on the mine bulletin board a paper record (Dust Data Card) of each sample run. This hard-copy record shall include the data entered when the sample run was first programmed, and the following:

(1) The mine identification number;

(2) The DWP at the mine from which the samples were taken;

(3) The concentration of respirable dust, expressed as an equivalent concentration reported and stored for each sample;

(4) The sampling status conditions encountered for each sample; and

(5) The shift length.

(d) The information required by paragraph (c) of this section shall remain posted until receipt of the MSHA report covering these respirable dust samples.

§ 71.209 Status change reports.

(a) If there is a change in operational status that affects the respirable dust sampling requirements of this part, the operator shall report the change in operational status of the mine or DWP to the MSHA District Office or to any other MSHA office designated by the District Manager. Status changes shall be reported in writing or electronically within 3 working days after the status change has occurred.

(b) Each specific operational status is defined as follows:

(1) Underground mine:

(i) Producing—has at least one mechanized mining unit producing material.

(ii) Nonproducing—no material is being produced.

(iii) Abandoned—the work of all miners has been terminated and production activity has ceased.

(2) Surface mine:

(i) Producing—normal activity is occurring and coal is being produced or processed or other material or equipment is being handled or moved.

(ii) Nonproducing—normal activity is not occurring and coal is not being produced or processed, and other material or equipment is not being handled or moved.

(iii) Abandoned—the work of all miners has been terminated and all activity has ceased.

(3) DWP:

(i) Producing—normal activity is occurring.

(ii) Nonproducing—normal activity is not occurring.

(iii) Abandoned—the dust generating source has been withdrawn and activity has ceased.

■ 10. Subpart D to part 71 is revised to read as follows:

Subpart D—Respirable Dust Control Plans

Sec.
71.300 Respirable dust control plan; filing requirements.
71.301 Respirable dust control plan; approval by District Manager and posting.

Subpart D—Respirable Dust Control Plans

§ 71.300 Respirable dust control plan; filing requirements.

(a) Within 15 calendar days after the termination date of a citation for violation of the applicable standard, the operator shall submit to the District Manager for approval a written respirable dust control plan applicable to the DWP identified in the citation. The respirable dust control plan and revisions thereof shall be suitable to the conditions and the mining system of the

coal mine and shall be adequate to continuously maintain respirable dust to at or below the applicable standard at the DWP identified in the citation.

(1) The mine operator shall notify the representative of miners at least 5 days prior to submission of a respirable dust control plan and any revision to a dust control plan. If requested, the mine operator shall provide a copy to the representative of miners at the time of notification;

(2) A copy of the proposed respirable dust control plan, and a copy of any proposed revision, submitted for approval shall be made available for inspection by the representative of miners; and

(3) A copy of the proposed respirable dust control plan, and a copy of any proposed revision, submitted for approval shall be posted on the mine bulletin board at the time of submittal. The proposed plan or proposed revision shall remain posted until it is approved, withdrawn, or denied.

(4) Following receipt of the proposed plan or proposed revision, the representative of miners may submit timely comments to the District Manager, in writing, for consideration during the review process. Upon request, a copy of these comments shall be provided to the operator by the District Manager.

(b) Each respirable dust control plan shall include at least the following:

(1) The mine identification number and DWP number assigned by MSHA, the operator's name, mine name, mine address, and mine telephone number and the name, address, and telephone number of the principal officer in charge of health and safety at the mine;

(2) The specific DWP at the mine to which the plan applies;

(3) A detailed description of the specific respirable dust control measures used to abate the violation of the respirable dust standard; and

(4) A detailed description of how each of the respirable dust control measures described in response to paragraph (b)(3) of this section will continue to be used by the operator, including at least the specific time, place and manner the control measures will be used.

§ 71.301 Respirable dust control plan; approval by District Manager and posting.

(a) The District Manager will approve respirable dust control plans on a mine-by-mine basis. When approving respirable dust control plans, the District Manager shall consider whether:

(1) The respirable dust control measures would be likely to maintain concentrations of respirable coal mine dust at or below the applicable standard; and

(2) The operator's compliance with all provisions of the respirable dust control plan could be objectively ascertained by MSHA.

(b) MSHA may take respirable dust samples to determine whether the respirable dust control measures in the operator's plan effectively maintain concentrations of respirable coal mine dust at or below the applicable standard.

(c) The operator shall comply with all provisions of each respirable dust control plan upon notice from MSHA that the respirable dust control plan is approved.

(d) The approved respirable dust control plan and any revisions shall be:

(1) Provided upon request to the representative of miners by the operator following notification of approval;

(2) Made available for inspection by the representative of miners; and

(3) Posted on the mine bulletin board within 1 working day following notification of approval, and shall remain posted for the period that the plan is in effect.

(e) The operator may review respirable dust control plans and submit proposed revisions to such plans to the District Manager for approval.

PART 72—HEALTH STANDARDS FOR COAL MINES

■ 11. The authority citation for part 72 is revised to read as follows:

Authority: 30 U.S.C. 811, 813(h), 957.

■ 12. Add subpart B to part 72 to read as follows:

Subpart B—Medical Surveillance

Sec.
72.100 Periodic examinations.

Subpart B—Medical Surveillance

§ 72.100 Periodic examinations.

(a) Each operator of a coal mine shall provide to each miner periodic examinations including chest x-rays, spirometry, symptom assessment, and occupational history at a frequency specified in this section and at no cost to the miner.

(1) Each operator shall use facilities approved by the National Institute for Occupational Safety and Health (NIOSH) to provide examinations specified in paragraph (a) of this section.

(2) The results of examinations or tests made pursuant to this section shall be furnished only to the Secretary, Secretary of Health and Human Services (HHS), and at the request of the miner, to the miner's designated physician.

(b) *Voluntary examinations.* Each operator shall provide the opportunity to have the examinations specified in § 72.100(a) at least every 5 years to all miners employed at a coal mine. The examinations shall be available during a 6-month period that begins no less than 3.5 years and not more than 4.5 years from the end of the last 6-month period.

(c) *Mandatory examinations.* For each miner who begins work at a coal mine for the first time, the operator shall provide examinations specified in § 72.100(a) as follows:

(1) An initial examination no later than 30 days after beginning employment;

(2) A follow-up examination no later than 3 years after the initial examination in paragraph (c)(1); and

(3) A follow-up examination no later than 2 years after the examinations in paragraph (c)(2) if the chest x-ray shows evidence of pneumoconiosis or the spirometry examination indicates evidence of decreased lung function. For this purpose, evidential criteria will be defined by NIOSH.

(d) Each mine operator shall develop and submit for approval to NIOSH a plan in accordance with 42 CFR part 37 for providing miners with the examinations specified in § 72.100(a) and a roster specifying the name and current address of each miner covered by the plan.

(e) Each mine operator shall post on the mine bulletin board at all times the approved plan for providing the examinations specified in § 72.100(a).

■ 13. Add §§ 72.700, 72.701, and 72.800 to subpart E of part 72 to read as follows:

Subpart E—Miscellaneous

§ 72.700 Respiratory equipment; respirable dust.

(a) Respiratory equipment approved by NIOSH under 42 CFR part 84 shall be made available to all persons as required under parts 70, 71, and 90 of this chapter. Use of respirators shall not be substituted for environmental control measures in the active workings. Each operator shall maintain an adequate supply of respiratory equipment.

(b) When required to make respirators available, the operator shall provide training prior to the miner's next scheduled work shift, unless the miner received training within the previous 12 months on the types of respirators made available. The training shall include: The care, fit, use, and limitations of each type of respirator.

(c) An operator shall keep a record of the training at the mine site for 24 months after completion of the training.

An operator may keep the record elsewhere if the record is immediately accessible from the mine site by electronic transmission. Upon request from an authorized representative of the Secretary, Secretary of HHS, or representative of miners, the operator shall promptly provide access to any such training records. The record shall include:

(1) The date of training;

(2) The names of miners trained; and

(3) The subjects included in the training.

§ 72.701 Respiratory equipment; gas, dusts, fumes, or mists.

Respiratory equipment approved by NIOSH under 42 CFR part 84 shall be provided to persons exposed for short periods to inhalation hazards from gas, dusts, fumes, or mists. When the exposure is for prolonged periods, other measures to protect such persons or to reduce the hazard shall be taken.

§ 72.800 Single, full-shift measurement of respirable coal mine dust.

The Secretary will use a single, full-shift measurement of respirable coal mine dust to determine the average concentration on a shift since that measurement accurately represents atmospheric conditions to which a miner is exposed during such shift. Noncompliance with the applicable respirable dust standard or the applicable respirable dust standard when quartz is present, in accordance with subchapter O of this chapter, is demonstrated when a single, full-shift measurement taken by MSHA meets or exceeds the applicable ECV in Table 70–1, 71–1, or 90–1 that corresponds to the applicable standard and the particular sampling device used. Upon issuance of a citation for a violation of the applicable standard, and for MSHA to terminate the citation, the operator shall take the specified actions in subchapter O of this chapter.

PART 75—MANDATORY SAFETY STANDARDS—UNDERGROUND COAL MINES

■ 14. The authority citation for part 75 is revised to read as follows:

Authority: 30 U.S.C. 811, 813(h), 957.

■ 15. Amend § 75.325 by revising paragraph (a)(2) to read as follows:

§ 75.325 Air quantity.

(a) * * *

(2) The quantity of air reaching the working face shall be determined at or near the face end of the line curtain, ventilation tubing, or other ventilation control device. If the curtain, tubing, or device extends beyond the last row of permanent roof supports, the quantity of air reaching the working face shall be determined behind the line curtain or in the ventilation tubing at or near the last row of permanent supports. When machine-mounted dust collectors are used in conjunction with blowing face ventilation systems, the quantity of air reaching the working face shall be determined with the dust collector turned off.

* * * * *

■ 16. Amend § 75.350 by revising paragraph (b)(3)(i) and (ii) to read as follows:

§ 75.350 Belt air course ventilation.

* * * * *

(b) * * *

(3)(i) The average concentration of respirable dust in the belt air course, when used as a section intake air course, shall be maintained at or below:

(A) 1.0 mg/m^3.

(B) 0.5 mg/m^3 as of August 1, 2016.

(ii) Where miners on the working section are on a reduced standard below that specified in § 75.350(b)(3)(i), the average concentration of respirable dust in the belt entry must be at or below the lowest applicable standard on that section.

* * * * *

■ 17. Amend § 75.362 by revising paragraphs (a)(2) and (g)(2) and adding paragraphs (g)(3) and (g)(4) to read as follows:

§ 75.362 On-shift examinations.

(a)(1) * * *

(2) A person designated by the operator shall conduct an examination and record the results and the corrective actions taken to assure compliance with the respirable dust control parameters specified in the approved mine ventilation plan. In those instances when a shift change is accomplished without an interruption in production on a section, the examination shall be made anytime within 1 hour after the shift change. In those instances when there is an interruption in production during the shift change, the examination shall be made before production begins on a section. Deficiencies in dust controls shall be corrected before production begins or resumes. The examination shall include: Air quantities and velocities; water pressures and flow rates; excessive leakage in the water delivery system; water spray numbers and orientations; section ventilation and control device placement; roof bolting machine dust collector vacuum levels; scrubber air flow rate; work practices required by the ventilation plan; and any other dust suppression measures. Measurements of the air velocity and quantity, water pressure and flow rates are not required if continuous monitoring of these controls is used and indicates that the dust controls are functioning properly.

* * * * *

(g) * * *

(2) The certified person directing the on-shift examination to assure compliance with the respirable dust control parameters specified in the approved mine ventilation plan shall:

(i) Certify by initials, date, and time on a board maintained at the section load-out or similar location showing that the examination was made prior to resuming production; and

(ii) Verify, by initials and date, the record of the results of the examination required under (a)(2) of this section to assure compliance with the respirable dust control parameters specified in the mine ventilation plan. The verification shall be made no later than the end of the shift for which the examination was made.

(3) The mine foreman or equivalent mine official shall countersign each examination record required under (a)(2) of this section after it is verified by the certified person under (g)(2)(ii) of this section, and no later than the end of the mine foreman's or equivalent mine official's next regularly scheduled working shift. The record shall be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration.

(4) Records shall be retained at a surface location at the mine for at least 1 year and shall be made available for inspection by authorized representatives of the Secretary and the representative of miners.

■ 18. Amend § 75.371 by revising paragraphs (f), (j), and (t) to read as follows:

§ 75.371 Mine ventilation plan; contents.

* * * * *

(f) Section and face ventilation systems used and the minimum quantity of air that will be delivered to the working section for each mechanized mining unit, including drawings illustrating how each system is used, and a description of each different dust suppression system used on equipment, identified by make and model, on each working section, including:

(1) The number, types, location, orientation, operating pressure, and flow rate of operating water sprays;

(2) The maximum distance that ventilation control devices will be

installed from each working face when mining or installing roof bolts in entries and crosscuts;

(3) Procedures for maintaining the roof bolting machine dust collection system in approved condition; and

(4) Recommended best work practices for equipment operators to minimize dust exposure.

* * * * *

(j) The operating volume of machine mounted dust collectors or diffuser fans, if used (see § 75.325(a)(3)), including the type and size of dust collector screen used, and a description of the procedures to maintain dust collectors used on equipment.

* * * * *

(t) The locations where samples for ''designated areas'' will be collected, including the specific location of each sampling device, and the respirable dust control measures used at the dust generating sources for these locations (see §§ 70.207 and 70.209 of this chapter).

* * * * *

PART 90—MANDATORY HEALTH STANDARDS—COAL MINERS WHO HAVE EVIDENCE OF THE DEVELOPMENT OF PNEUMOCONIOSIS

■ 19. The authority citation for part 90 is revised to read as follows:

Authority: 30 U.S.C. 811, 813(h), 957.

■ 20. Subpart A to part 90 is revised to read as follows:

Subpart A—General

Sec.
90.1 Scope.
90.2 Definitions.
90.3 Part 90 option; notice of eligibility; exercise of option.

Subpart A—General

§ 90.1 Scope.

This part 90 establishes the option of miners who are employed at coal mines and who have evidence of the development of pneumoconiosis to work in an area of a mine where the average concentration of respirable dust in the mine atmosphere during each shift is continuously maintained at or below the applicable standard as specified in § 90.100. The rule sets forth procedures for miners to exercise this option, and establishes the right of miners to retain their regular rate of pay and receive wage increases. The rule also sets forth the operator's obligations, including respirable dust sampling for part 90 miners. This part 90 is promulgated pursuant to section 101 of the Act and supersedes section 203(b) of the Federal Mine Safety and Health Act of 1977, as amended.

§ 90.2 Definitions.

The following definitions apply in this part:

Act. The Federal Mine Safety and Health Act of 1977, Public Law 91–173, as amended by Public Law 95–164 and Public Law 109–236.

Active workings. Any place in a coal mine where miners are normally required to work or travel.

Approved sampling device. A sampling device approved by the Secretary and Secretary for Health and Human Services (HHS) under part 74 of this title.

Certified person. An individual certified by the Secretary in accordance with § 90.202 to take respirable dust samples required by this part or certified in accordance with § 90.203 to perform the maintenance and calibration of respirable dust sampling equipment as required by this part.

Coal mine dust personal sampler unit (CMDPSU). A personal sampling device approved under part 74, subpart B, of this title.

Concentration. A measure of the amount of a substance contained per unit volume of air.

Continuous personal dust monitor (CPDM). A personal sampling device approved under part 74, subpart C, of this title.

District Manager. The manager of the Coal Mine Safety and Health District in which the mine is located.

Equivalent concentration. The concentration of respirable coal mine dust, including quartz, expressed in milligrams per cubic meter of air (mg/m^3) as measured with an approved sampling device, determined by dividing the weight of dust in milligrams collected on the filter of an approved sampling device by the volume of air in cubic meters passing through the filter (sampling time in minutes (t) times the sampling airflow rate in cubic meters per minute), and then converting that concentration to an equivalent concentration as measured by the Mining Research Establishment (MRE) instrument. When the approved sampling device is:

(1) The CMDPSU, the equivalent concentration is determined by multiplying the concentration of respirable coal mine dust by the constant factor prescribed by the Secretary.

(2) The CPDM, the device shall be programmed to automatically report end-of-shift concentration measurements as equivalent concentrations.

Mechanized mining unit (MMU). A unit of mining equipment including hand loading equipment used for the production of material; or a specialized unit which uses mining equipment other than specified in § 70.206(b) or in § 70.208(b) of this chapter. Each MMU will be assigned a four-digit identification number by MSHA, which is retained by the MMU regardless of where the unit relocates within the mine. However, when:

(1) Two sets of mining equipment are used in a series of working places within the same working section and only one production crew is employed at any given time on either set of mining equipment, the two sets of equipment shall be identified as a single MMU.

(2) Two or more sets of mining equipment are simultaneously engaged in cutting, mining, or loading coal or rock from working places within the same working section, each set of mining equipment shall be identified as a separate MMU.

MRE instrument. The gravimetric dust sampler with a four channel horizontal elutriator developed by the Mining Research Establishment of the National Coal Board, London, England.

MSHA. The Mine Safety and Health Administration of the U.S. Department of Labor.

Normal work duties. Duties which the part 90 miner performs on a routine day-to-day basis in his or her job classification at a mine.

Part 90 miner. A miner employed at a coal mine who has exercised the option under the old section 203(b) program (36 FR 20601, October 27, 1971), or under § 90.3 of this part to work in an area of a mine where the average concentration of respirable dust in the mine atmosphere during each shift to which that miner is exposed is continuously maintained at or below the applicable standard, and who has not waived these rights.

Quartz. Crystalline silicon dioxide (SiO_2) not chemically combined with other substances and having a distinctive physical structure.

Representative sample. A respirable dust sample, expressed as an equivalent concentration, that reflects typical dust concentration levels in the working environment of the part 90 miner when performing normal work duties.

Respirable dust. Dust collected with a sampling device approved by the Secretary and the Secretary of HHS in accordance with part 74 (Coal Mine Dust Sampling Devices) of this title.

Secretary. The Secretary of Labor or a delegate.

Secretary of Health and Human Services. The Secretary of Health and

Human Services (HHS) or the Secretary of Health, Education, and Welfare.

Transfer. Any change in the work assignment of a part 90 miner by the operator and includes: (1) Any change in occupation code of a part 90 miner; (2) any movement of a part 90 miner to or from an MMU; or (3) any assignment of a part 90 miner to the same occupation in a different location at a mine.

Valid respirable dust sample. A respirable dust sample collected and submitted as required by this part, including any sample for which the data were electronically transmitted to MSHA, and not voided by MSHA.

§ 90.3 Part 90 option; notice of eligibility; exercise of option.

(a) Any miner employed at a coal mine who, in the judgment of the Secretary of HHS, has evidence of the development of pneumoconiosis based on a chest X-ray, read and classified in the manner prescribed by the Secretary of HHS, or based on other medical examinations shall be afforded the option to work in an area of a mine where the average concentration of respirable dust in the mine atmosphere during each shift to which that miner is exposed is continuously maintained at or below the applicable standard. Each of these miners shall be notified in writing of eligibility to exercise the option.

(b) Any miner who is a section 203(b) miner on January 31, 1981, shall be a part 90 miner on February 1, 1981, entitled to full rights under this part to retention of pay rate, future actual wage increases, and future work assignment, shift and respirable dust protection.

(c) Any part 90 miner who is transferred to a position at the same or another coal mine shall remain a part 90 miner entitled to full rights under this part at the new work assignment.

(d) The option to work in a low dust area of the mine may be exercised for the first time by any miner employed at a coal mine who was eligible for the option under the old section 203(b) program (36 FR 20601, October 27, 1971), or is eligible for the option under this part by signing and dating the Exercise of Option Form and mailing the form to the Chief, Division of Health, Coal Mine Safety and Health, MSHA, 1100 Wilson Boulevard, Arlington, Virginia 22209.

(e) The option to work in a low dust area of the mine may be re-exercised by any miner employed at a coal mine who exercised the option under the old section 203(b) program (36 FR 20601, October 27, 1971), or exercised the option under this part by sending a written request to the Chief, Division of Health, Coal Mine Safety and Health, MSHA, 1100 Wilson Boulevard, Arlington, Virginia 22209. The request should include the name and address of the mine and operator where the miner is employed.

(f) No operator shall require from a miner a copy of the medical information received from the Secretary or Secretary of HHS.

■ 21. Subpart B to part 90 is revised to read as follows:

Subpart B—Dust Standards, Rights of Part 90 Miners

Sec.
90.100 Respirable dust standard.
90.101 Respirable dust standard when quartz is present.
90.102 Transfer; notice.
90.103 Compensation.
90.104 Waiver of rights; re-exercise of option.

Subpart B—Dust Standards, Rights of Part 90 Miners

§ 90.100 Respirable dust standard.

After the 20th calendar day following receipt of notification from MSHA that a part 90 miner is employed at the mine, the operator shall continuously maintain the average concentration of respirable dust in the mine atmosphere during each shift to which the part 90 miner in the active workings of the mine is exposed, as measured with an approved sampling device and expressed in terms of an equivalent concentration, at or below:

(a) 1.0 milligrams of respirable dust per cubic meter of air (mg/m^3).

(b) 0.5 mg/m^3 as of August 1, 2016.

§ 90.101 Respirable dust standard when quartz is present.

(a) Each operator shall continuously maintain the average concentration of respirable quartz dust in the mine atmosphere during each shift to which a part 90 miner in the active workings of each mine is exposed at or below 0.1 mg/m^3 (100 micrograms per cubic meter or μg/m^3) as measured with an approved sampling device and expressed in terms of an equivalent concentration.

(b) When the mine atmosphere of the active workings where the part 90 miner performs his or her normal work duties exceeds 100 μg/m^3 of respirable quartz dust, the operator shall continuously maintain the average concentration of respirable dust in the mine atmosphere during each shift to which a part 90 miner is exposed as measured with an approved sampling device and expressed in terms of an equivalent concentration at or below the applicable standard. The applicable standard is computed by dividing the percent of quartz into the number 10. The application of this formula shall not result in an applicable standard that exceeds the standards specified in § 90.100.

Example: Assume the part 90 miner is on a 0.5 mg/m^3 dust standard. Suppose a valid representative dust sample with an equivalent concentration of 0.50 mg/m^3 contains 25.6% of quartz dust, which corresponds to a quartz concentration of 128 μg/m^3. Therefore, the average concentration of respirable dust in the mine atmosphere associated with that part 90 miner shall be maintained on each shift at or below 0.4 mg/m^3 (10/25.6% = 0.4 mg/m^3).

§ 90.102 Transfer; notice.

(a) Whenever a part 90 miner is transferred in order to meet the applicable standard, the operator shall transfer the miner to an existing position at the same coal mine on the same shift or shift rotation on which the miner was employed immediately before the transfer. The operator may transfer a part 90 miner to a different coal mine, a newly-created position or a position on a different shift or shift rotation if the miner agrees in writing to the transfer. The requirements of this paragraph do not apply when the respirable dust concentration in a part 90 miner's work position complies with the applicable standard but circumstances, such as reductions in workforce or changes in operational status, require a change in the miner's job or shift assignment.

(b) On or before the 20th calendar day following receipt of notification from MSHA that a part 90 miner is employed at the mine, the operator shall give the District Manager written notice of the occupation and, if applicable, the MMU unit to which the part 90 miner shall be assigned on the 21st calendar day following receipt of the notification from MSHA.

(c) After the 20th calendar day following receipt of notification from MSHA that a part 90 miner is employed at the mine, the operator shall give the District Manager written notice before any transfer of a part 90 miner. This notice shall include the scheduled date of the transfer.

§ 90.103 Compensation.

(a) The operator shall compensate each part 90 miner at not less than the regular rate of pay received by that miner immediately before exercising the option under § 90.3.

(b) Whenever a part 90 miner is transferred, the operator shall compensate the miner at not less than the regular rate of pay received by that miner immediately before the transfer.

(c) Once a miner has been placed in a position in compliance with the provisions of part 90, paragraphs (a) and (b) of this section do not apply when the part 90 miner initiates and accepts a change in work assignment for reasons of job preference.

(d) The operator shall compensate each miner who is a section 203(b) miner on January 31, 1981, at not less than the regular rate of pay that the miner is required to receive under section 203(b) of the Act immediately before the effective date of this part.

(e) In addition to the compensation required to be paid under paragraphs (a), (b), and (d) of this section, the operator shall pay each part 90 miner the actual wage increases that accrue to the classification to which the miner is assigned.

(f) If a miner is temporarily employed in an occupation other than his or her regular work classification for two months or more before exercising the option under § 90.3, the miner's regular rate of pay for purposes of paragraph (a) and (b) of this section is the higher of the temporary or regular rates of pay. If the temporary assignment is for less than two months, the operator may pay the part 90 miner at his or her regular work classification rate regardless of the temporary wage rate.

(g) If a part 90 miner is transferred, and the Secretary subsequently notifies the miner that notice of the miner's eligibility to exercise the part 90 option was incorrect, the operator shall retain the affected miner in the current position to which the miner is assigned and continue to pay the affected miner the applicable rate of pay provided in paragraphs (a), (b), (d), and (e) of this section, until:

(1) The affected miner and operator agree in writing to a position with pay at not less than the regular rate of pay for that occupation; or

(2) A position is available at the same coal mine in both the same occupation and on the same shift on which the miner was employed immediately before exercising the option under § 90.3 or under the old section 203(b) program (36 FR 20601, October 27, 1971).

(i) When such a position is available, the operator shall offer the available position in writing to the affected miner with pay at not less than the regular rate of pay for that occupation.

(ii) If the affected miner accepts the available position in writing, the operator shall implement the miner's reassignment upon notice of the miner's acceptance. If the miner does not accept the available position in writing, the miner may be reassigned and protections under part 90 shall not apply. Failure by the miner to act on the written offer of the available position within 15 days after notice of the offer is received from the operator shall operate as an election not to accept the available position.

§ 90.104 Waiver of rights; re-exercise of option.

(a) A part 90 miner may waive his or her rights and be removed from MSHA's active list of miners who have rights under part 90 by:

(1) Giving written notification to the Chief, Division of Health, Coal Mine Safety and Health, MSHA, that the miner waives all rights under this part;

(2) Applying for and accepting a position in an area of a mine which the miner knows has an average respirable dust concentration exceeding the applicable standard; or

(3) Refusing to accept another position offered by the operator at the same coal mine that meets the requirements of §§ 90.100, 90.101 and 90.102(a) after dust sampling shows that the present position exceeds the applicable standard.

(b) If rights under part 90 are waived, the miner gives up all rights under part 90 until the miner re-exercises the option in accordance with § 90.3(e) (Part 90 option; notice of eligibility; exercise of option).

(c) If rights under part 90 are waived, the miner may re-exercise the option under this part in accordance with § 90.3(e) (Part 90 option; notice of eligibility; exercise of option) at any time.

■ 22. Subpart C to part 90 is revised to read as follows:

Subpart C—Sampling Procedures

Sec.
90.201 Sampling; general and technical requirements.
90.202 Certified person; sampling.
90.203 Certified person; maintenance and calibration.
90.204 Approved sampling devices; maintenance and calibration.
90.205 Approved sampling devices; operation; air flowrate.
90.206 Exercise of option or transfer sampling.
90.207 Quarterly sampling.
90.208 Respirable dust samples; transmission by operator.
90.209 Respirable dust samples; report to operator.
90.210 Status change reports.

Subpart C—Sampling Procedures

§ 90.201 Sampling; general and technical requirements.

(a) An approved coal mine dust personal sampler unit (CMDPSU) shall be used to take samples of the concentration of respirable coal mine dust in the working environment of each part 90 miner as required by this part. On February 1, 2016, part 90 miners shall be sampled only with an approved continuous personal dust monitor (CPDM) as required by this part and an approved CMDPSU shall not be used, unless notified by the Secretary to continue to use an approved CMDPSU to conduct quarterly sampling.

(b) If using a CMDPSU, the sampling device shall be worn or carried to and from each part 90 miner. If using a CPDM, the sampling device shall be worn by the part 90 miner at all times. Approved sampling devices shall be operated portal-to-portal and shall remain operational during the part 90 miner's entire shift, which includes the time spent performing normal work duties and while traveling to and from the assigned work location. If the work shift to be sampled is longer than 12 hours and the sampling device is:

(1) A CMDPSU, the operator shall switch-out the unit's sampling pump prior to the 13th-hour of operation.

(2) A CPDM, the operator shall switch-out the CPDM with a fully charged device prior to the 13th-hour of operation.

(c) Unless otherwise directed by the District Manager, the respirable dust samples required under this part using a CMDPSU shall be taken by placing the sampling device as follows:

(1) On the part 90 miner;

(2) On the piece of equipment which the part 90 miner operates within 36 inches of the normal working position; or

(3) At a location that represents the maximum concentration of dust to which the part 90 miner is exposed.

(d) If using a CMDPSU, one control filter shall be used for each shift of sampling. Each control filter shall:

(1) Have the same pre-weight date (noted on the dust data card) as the filter used for sampling;

(2) Remain plugged at all times;

(3) Be used for the same amount of time, and exposed to the same temperature and handling conditions as the filter used for sampling; and

(4) Be kept with the exposed samples after sampling and in the same mailing container when transmitted to MSHA.

(e) The respirable dust samples required by this part and taken with a CMDPSU shall be collected while the part 90 miner is performing normal work duties.

(f) Records showing the length of each shift for each part 90 miner shall be made and retained for at least six months, and shall be made available for inspection by authorized representatives

of the Secretary and submitted to the District Manager when requested in writing.

(g) Upon request from the District Manager, the operator shall submit the date and time any respirable dust sampling required by this part will begin. This information shall be submitted at least 48 hours prior to scheduled sampling.

(h) Operators using CPDMs shall provide training to all part 90 miners. The training shall be completed prior to a part 90 miner wearing a CPDM and then every 12 months thereafter. The training shall include:

(1) The importance of monitoring dust concentrations and properly wearing the CPDM;

(2) Explaining the basic features and capabilities of the CPDM;

(3) Discussing the various types of information displayed by the CPDM and how to access that information; and

(4) How to start and stop a short-term sample run during compliance sampling.

(i) An operator shall keep a record of the CPDM training at the mine site for 24 months after completion of the training. An operator may keep the record elsewhere if the record is immediately accessible from the mine site by electronic transmission. Upon request from an authorized representative of the Secretary or Secretary of HHS, the operator shall promptly provide access to any such training records. The record shall include:

(1) The date of training;

(2) The names of miners trained; and

(3) The subjects included in the training.

(j) An anthracite mine using the full box, open breast, or slant breast mining method may use either a CPDM or a CMDPSU to conduct the required sampling. The mine operator shall notify the District Manager in writing of its decision to not use a CPDM.

§ 90.202 Certified person; sampling.

(a) The respirable dust sampling required by this part shall be performed by a certified person.

(b) To be certified, a person shall complete the applicable MSHA course of instruction and pass the MSHA examination demonstrating competency in sampling procedures. Persons not certified in sampling and those certified only in maintenance and calibration procedures in accordance with § 90.203(b) are not permitted to collect respirable dust samples required by this part or handle approved sampling devices when being used in sampling.

(c) To maintain certification, a person must pass the MSHA examination demonstrating competency in sampling procedures every three years.

(d) MSHA may revoke a person's certification for failing to properly carry out the required sampling procedures.

§ 90.203 Certified person; maintenance and calibration.

(a) Approved sampling devices shall be maintained and calibrated by a certified person.

(b) To be certified, a person shall complete the applicable MSHA course of instruction and pass the MSHA examination demonstrating competency in maintenance and calibration procedures for approved sampling devices. Necessary maintenance of the sampling head assembly of a CMDPSU, or the cyclone assembly of a CPDM, can be performed by persons certified in sampling or in maintenance and calibration.

(c) To maintain certification, a person must pass the MSHA examination demonstrating competency in maintenance and calibration procedures every three years.

(d) MSHA may revoke a person's certification for failing to properly carry out the required maintenance and calibration procedures.

§ 90.204 Approved sampling devices; maintenance and calibration.

(a) Approved sampling devices shall be maintained as approved under part 74 of this title and calibrated in accordance with MSHA Informational Report IR 1240 (1996) ''Calibration and Maintenance Procedures for Coal Mine Respirable Dust Samplers'' or in accordance with the manufacturer's recommendations if using a CPDM. Only persons certified in maintenance and calibration can perform maintenance on the CPDM or the pump unit of the CMDPSU.

(b) Approved sampling devices shall be calibrated at the flowrate of 2.0 liters of air per minute (L/min) if using a CMDPSU; at 2.2 L/min if using a CPDM; or at a different flowrate recommended by the manufacturer, before they are put into service and, thereafter, at time intervals recommended by the manufacturer or prescribed by the Secretary or Secretary of HHS.

(c) If using a CMDPSU, sampling devices shall be examined and tested by a person certified in sampling or in maintenance and calibration within 3 hours before the start of the shift on which the approved sampling devices will be used to collect respirable dust samples. This is to assure that the sampling devices are clean and in proper working condition. This examination and testing shall include the following:

(1) Examination of all components of the cyclone assembly to assure that they are clean and free of dust and dirt. This includes examining the interior of the connector barrel (located between the cassette assembly and vortex finder), vortex finder, cyclone body, and grit pot;

(2) Examination of the inner surface of the cyclone body to assure that it is free of scoring or scratch marks on the inner surface of the cyclone where the air flow is directed by the vortex finder into the cyclone body;

(3) Examination of the external hose connecting the pump unit to the sampling head assembly to assure that it is clean and free of leaks; and

(4) Examination of the clamping and positioning of the cyclone body, vortex finder, and cassette to assure that they are rigid, in alignment, firmly in contact, and airtight.

(5) Testing the voltage of each battery while under actual load to assure the battery is fully charged. This requires that a fully assembled and examined sampling head assembly be attached to the pump inlet with the pump unit running when the voltage check is made. The voltage for batteries used in the CMDPSU shall not be lower than the product of the number of cells in the battery multiplied by the manufacturer's nominal voltage per cell.

(d) If using a CPDM, the certified person in sampling or in maintenance and calibration shall:

(1) Follow the pre-operational examinations, testing, and set-up procedures, and perform necessary external maintenance recommended by the manufacturer to assure the operational readiness of the CPDM within 3 hours before the start of the shift on which the sampling device will be used to collect respirable dust samples; and

(2) Perform other required scheduled examinations and maintenance procedures recommended by the manufacturer.

(e) You must proceed in accordance with ''Calibration and Maintenance Procedures for Coal Mine Respirable Dust Samplers,'' MSHA Informational Report IR 1240 (1996) referenced in paragraph (a) of this section. The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may obtain a copy from the MSHA Web site at *http://www.msha.gov* and you may inspect or obtain a copy at MSHA, Coal Mine Safety and Health, 1100 Wilson Blvd., Room 2424, Arlington, Virginia 22209–3939 and at each MSHA Coal Mine Safety and Health District Office, or at

the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to:*http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html*.

§ 90.205 Approved sampling devices; operation; air flowrate.

(a) Approved sampling devices shall be operated at the flowrate of 2.0 L/min if using a CMDPSU; at 2.2 L/min if using a CPDM; or at a different flowrate recommended by the manufacturer.

(b) If using a CMDPSU, each approved sampling device shall be examined each shift, by a person certified in sampling during:

(1) The second hour after being put into operation to assure it is in the proper location, operating properly, and at the proper flowrate. If the proper flowrate is not maintained, necessary adjustments shall be made by the certified person. This examination is not required if the sampling device is being operated in an anthracite coal mine using the full box, open breast, or slant breast mining method.

(2) The last hour of operation to assure that the sampling device is operating properly and at the proper flowrate. If the proper flowrate is not maintained, the respirable dust sample shall be transmitted to MSHA with a notation by the certified person on the back of the dust data card stating that the proper flowrate was not maintained. Other events occurring during the collection of respirable dust samples that may affect the validity of the sample, such as dropping of the sampling head assembly onto the mine floor, shall be noted on the back of the dust data card.

(c) If using a CPDM, the person certified in sampling shall monitor the dust concentrations and the sampling status conditions being reported by the sampling device at mid-shift or more frequently as specified in the approved respirable dust control plan, if applicable, to assure: The sampling device is in the proper location and operating properly; and the work environment of the part 90 miner being sampled remains in compliance with the applicable standard at the end of the shift. This monitoring is not required if the sampling device is being operated in an anthracite coal mine using the full box, open breast, or slant breast mining method.

§ 90.206 Exercise of option or transfer sampling.

(a) The operator shall take five valid representative dust samples for each part 90 miner within 15 calendar days after:

(1) The 20-day period specified for each part 90 miner in § 90.100; and

(2) Implementing any transfer after the 20th calendar day following receipt of notification from MSHA that a part 90 miner is employed at the mine.

(b) Noncompliance with the applicable standard shall be determined in accordance with § 90.207(d) of this part.

(c) Upon issuance of a citation for a violation of the applicable standard, the operator shall comply with § 90.207(f) of this part.

§ 90.207 Quarterly sampling.

(a) Each operator shall take five valid representative samples every calendar quarter from the environment of each part 90 miner while performing normal work duties. Part 90 miner samples shall be collected on consecutive work days. The quarterly periods are:

January 1–March 31
April 1–June 30
July 1–September 30
October 1–December 31.

(b) When the respirable dust standard is changed in accordance with § 90.101, the new applicable standard shall become effective 7 calendar days after the date of notification of the change by MSHA.

(c) When a valid representative sample taken in accordance with this section meets or exceeds the excessive concentration value (ECV) in Table 90–1 that corresponds to the applicable standard and particular sampling device used, the operator shall:

(1) Make approved respiratory equipment available to affected miners in accordance with § 72.700 of this chapter;

(2) Immediately take corrective action to lower the concentration of respirable coal mine dust to at or below the applicable standard; and

(3) Make a record of the corrective actions taken. The record shall be certified by the mine foreman or equivalent mine official, no later than the end of the mine foreman's or equivalent official's next regularly scheduled working shift. The record shall be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration. Such records shall be retained at a surface location at the mine for at least 1 year and shall be made available for inspection by authorized representatives of the Secretary and the part 90 miner.

(d) Noncompliance with the applicable standard is demonstrated during the sampling period when:

(1) Two or more valid representative samples meet or exceed the ECV in Table 90–1 that corresponds to the applicable standard and the particular sampling device used; or

(2) The average for all valid representative samples meets or exceeds the ECV in Table 90–2 that corresponds to the applicable standard and the particular sampling device used.

(e) Unless otherwise directed by the District Manager, upon issuance of a citation for a violation of the applicable standard, paragraph (a) of this section shall not apply to that part 90 miner until the violation is abated and the citation is terminated in accordance with paragraphs (f) and (g) of this section.

(f) Upon issuance of a citation for a violation of the applicable standard, the operator shall take the following actions sequentially:

(1) Make approved respiratory equipment available to the affected part 90 miner in accordance with § 72.700 of this chapter.

(2) Immediately take corrective action to lower the concentration of respirable dust to at or below the applicable standard. If the corrective action involves:

(i) Reducing the respirable dust levels in the work position of the part 90 miner identified in the citation, the operator shall implement the proposed corrective actions and begin sampling the affected miner within 8 calendar days after the date the citation is issued, until five valid representative samples are taken.

(ii) Transferring the part 90 miner to another work position at the mine to meet the applicable standard, the operator shall comply with § 90.102 of this part and then sample the affected miner in accordance with § 90.206(a) of this part.

(3) Make a record of the corrective actions taken. The record shall be certified by the mine foreman or equivalent mine official, no later than the end of the mine foreman's or equivalent official's next regularly scheduled working shift. The record shall be made in a secure book that is not susceptible to alteration or electronically in a computer system so as to be secure and not susceptible to alteration. Such records shall be retained at a surface location at the mine for at least 1 year and shall be made available for inspection by authorized representatives of the Secretary and the part 90 miner.

(g) A citation for a violation of the applicable standard shall be terminated by MSHA when the equivalent concentration of each of the five valid representative samples is at or below the applicable standard.

TABLE 90–1—EXCESSIVE CONCENTRATION VALUES (ECV) BASED ON SINGLE, FULL-SHIFT CMDPSU/CPDM CONCENTRATION MEASUREMENTS

Applicable standard (mg/m³)	ECV (mg/m³)	
	CMDPSU	CPDM
1.0	1.26	1.13
0.9	1.16	1.02
0.8	1.05	0.91
0.7	0.95	0.79
0.6	0.85	0.68
0.5	0.74	0.57
0.4	0.65	0.46
0.3	0.54	0.34
0.2	0.44	0.23

TABLE 90–2—EXCESSIVE CONCENTRATION VALUES (ECV) BASED ON THE AVERAGE OF 5 FULL-SHIFT CMDPSU/CPDM CONCENTRATION MEASUREMENTS

Applicable standard (mg/m³)	ECV (mg/m³)	
	CMDPSU	CPDM
1.0	1.12	1.06
0.9	1.02	0.96
0.8	0.92	0.85
0.7	0.81	0.75
0.6	0.71	0.64
0.5	0.61	0.53
0.4	0.51	0.43
0.3	0.41	0.32
0.2	0.31	0.22

§ 90.208 Respirable dust samples; transmission by operator.

(a) If using a CMDPSU, the operator shall transmit within 24 hours after the end of the sampling shift all samples collected to fulfill the requirements of this part, including control filters, in containers provided by the manufacturer of the filter cassette to: Respirable Dust Processing Laboratory, Pittsburgh Safety and Health Technology Center, Cochrans Mill Road, Building 38, P.O. Box 18179, Pittsburgh, Pennsylvania 15236–0179, or to any other address designated by the District Manager.

(b) The operator shall not open or tamper with the seal of any filter cassette or alter the weight of any filter cassette before or after it is used to fulfill the requirements of this part.

(c) A person certified in sampling shall properly complete the dust data card that is provided by the manufacturer for each filter cassette. The card shall have an identification number identical to that on the cassette used to take the sample and be submitted to MSHA with the sample. Each card shall be signed by the certified person who actually performed the required examinations under 90.205(b) of this part during the sampling shift and shall include that person's MSHA Individual Identification Number (MIIN). Respirable dust samples with data cards not properly completed may be voided by MSHA.

(d) All respirable dust samples collected by the operator shall be considered taken to fulfill the sampling requirements of part 70, 71, or 90 of this title, unless the sample has been identified in writing by the operator to the District Manager, prior to the intended sampling shift, as a sample to be used for purposes other than required by part 70, 71, or 90 of this title.

(e) Respirable dust samples received by MSHA in excess of those required by this part shall be considered invalid samples.

(f) If using a CPDM, the person certified in sampling shall (1) validate, certify, and transmit electronically to MSHA within 24 hours after the end of each sampling shift all sample data file information collected and stored in the CPDM, including the sampling status conditions encountered when sampling each part 90 miner; and (2) not tamper with the CPDM or its components in any way before, during, or after it is used to fulfill the requirements of this part, or alter any data files. All CPDM data files transmitted electronically to MSHA shall be maintained by the operator for at least 12 months.

§ 90.209 Respirable dust samples; report to operator.

(a) MSHA shall provide the operator, as soon as practicable, a report with the following data on respirable dust samples submitted or whose results were transmitted electronically, if using a CPDM, in accordance with this part:

(1) The mine identification number;

(2) The locations within the mine from which the samples were taken;

(3) The concentration of respirable dust, expressed as an equivalent concentration for each valid sample;

(4) The average equivalent concentration of respirable dust for all valid samples;

(5) The occupation code;

(6) The reason for voiding any sample; and

(7) The part 90 miner's MSHA Individual Identification Number (MIIN).

(b) Upon receipt, the operator shall provide a copy of this report to the part 90 miner. The operator shall not post the original or a copy of this report on the mine bulletin board.

(c) If using a CPDM, the person certified in sampling shall print, sign, and provide to each part 90 miner, a paper record (Dust Data Card) of the sample run within one hour after the start of the part 90 miner's next work shift. This hard-copy record shall include the data entered when the sample run was first programmed, and the following:

(1) The mine identification number;

(2) The location within the mine from which the sample was taken;

(3) The concentration of respirable dust, expressed as an equivalent concentration reported and stored for each sample;

(4) The sampling status conditions encountered for each sample;

(5) The shift length; and

(6) The part 90 miner's MSHA Individual Identification Number (MIIN).

(d) The operator shall not post data on respirable dust samples for part 90 miners on the mine bulletin board.

§ 90.210 Status change reports.

If there is a change in the status of a part 90 miner (such as entering a terminated, injured, or ill status, or returning to work), the operator shall report the change in the status of the part 90 miner to the MSHA District Office or to any other MSHA office designated by the District Manager. Status changes shall be reported in writing or by electronic means within 3 working days after the status change has occurred.

■ 23. Subpart D to part 90 is revised to read as follows:

Subpart D—Respirable Dust Control Plans

Sec.
90.300 Respirable dust control plan; filing requirements.
90.301 Respirable dust control plan; approval by District Manager; copy to part 90 miner.

Subpart D—Respirable Dust Control Plans

§ 90.300 Respirable dust control plan; filing requirements.

(a) If an operator abates a violation of the applicable standard by reducing the respirable dust level in the position of the part 90 miner, the operator shall submit to the District Manager for approval a written respirable dust

control plan for the part 90 miner in the position identified in the citation within 15 calendar days after the citation is terminated. The respirable dust control plan and revisions thereof shall be suitable to the conditions and the mining system of the coal mine and shall be adequate to continuously maintain respirable dust to at or below the applicable standard for that part 90 miner.

(b) Each respirable dust control plan shall include at least the following:

(1) The mine identification number assigned by MSHA, the operator's name, mine name, mine address, and mine telephone number and the name, address and telephone number of the principal officer in charge of health and safety at the mine;

(2) The name and MSHA Individual Identification Number of the part 90 miner and the position at the mine to which the plan applies;

(3) A detailed description of the specific respirable dust control measures used to continuously maintain concentrations of respirable coal mine dust at or below the applicable standard; and

(4) A detailed description of how each of the respirable dust control measures described in response to paragraph (b)(3) of this section will continue to be used by the operator, including at least the specific time, place, and manner the control measures will be used.

§ 90.301 Respirable dust control plan; approval by District Manager; copy to part 90 miner.

(a) The District Manager will approve respirable dust control plans on a mine-by-mine basis. When approving respirable dust control plans, the District Manager shall consider whether:

(1) The respirable dust control measures would be likely to maintain concentrations of respirable coal mine dust at or below the applicable standard; and

(2) The operator's compliance with all provisions of the respirable dust control plan could be objectively ascertained by MSHA.

(b) MSHA may take respirable dust samples to determine whether the respirable dust control measures in the operator's plan effectively maintain concentrations of respirable coal mine dust at or below the applicable standard.

(c) The operator shall comply with all provisions of each respirable dust control plan upon notice from MSHA that the respirable dust control plan is approved.

(d) The operator shall provide a copy of the current respirable dust control plan required under this part to the part 90 miner. The operator shall not post the original or a copy of the plan on the mine bulletin board.

(e) The operator may review respirable dust control plans and submit proposed revisions to such plans to the District Manager for approval.

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