

METAL AND NONMETAL DIESEL PARTICULATE MATTER (DPM) STANDARD
Compliance Guide Q&As
Issued September 2006

INTRODUCTION - HOW TO USE THIS PUBLICATION

This document is presented in a question and answer format with the questions asked from the perspective of the mine operator. The terms "standard" and "rule" are interchangeable and mean the same thing in this guide.

1. Who should use this publication?

This publication is intended to provide compliance information to underground mine operators, miners, and representatives of miners in metal and nonmetal underground mines that use diesel powered equipment.

2. What is the purpose of this guide?

This guide provides a summary of the requirements of the Mine Safety and Health Administration's (MSHA's) standard on Diesel Particulate Matter Exposure of Underground Metal and Nonmetal Miners. This guide also contains compliance assistance information to help you meet current requirements of the standard.

HEALTH RISKS

3. What is DPM and why is MSHA regulating it?

DPM is a component of diesel exhaust. DPM includes diesel soot and solid aerosols such as organic carbon compounds, ash, metallic abrasion particles, sulfates and silicates. The majority of diesel exhaust particles are less than 1.0 μm in size. Diesel soot particles have a solid core mainly consisting of elemental carbon, with a wide variety of other substances attached to the surface.

Exposure to high concentrations of DPM can result in a variety of serious adverse health effects. These health effects have been found to include: (i) sensory irritations and respiratory symptoms serious enough to distract or disable miners; (ii) premature death from cardiovascular, cardiopulmonary, or respiratory causes; and (iii) lung cancer. The health effects are discussed in the January 2001 and the June 2005 preambles.

SCOPE OF THE DPM STANDARD

4. What mine operators will have to comply with this standard?

The standard applies to all operators of underground metal and nonmetal mines that use diesel powered equipment in the underground areas of the mine. This includes certain independent contractors that use diesel powered equipment underground in metal and nonmetal mines.

Independent contractors whose diesel powered vehicles enter underground areas of a mine on a frequent, regular, and recurring basis, or remain inside the mine for a prolonged period of time are covered under the requirements of this standard because such equipment would be considered to be part of the mine's diesel equipment fleet. Examples of such contractors include a mining contractor that has been hired to handle a mine's production haulage using its own haulage trucks, or a blasting contractor that uses its own powder truck to load blast holes at a mine. These vehicles and equipment are used on a regular basis underground, and the contractor's employees as well as the mine operator's employees would be exposed to DPM hazards. MSHA intends that contractor employees be protected from hazards from DPM exposure.

5. Are customer and delivery vehicles covered under the standard?

No. Delivery and customer vehicles are not covered by the requirements of this standard. For example, contractors such as an electrical contractor vehicle that is brought into a mine to install a new power center; or an equipment dealer's service truck that is brought into a mine to maintain a new loader are not covered under the DPM standard. Mine operators may need to restrict emissions from customer vehicles in order to reduce miners' exposures to the PEL.

6. Does the standard apply to gasoline-powered vehicles and equipment?

No. Only diesel powered vehicles and equipment used underground are covered.

7. Does the standard apply to active underground mines that are not in production?

Yes. The standard applies to active underground mines that are in development, undergoing rehabilitation and mines engaged in exploratory activities.

8. What are the provisions of the DPM rule in effect now?

§ 57.5060(b), addressing the final concentration limit

- effective May 20, 2006, the final PEL is $308_{EC} \mu\text{g}/\text{m}^3$
- effective January 20, 2007, the final PEL is $350_{TC} \mu\text{g}/\text{m}^3$
- effective May 20, 2008, the final PEL is $160_{TC} \mu\text{g}/\text{m}^3$

§ 57.5060(c), Extension of time in which to meet the final concentration limit.

§ 57.5060(d), Use of feasible controls and respiratory protection

- install, use, and maintain feasible engineering and administrative controls
- supplement with respiratory protection
- effective on August 16, 2006:
 - conforming changes to the introductory text
 - new paragraphs (d)(3) through (d)(8) regarding medical evaluation of miners required to wear respiratory protection and transfer of miners who are medically unable to wear a respirator.

§ 57.5060(e), Prohibition on rotation of miners

§ 57.5061, Compliance determinations

§ 57.5065, Fueling practices

§ 57.5066, Maintenance standards

§ 57.5067, Engines

§ 57.5070, Miner training

§ 57.5071, Exposure monitoring
§ 57.5075, Diesel particulate records

Note: The effectiveness of § 57.5060(a) has expired.

9. Why is the initial final limit EC and the other final limits are TC?

In 2005, we converted the 400 $\mu\text{g}/\text{m}^3$ total carbon limit to 308 $\mu\text{g}/\text{m}^3$ elemental carbon. We are committed to initiating a separate rulemaking to determine the most appropriate conversion of the other final TC limits to comparable EC limits.

10. If the purpose of the rule is to limit a miner's exposure to DPM, why does the standard restrict exposure to elemental carbon?

MSHA is unaware of an appropriate sampling and analytical method that can accurately and precisely measure field samples of whole DPM at the concentrations required for compliance determinations. MSHA therefore measures miners' exposures to DPM by analyzing samples for a component of DPM that can be accurately and precisely measured. The component of DPM that MSHA will analyze, called the "surrogate," is elemental carbon (EC). The carbon in diesel soot is present in two forms: elemental carbon and organic carbon. The analytical method that MSHA uses for DPM analysis is capable of individually measuring both the elemental and organic carbon captured on the sample filter. The sum of the elemental carbon and organic carbon (OC) is total carbon. MSHA will use the EC measurement as the surrogate to assure that the result is representative of DPM without interferences.

11. How many samples will MSHA use to determine a miner's exposure?

MSHA will determine a miner's exposure with a single full-shift sample.

12. Will MSHA sample a miner's exposure for less than the full shift?

No. All of MSHA's compliance samples will be collected for the affected miner's full-shift.

13. How will MSHA determine a miner's overexposure to the final elemental carbon limit of 308 $\mu\text{g}/\text{m}^3$?

MSHA will determine compliance with the EC limit based on a single full-shift personal sample of the affected miner. If the result of the EC measurement is above the final limit of 308 micrograms plus the error factor, then an overexposure has occurred.

MSHA will determine an overexposure of the final DPM limit follows:

308 micrograms EC limit enforced as a PEL

EC result is **less than or equal to [308 x error factor]** = Not an overexposure.

EC result is **greater than [308 x error factor]** = An overexposure has occurred.

14. What is the error factor?

As with all other exposure-based metal/nonmetal compliance determinations, MSHA will address uncontrollable sampling and analytical errors by allowing a margin of error before issuing a citation for exceeding the elemental carbon (EC) limit. MSHA has developed an appropriate error factor to account for variability in sampling and analysis from such things as pump flow rate, filters, and the NIOSH 5040 method. If the EC measurement is above 308 $\mu\text{g}/\text{m}^3$ times the error factor for EC (1.12), the miner is overexposed.

15. What is meant by “average eight-hour equivalent full shift airborne concentration”?

“Average full shift airborne concentration” means that a miner’s exposure is determined by measuring the average concentration of airborne DPM to which the miner is exposed over a full work shift, regardless of shift length. Temporary excursions above a limit are permitted from time to time during the shift, as long as the average over the entire shift is within the limit.

The term, “average eight hour equivalent full shift airborne concentration,” refers to MSHA’s longstanding practice of “shift-weighting” when applying compliance limits for airborne contaminants to exposures that occur over a time period that is different from a standard 8-hour shift. MSHA’s compliance limits are normally based on 8 hours of workplace exposure to a contaminant and 16 hours of recovery time in the absence of the contaminant. The workplace 8-hour shift weighted average (SWA) exposure is computed as the mass of DPM on the filter divided by the 8-hour sample volume, which is 0.816 cubic meter for a sample flow rate of 1.7 liters per minute.

Actual concentrations are computed using actual sampling times; the SWA is adjusted to the 8-hour shift equivalent using the following equation:

$$\text{SWA} = \frac{\text{actual shift length (in minutes)}}{\text{measured concentration of DPM}} \times 480 \text{ minutes}$$

16. How will MSHA determine a miner’s overexposure to the final total carbon limits of 350 $\mu\text{g}/\text{m}^3$ and 160 $\mu\text{g}/\text{m}^3$?

We intend to use the 1.3 conversion factor to convert the 350_{TC} $\mu\text{g}/\text{m}^3$ final limit to an EC equivalent. As we did with the 400_{TC} $\mu\text{g}/\text{m}^3$ interim limit pursuant to the Second Partial Settlement Agreement, we will use the EC equivalent to validate that an overexposure to the 350 TC limit is not the result of interferences. We will first develop an appropriate error factor to account for variability in sampling and analysis from such things as pump flow rate, filters, and the NIOSH Analytical Method 5040.

If the TC measurement is below 350_{TC} $\mu\text{g}/\text{m}^3$ plus the error factor, we will not issue a citation for an overexposure. If the TC measurement is above 350_{TC} $\mu\text{g}/\text{m}^3$ times the error factor, we would look at the EC measurement from the sample obtained through the NIOSH Analytical Method 5040, and multiply EC by a factor of 1.3 to produce a statistical valid estimate of what the TC result is without interferences. If the TC measurement is above this estimate, we would not issue a citation when the EC measurement times the multiplier is below the TC analysis.

The 1.3 multiplier that we will use to estimate TC (i.e., EC x 1.3 = estimated TC) is derived from NIOSH's determination that TC is 60-80% EC.

Regarding enforcement of the 160 µg/m³, MSHA intends to initiate a rulemaking to convert the TC limit to an equivalent EC limit.

§ 57.5060(c), EXTENSION OF TIME IN WHICH TO MEET THE FINAL CONCENTRATION LIMIT

17. What may I do if I require additional time to come into compliance with the final DPM concentration limit established in § 57.5060 (b)?

If you require additional time to come into compliance with the final DPM limit established in § 57.5060(b) due to technological or economic constraints, you may file an application with the District Manager for a special extension. If the District Manager grants you a special extension, you must comply with the conditions of the extension for its duration. We will periodically check to determine current DPM exposures and your ability to implement new control technology.

18. When can I apply for a special extension?

You may apply for an extension any time you believe that you have technological or economic constraints in meeting the final DPM limits.

19. How much extra time will a special extension give me to come into compliance with the final limit?

A special extension is not a substitute for required feasible controls. No special extension can exceed a period of one year from the date of approval. You may, however, file for additional special extensions provided each extension does not exceed a period of one year. If, however, controls become feasible at any time while the extension is in effect, you must implement those controls.

20. If the next lower final limit goes into effect before the one year is up, do I have to re-apply?

If MSHA has determined it was infeasible for you to achieve compliance with the applicable PEL, it would likewise be infeasible for you to achieve compliance with a lower PEL. The extension would remain in effect for the period granted. If, however, controls become feasible at any time the extension is in effect, you must implement those controls.

21. How will MSHA determine whether to grant the special extension?

MSHA will consider both economic and technological feasibility when determining whether operators qualify for a special extension for the final concentration limit. Technological and economic feasibility must be assessed on a case-by-case basis. Therefore, you will have an opportunity to demonstrate that there is no cost-effective solution to reducing a miner's exposure to DPM. The District Managers are more

knowledgeable of the specific conditions and circumstances that exist at mines within their regions rather than Headquarters. Consequently, MSHA has determined that they are the appropriate entity to assess technical and economic feasibility issues at mines.

When determining whether to grant a special extension for complying with the final concentration limit, MSHA will apply the criteria of the standard. MSHA will conduct an analysis of the circumstances at a mining operation to determine whether the mine operator has exhausted all feasible engineering and administrative controls before using respiratory protection to supplement controls. Such an evaluation will involve consideration of certain factors, including specific mining conditions, type of mining equipment used, nature of the overexposure, controls used by the mine operator, and MSHA policy and case law governing the economic and technological feasibility of controls.

Upon receipt of an application for a special extension, the MSHA District Manager will initiate a review of your application. In making this determination, the District Manager may ask you to provide additional information, conduct additional sampling and on-site evaluation, and request the assistance of personnel in MSHA's Directorate of Technical Support.

22. What do I have to include in my application for a special extension?

An application for an extension must include information that explains why you believe engineering and administrative controls sufficient to achieve compliance with the applicable limit are economically or technologically infeasible. The application also must include the most recent DPM monitoring results, and specify the actions you intend to take during the extension period to minimize exposure of miners to DPM. These actions will include the requirement for you to implement and maintain engineering and administrative controls as they become feasible during the period of extension.

Supporting documentation should include sufficient information for MSHA to determine that controls are technologically or economically infeasible, such as specific cost data, unique mining conditions, implementation difficulties, effects on productivity, unavailability of controls, miners' DPM exposures, the occupations and mine areas for which you are seeking an extension of time to come into compliance, and any other relevant information. The actions you will be taking to minimize the exposure of miners to DPM should include such items as monitoring, maintaining controls and respiratory protection, and other good faith actions.

You must also certify on the application that you have posted one copy of the application at the mine site for at least 30 days prior to the date of application, and have provided another copy to the authorized representative of miners.

23. May I apply for a special extension for the whole mine?

Yes, however, you must still specify all the occupations and mine areas for which you are seeking an extension of time to come into compliance and provide supporting documentation that includes sufficient information for MSHA to determine that controls are technologically or economically infeasible for all the affected occupations in all areas of the mine.

24. Do I have to post the application before I file it with the District Manager?

Yes. You must post one copy of the application at the mine site for at least 30 days prior to the date of application, and provide a copy to the authorized representative of miners.

25. What must I do if the application for a special extension is approved?

You must comply with the terms of the approved application for a special extension for the duration of the extension. You must also post a copy of the approved application at the mine site for the duration of the special extension period, and provide a copy of the approved application to the authorized representative of miners.

MSHA does not intend for the 1-year period of an extension to be considered as the period of abatement that the Agency will establish for noncompliance citations pursuant to § 57.5060. When MSHA issues a citation for a miner's overexposure to DPM, we apply a time frame for abatement of the citation based on our assessment of specific circumstances at each mine.

26. Do the affected miners have to wear respirators under a special extension?

Yes. Where an extension is granted, overexposed miners will be required to wear respiratory protection under a respiratory protection program as specified in § 57.5060(d).

27. Do I have to maintain engineering and administrative controls under a special extension?

Yes. MSHA does not intend for PPE to be permitted during an extension period as a substitute for feasible engineering and administrative controls. Rather, you are required to implement all feasible engineering and administrative controls to reduce exposures to the applicable limit, or if that is not possible, to the lowest level feasible.

28. What may I do if my application for a special extension is denied by the District Manager?

If MSHA has found a miner to be overexposed to DPM, and that additional controls are technologically or economically feasible for you to install to further reduce miners' exposures to the PEL, you will be issued a citation. The DPM rule does not include a process for appealing a denial of a special extension. This is due to the existing provisions of the Mine Act which currently afford mine operators adequate due process rights to a hearing on the merits before an administrative law judge (ALJ) of the independent Federal Mine Safety and Health Review Commission. If you disagree with the ALJ's decision, you may request an appeal before the Commission, which is composed of five independent commissioners. Any person adversely affected by a determination of the Commission may obtain review from a U.S. court of appeals for the applicable circuit.

§ 57.5060(d) USE OF FEASIBLE CONTROLS

29. What is the difference between DPM engineering controls and administrative controls?

Engineering controls refer to controls that remove the DPM hazard from the workplace by applying such methods as substitution, isolation, enclosure, and ventilation. Installing engine exhaust filters and cleaner burning engines, the use of special fuels or fuel additives that reduce DPM emissions, de-rating engines, providing environmental cabs with filtered breathing air, and mine ventilation system upgrades (main or auxiliary) would be examples of engineering controls.

Administrative controls refer to specified changes in the way work tasks are performed that reduce or eliminate the hazard. Speed limits, one-way travel, prohibitions on unnecessary idling or lugging of engines, restrictions on the number of engines or total engine horsepower that would be allowed to operate in a given ventilation split at any one time, and designating areas that are “off limits” for diesel engine operation or personnel travel are examples of administrative controls.

30. How will MSHA determine whether engineering and administrative controls are feasible?

For purposes of determining feasibility of engineering and administrative controls, MSHA will assess both the technological and economic feasibility of reducing a miner’s exposure to the interim DPM limit. MSHA will apply the same test as established by the Mine Safety and Health Review Commission (Commission) in ruling that a noise control is considered feasible when it:

- reduces exposure;
- is technologically achievable; and
- is economically achievable.

Consistent with Commission case law, MSHA considers three factors in determining whether engineering controls are feasible at a particular mine: (1) the nature and extent of the exposure; (2) the demonstrated effectiveness of available technology; and (3) whether the committed resources are wholly out of proportion to the expected results. A violation under the final standard would entail MSHA determining that a miner has been overexposed, that controls are feasible, and that you failed to install and maintain such controls.

The Commission further ruled that a control need not reduce exposure below the PEL in order to be feasible, as long as there is a significant reduction. Sometimes, however, a single control may achieve less than a significant reduction and still be considered feasible if its use, in combination with other controls, achieves a significant reduction.

31. Is job rotation allowed for compliance with the DPM standard?

No. The DPM standard prohibits rotation of miners to achieve compliance with the DPM PEL.

32. Will MSHA restrict the practice of having a miner work in a job assignment that requires the miner to split their shift between surface and underground or to perform more than one job underground?

No, unless the split shift is established to comply with the DPM rule. MSHA recognizes that a number of mining operations routinely require their miners to work on both the surface and underground or to perform more than one job for reasons not involving compliance with DPM. MSHA would allow this practice to continue.

33. What is a significant reduction?

MSHA considers a significant reduction in DPM to be at least a 25% reduction in the miner's exposure.

34. How long will MSHA give me to implement controls?

In every case, MSHA intends to establish reasonable abatement time frames for compliance. MSHA makes this decision on a case-by-case basis depending on the facts of the particular situation. For example, if a mine operator decides to utilize after-treatment devices to reduce DPM exposure levels, MSHA would consider the amount of time required to order and receive the devices as well as the time to install and fully implement the devices.

35. If MSHA finds a miner overexposed to DPM and I have a valid purchase order for controls that have not been delivered to my mine site, will I be cited for a violation?

No. If you can demonstrate to MSHA, through appropriate documentation such as purchase orders, that you are making reasonable progress toward implementing feasible engineering and/or administrative controls that have a reasonable likelihood of achieving compliance with the final DPM limit within a reasonable timeframe, and you have implemented a respiratory protection program meeting the requirements of § 57.5060(d) that covers all affected miners, MSHA will not conduct compliance sampling of affected miners at that time. The inspector will return to the mine to verify that adequate progress is being made toward full implementation of controls and/or to conduct DPM sampling based on the projected timeframe established by the mine operator for implementing the controls.

Note that such efforts to implement feasible engineering and/or administrative controls for DPM do not exempt a mine operator from complying with the other provisions of the standard, such as use of low sulfur fuel and EPA-registered fuel additives, the maintenance and engine provisions, providing required DPM training, and the recordkeeping requirements.

36. How will MSHA evaluate feasibility of controls in determining whether to issue a citation for a miner's overexposure to the PEL?

Once you use and maintain all feasible engineering and administrative controls to reduce a miner's exposure, implement the required respiratory protection program and require the miner to use a respirator, you are in compliance with § 57.5060(b), even though a miner's DPM exposure may continue to exceed the limit and a citation will not be issued. Note that you must have a physician or other licensed health care

professional (PLHCP) conduct a medical evaluation of a miner who is required to wear a respirator before the miner is fit tested.

Keep in mind that feasibility is an MSHA determination. If the agency finds that you failed to install, use and maintain all feasible controls, or you failed to establish an appropriate respiratory protection program, you will be out of compliance.

DIESEL PARTICULATE FILTERS

37. If I determine that I need to install a DPM filter system on a piece of equipment to reduce DPM emissions, how do I know what type of DPM filter to purchase?

The majority of the commercially available DPM filter media are either cordierite or silicon carbide. However, both filter media have similar filtering efficiencies. The ceramic media can be used directly in the engine's hot exhaust. The correct cleaning or regeneration method for the DPM filter is dependent on a machine's intended use and duty cycle, as well as the make and model of its diesel engine. MSHA strongly suggests mine operators consult with their engine manufacturer and filter supplier before making a selection. Additionally, MSHA worked with NIOSH to develop a "Diesel Particulate Filter Guide" which can be used by mine operators in decision making for filter selection. The "Filter Guide" can be found at the following MSHA Internet address:
<http://www.msha.gov/nioshnmfilterselectionguide/dpmfilterguide.htm>

Another significant tool for you to use is the "Best Practices." MSHA and NIOSH developed this compliance assistance tool so that you will have appropriate information on proper use and installation. These files present information based on in-mine use experience with DPM filters and can be found at the following MSHA Internet address:
<http://www.msha.gov/nioshnmfilterselectionguide/dpmfilterguide.htm>

Finally, NIOSH has implemented a "List Server." The list-server is a means to disseminate and share information and experiences concerning the application of available technologies for reducing miners' exposures to DPM and other gaseous emissions in underground mines. Anyone can sign up at no cost to share and receive information. The Internet address is posted on MSHA's web site at:
<http://www.msha.gov/01-995/nioshserve/nioshserve.htm>

In some cases, even a properly selected and installed filter may not function exactly as anticipated by the mine operator. For example, if a filter is selected based on the assumption that passive regeneration will occur due to a machine's heavy duty cycle, but then that machine is shifted to another job having a light or mixed duty cycle, the expected passive regeneration will probably not occur.

38. Are DPM filters suitable for retrofitting on my existing diesel powered equipment?

Yes. Properly selected and maintained filters work in many applications. Commercially available diesel particulate filter (DPF) systems may be suitable for retrofitting to existing diesel-powered equipment in underground metal and nonmetal mines to effectively reduce miners' exposures to DPM. You will need to work through technical and operational situations unique to your specific mining circumstances. For example, equipment subject to heavy-duty cycle operating conditions may be suitable candidates for passively regenerated filters, whereas lighter duty cycle applications would likely

require actively regenerated filters.

You should, however, be aware that older engines, especially ones that are emitting black smoke or burning excessive engine oil, may not be suitable candidates for DPFs. High amounts of DPM emitted from older engines may overload a DPF too quickly, thus reducing the ability of the DPF to regenerate properly. Mine operators should consult with the DPF manufacturers to determine if an engine is suitable for retrofit with a DPF.

39. How does a ceramic DPM filter work?

Several ceramic DPM filter designs have been developed. One design, referred to as a ceramic monolith type filter, consists of a “honeycomb” arrangement of long, small diameter parallel hollow ceramic-walled tubes. Alternate tubes are sealed on one end and open on the other end in a “checkerboard” pattern. The filter assembly is placed in-line into the exhaust system. DPM laden exhaust enters the open ends of the tubes and the DPM collects on the sidewalls, unable to pass through the porous filter media. The exhaust gases pass through the porous sidewalls of the tubes into the adjacent tubes, which are open only on their downstream ends. The gases exit through the exhaust pipe downstream of the filter.

40. How do you clean the ceramic type filters?

The ceramic filter collects and stores DPM. Cleaning the filter requires a source of heat to burn the DPM off of the filter media. Cleaning of the filter, referred to as “regeneration,” is either accomplished by a passive, active, or combination passive/active method.

41. What happens if a ceramic filter is not properly cleaned?

If ceramic filters are not properly cleaned (regenerated), the filter can become overloaded and clogged with DPM, thus causing excessive exhaust backpressure and possibly leading to uncontrolled combustion of the accumulated soot (uncontrolled regeneration) and destruction of the filter. The engine manufacturers specify maximum backpressure allowed on their engines. An engine warranty can be voided if the engine is operated with excessive backpressure, and ultimately, filter failure and engine damage can occur.

Uncontrolled regeneration occurs when an excessively large amount of soot in the ceramic filters starts to combust due to a sustained period of heavy engine loading followed by light engine loads. The combustion temperature rises beyond the melting point of the ceramic or a hot spot develops that either melts or cracks the ceramic.

42. What can be done to avoid uncontrolled regeneration of a ceramic DPM filter?

The magnitude of the backpressure on the engine provides an indication of the loading on the filter, so continuous monitoring of the backpressure enables users to take appropriate action to clean or remove the filter before filter overloading and resultant filter failure and engine damage occur. DPM filters are available that are provided with appropriate pressure sensors, enabling continuous monitoring of filter backpressure.

43. What is passive regeneration?

Passive regeneration means the filter is cleaned while it is installed on the machine and the machine operates through its normal work cycle. The hot exhaust gas actually causes accumulated DPM to combust. This combustion converts the solid particulates to combustion gases, which pass through the filter and out through the exhaust pipe. For passive regeneration to work properly, the exhaust gas temperature must exceed a certain minimum value for a certain percentage of the work shift, typically around 400°C to 425°C for about 25 percent of the shift.

44. Why is a catalyst usually needed for passive regeneration?

The catalyst promotes filter regeneration at a lower exhaust gas temperature, thereby facilitating passive regeneration under load conditions that would otherwise not achieve sufficient engine exhaust temperature for passive regeneration to occur. A catalyst may be added to the fuel (fuelborne) or may be coated onto a DPM filter. Filters may be coated with either a precious metal catalyst or a base metal catalyst. However, using a catalyst can only reduce the required exhaust temperature somewhat. Achieving successful passive regeneration on light duty equipment is often impossible. Filter manufacturers should be contacted for further information on specific products or users can consult the MSHA homepage at www.msha.gov.

Certain platinum based catalyzed filters can also cause an increase in nitrogen dioxide (NO₂) emissions due to the conversion of nitric oxide (NO) to NO₂. The mine operator should be aware of this when using these devices. MSHA has issued a program information bulletin on its web site addressing this issue.

45. What is active regeneration?

Active regeneration occurs when the filter is cleaned by a heat source other than the engine's exhaust gas temperature. This is normally done using an external electrical heat source, fuel additive, oven, or diesel fuel burner. Regeneration can be done while the filter is on the machine (on-board active regeneration) or the filter can be taken off the machine (off-board active regeneration) depending on the filter manufacturer's active regeneration system. Active regeneration normally requires two to four hours, and some provision for handling hot exhaust gases from the active regeneration process may be necessary. In some applications, equipment operators will need to be instructed and trained to engage the external heat source at the end of their shifts.

46. What is passive/active regeneration?

Passive/active regeneration is a combination of both regeneration systems. For example, this has been done with base metal catalyzed traps, uncatalyzed traps with fuelborne additives, or combinations of these two systems, where the engine produces exhaust gas temperature that can burn off almost, but not quite all of the DPM. In this case, the DPM slowly builds up so that at a certain extended time interval, once every 250 hours, for example, based on backpressure or the maintenance schedule, the filter is removed for cleaning in a "regeneration station" or remains in place and is cleaned using on-board electric heaters.

47. How do I know if my machine can produce enough heat for passive regeneration?

To determine if a machine is suitable for passive regeneration, an exhaust gas temperature trace must be performed. This is done by measuring the exhaust gas temperature with a thermocouple and a data logger during the working shift. This will indicate the exhaust gas temperature that the machine is developing during the working shift, and for how long various temperature levels are maintained. The filter manufacturer can review this data to assist the mine operator in purchasing the correct filter with the correct regeneration system. MSHA has also posted some guidelines on this subject on their web site.

48. How often do I have to clean the filter?

Exhaust backpressure is the best indicator for determining when the DPM filter needs to be cleaned. As noted above, the engine manufacturer specifies a maximum allowable exhaust backpressure for their engine. This backpressure should never be exceeded in order to prevent engine or filter damage.

49. Where should I install the filter in the exhaust system?

The filter manufacturer should be able to assist you with exact location. For passive or passive/active regeneration filters, the filter should be installed close to the outlet of the exhaust manifold or the turbocharger in order for the filter to be exposed to the highest possible exhaust gas temperature. For active regeneration filter systems, the location is not as important since the filter does not depend on the exhaust gas temperature for heat for regeneration.

50. If I install a ceramic filter, how do I know it is working properly?

A quick qualitative check can be made by observing the engine exhaust for signs of diesel soot, especially when the engine is operating under heavy load or lugging conditions. An adequate indicator of the amount of soot being passed by the filter is available. This device samples the exhaust through a white paper filter and the “grayness” of the spot is compared to a 0 to 9 “grayness” scale.

The entire exhaust system should be checked for leaks too, especially upstream of the filter. Look for soot shadows at the joints. If the exhaust system is leak tight, and the exhaust pipe at the exit of the filter is clean on the inside, the filter is effective in reducing the ambient DPM from the machine by more than 85%. If a quantitative measure of performance is needed, the best way is to operate the equipment in an isolated zone with and without the filter installed, and sample the mine atmosphere for DPM under both conditions.

51. What do I do if I install a ceramic filter, and do everything possible to promote passive regeneration, but the filter won't passively regenerate?

Despite every effort to achieve passive regeneration, in some cases, especially with light or mixed duty applications, passive regeneration is not possible. In these cases, the filter will need to be cleaned by other means. This may be considered less desirable and add unanticipated costs and complexity to the process. However, users should remember that the ultimate goal of filtering diesel exhaust is to remove the DPM. As

long as the DPM is removed at an acceptable efficiency, the filter is “doing its job.”

52. Where do I install the backpressure monitoring device?

The backpressure monitoring device should be installed ahead of the DPM filter or catalytic converter in the exhaust pipe so it will provide the total exhaust system backpressure.

53. How often should I check the backpressure?

The backpressure device should be set up so that the machine operator can monitor the backpressure during machine operation. A mechanical needle gauge or an electronic monitor that uses indicator lights to provide the backpressure status can be installed in the operator’s compartment. In both cases, the tubing that connects the backpressure device to the exhaust pipe must be maintained to prevent clogging.

54. What conditions prevent the backpressure from being monitored accurately?

A blocked exhaust port will not allow the exhaust pressure to be monitored. This can give the machine operator a false indication on the status of the exhaust backpressure. If a needle gauge is being used, the needle should always be moving. Absence of any movement in the gauge or the gauge always reading “zero” or “low” would be an indication of a blocked port. Holes in the DPM filter or leaky gaskets will allow the exhaust to pass around the filter and minimize the backpressure. In this case, the backpressure will never increase because the DPM filter is not trapping the DPM.

55. What other maintenance should be performed on the backpressure monitoring line?

Since exhaust gas contains water vapor, when the exhaust starts to cool in the backpressure line, the water will condense to liquid. The exhaust backpressure line should contain a water drop out bowl. However, the drop out bowl can become full or clogged and prevent the backpressure from being properly monitored. This drop out bowl should be checked prior to machine operation.

56. How can I tell if the electronic backpressure monitoring lights are working?

Electronic backpressure monitors can become ineffective in the same way as mechanical needle gauges if the ports or lines are blocked. Some mine operators install a mechanical needle gauge along side the electronic device as a backup. As stated above, a needle gauge should always be moving. Lack of movement would indicate a blocked port. A maintenance person could check the lines and the electronic device by using compressed air to add pressure to the monitoring devices through the lines. However, you must be careful not to apply too much air and damage the gauges.

57. After the DPF is regenerated, what causes the exhaust backpressure to not return to as low as it was the last time the DPF was regenerated?

The regeneration cycle, either passive or active, burns off the DPM which is mainly carbon. However, over time the filter loads up with ash and metals from the oil and engine wear. The ash and metals cannot be removed by the regeneration process. The filter manufacturer should provide the proper schedule and procedure for DPF cleaning

to remove the ash and metals. If the ash and metal are not removed, the DPF will eventually clog which could lead to DPF or engine damage.

BIODIESEL

58. What is biodiesel?

Biodiesel is an EPA registered diesel fuel and diesel fuel additive made from feedstocks such as soy oil, cottonseed oil, peanut oil, rape seed oil, or animal fat. It can be made from these products before (virgin) or after they have been used as cooking oils (recycled oil or yellow grease). The virgin or recycled oils themselves cannot be used as diesel fuel. These oils need to be reacted with alcohol (methanol or ethanol) in the presence of a catalyst (sodium or potassium hydroxide) to remove the glycerin. The resulting product, consisting of mono-alkyl esters, is biodiesel, and it can either be mixed with standard #1 or #2 petroleum diesel or used in 100% (neat) form.

The applicable ASTM standard for biodiesel is D6751-06, "Standard Specification for Biodiesel Fuel (B100) Blend Stock for Distillate Fuels," which establishes minimum requirements for fuel quality and properties. Biodiesel meets clean diesel standards established by the California Air Resources Board (CARB). Neat biodiesel has been designated as an alternative fuel by the Department of Energy (DOE) and the U.S. Department of Transportation (DOT).

59. Will the use of biodiesel fuel reduce my DPM emissions?

Yes. Depending on the fuel blend used, biodiesel has been shown to significantly reduce DPM emissions in underground M/NM mines. Generally, higher biodiesel content fuel blends produce lower DPM emissions, with neat (100%) biodiesel producing the lowest DPM emissions. Fifty-percent blends can reduce DPM emissions by 15 to 65 percent compared to standard diesel fuel.

60. Besides reduced DPM emissions, are there other benefits of using biodiesel fuel?

Yes. Biodiesel has greater lubricity than standard petroleum diesel. Tests have shown that even in blends as low as B2, biodiesel can restore the lubricity of the poorest lubricity diesel fuel, including ultra low sulfur diesel fuel. Biodiesel has a very low sulfur content, and can be blended with ultra low sulfur diesel. Other benefits include lower emissions of carbon monoxide, carbon dioxide, polycyclic aromatic hydrocarbons, oxides of sulfur, and total hydrocarbons. Depending on the fuel blend, engine, operating practices, maintenance, duty cycles, etc., oxides of nitrogen could be somewhat increased or somewhat decreased.

Biodiesel has a higher flash point than standard petroleum diesel for greater storage and handling safety, and a higher cetane number for better cold starts. The solvent and cleaning properties of biodiesel, which are discussed in detail below, also promote better engine performance by keeping the fueling system and injectors clean. Biodiesel is also biodegradable and nontoxic.

61. What is meant by biodiesel fuel blend?

Biodiesel is often blended with standard petroleum diesel prior to sale. Typical blends are 2% biodiesel mixed with 98% standard diesel (B2), 20% biodiesel mixed with 80% standard diesel (B20), and 50% biodiesel mixed with 50% standard diesel (B50). Biodiesel can also be used in neat or 100% form, or blended with very low concentrations of standard diesel, such as 99% biodiesel mixed with 1% standard diesel (B99) or 99.9% biodiesel mixed with 0.1% standard diesel (B99.9).

62. What is the purpose of blending such small concentrations of standard diesel into biodiesel?

At the present time, and at least through the year 2008, a federal excise tax credit is available to blenders of biodiesel fuel. The credit is equal to 1¢ per gallon for each % biodiesel in a fuel blend when the biodiesel is made from virgin feedstocks, and 0.5¢ per gallon for each % biodiesel in a fuel blend when the biodiesel is made from recycled oils. To qualify for this blender's credit, the biodiesel must be blended with standard diesel in a proportion of at least a 99.9% biodiesel to 0.1% standard diesel (equivalent to 1 gallon of standard diesel in 999 gallons of biodiesel). For a 99.9% blend of virgin biodiesel (B99.9), this tax credit amounts to roughly \$1.00 per gallon.

63. Do I need to modify my engines in order to use biodiesel?

Generally, any diesel engine can use biodiesel fuel without any engine modifications. Due to the solvent properties of biodiesel, some elastomeric components of a vehicle's fueling system such as hoses and gaskets can be damaged by biodiesel, and may therefore need to be replaced with biodiesel-compatible parts. For biodiesel fuel blends with greater than 20% biodiesel content, Teflon and Viton can be used but natural rubber, butyl rubber, Buna, nitrile, polyurethane, polypropylene and polyvinyl are not acceptable materials. Users are cautioned to contact the engine manufacturer or distributor to determine whether a particular engine uses any parts that are not biodiesel-compatible, and would need to be replaced.

64. Will my engines perform as well on biodiesel?

Neat or 100% biodiesel has about the same energy content as #1 petroleum diesel, and 8-10% lower BTU content than standard #2 diesel. The lower energy content of biodiesel results in lower power output delivered by an engine fueled on biodiesel. This lower power output is generally not noticeable when an engine runs on lower biodiesel content blends such as B2 or B20. Lower power output will generally be noticeable only when an engine runs on a higher biodiesel content blend and when the engine is operated under heavy load, such as when a haulage truck travels upgrade fully loaded.

When considering an entire duty cycle, which includes some heavy work, some medium work, and some idle time, the overall effect of the lower power output is not as great as the difference in BTU content between biodiesel and standard #2 diesel. Mine operators that are using high biodiesel content fuel blends such as B99 and B99.9 have reported no negative effect on mine production.

65. Will I use the same amount of fuel if I change to biodiesel?

Biodiesel fuel consumption, measured on a gallons per hour basis, will generally be higher than when the equipment operates on standard #2 diesel. In some cases, the higher lubricity and cleaning effect of biodiesel compensate for the lower energy content of the fuel, with some users reporting better fuel economy with biodiesel compared to standard #2 diesel.

66. Where can I buy biodiesel?

At this time, biodiesel is available in every state except Alaska from over 1400 commercial fuel distributors and over 750 retail filling stations across the country.

67. How can I be sure that if I switch to biodiesel, it will be available the next time I want to buy it?

Biodiesel production was approximately 25 million gallons in the United States in 2004 and approximately 75 million gallons in 2005. Biodiesel plants under construction in 2006 were rated at 329 million gallons of annual production capacity, and plants in the pre-construction phase in 2006 were rated at 518 million gallons of annual production capacity. An on-line guide to buying biodiesel is maintained by the National Biodiesel Board at the following internet web site:

<http://www.nbb.org/buyingbiodiesel/guide/default.shtm>.

This web site includes up-to-date information on biodiesel production facilities, commercial distributors, and retail filling stations throughout the United States.

68. How can I be sure that the biodiesel I purchase is always the same quality?

It is strongly recommended that biodiesel in any blend be purchased from a producer or distributor that adheres to BQ-9000 quality standards to insure that fuel specifications meet or exceed ASTM D6751-06 requirements for fuel properties and quality. Off-specification fuel exceeding maximum glycerin content specifications or failing to meet other fuel quality requirements can adversely affect engine performance, even in blends as low as B2. A BQ-9000 certification process has been adopted by the National Biodiesel Accreditation Commission, and as of June 2006, eight US biodiesel producers have become BQ-9000 certified. The BQ-9000 certification process is a relatively recent development, and many more producers are expected to become certified in the future. To assure that biodiesel meets minimum fuel quality standards, purchasers should specify fuel that meets or exceeds the requirements of ASTM D6751-06.

69. What precautions do I need to take in cold weather if I wish to use a biodiesel fuel blend?

For biodiesel fuel blends with greater than 20% biodiesel content, precautions need to be taken in cold weather to prevent the fuel from gelling. Neat, or 100% biodiesel made from virgin soy oil has a cloud point of 32 degrees Fahrenheit and a pour point of 28 degrees Fahrenheit. The cloud point is the temperature at which crystals begin to form in the fuel, which could cause clogging of fuel filters. The pour point is the temperature at which the fuel begins to solidify and will not flow when poured. Where temperatures lower than 35 degrees Fahrenheit are possible, fuel storage tanks need to be heated or located in a heated structure.

Fuel transfer pipelines and fuel dispensing equipment also need to be protected from cold temperatures. Mobile equipment that is exposed to such temperatures, either during operations or between working shifts, may need to be provided with fuel tank heaters, fuel line heaters, and fuel filter heaters. Depending on the source of the biodiesel used in a fuel blend, the cloud and pour points may be higher or lower than the temperatures shown above. Users are urged to contact their fuel supplier to determine what precautions, if any, are required to insure problem-free use of a particular fuel under the temperature conditions that are possible at a specific mine location.

70. Are there any engine parts that I will have to replace if I use biodiesel?

As noted above, biodiesel can soften and degrade certain types of elastomers and rubber compounds over time. Using high percent blends can have greater impacts on fuel system components such as fuel hoses and fuel pump seals that contain compounds that are incompatible with B100. The engine manufacturer should be contacted to determine which, if any components need to be replaced with their B100 compatible counterparts. For older engines where specific information on biodiesel compatibility is not available, replacement of fuel system components with biodiesel compatible components is recommended.

71. Will biodiesel clog the fuel filters?

Standard petroleum diesel, especially #2 diesel, often leaves deposits in the bottom of fuel tanks and lines. Biodiesel acts as a cleaning agent, and can dissolve and remove these deposits, which are often retained on fuel filters, causing filter clogging. As a result, when a high biodiesel content fuel blend is used following prolonged use of standard petroleum diesel fuel, fuel filters may need to be changed more frequently until the entire system is fully cleaned.

72. Is biodiesel stable?

Most industry experts recommend that biodiesel fuel should be used within six months of manufacture to insure that the quality of the fuel is maintained. Biodiesel, like standard diesel fuel, is subject to oxidation, microbial growth, and other conditions during long-term storage. Prior to use, biodiesel fuels stored longer than six months should be tested for acid number, sediment, and viscosity to insure it remains within specifications. The acid number goes out of specification before fuel filters begin to clog or other problems are encountered, so checking the acid number is a good indicator of fuel stability that can help prevent fuel stability related problems.

73. What effect will biodiesel have on engine oil usage?

Engine oil change intervals may need to be shortened when using high biodiesel content fuel blends. Due to its slightly higher viscosity and density, more biodiesel fuel may pass over the piston rings and into the oil pan. High levels of biodiesel in the engine oil may polymerize over time, and cause serious engine sludge problems. Shortening engine oil change intervals will prevent this problem from occurring.

74. Will the use of biodiesel void my engine warranties?

Engine manufacturers warrant their engines against defects in materials and workmanship. The use of a particular fuel should have no effect on the materials and workmanship warranty. However, manufacturers are concerned that extensive use of biodiesel will result in increased numbers of warranty claims for what are actually problems caused by the fuel. Many manufacturers have issued “position statements” on the use of biodiesel fuel. More information on biodiesel and engine warranties can be found at

http://www.biodiesel.org/resources/fuelfactsheets/standards_and_warranties.shtm

§57.5060(d) RESPIRATORY PROTECTION

75. When is respiratory protection allowed?

When controls do not reduce a miner’s DPM exposure to the PEL, controls are infeasible, or controls do not produce significant reductions in DPM exposures, controls must be used to reduce the miner’s exposure to as low a level as feasible and must be supplemented with respiratory protection in accordance with § 57.5005(a), (b), and paragraphs (d)(1) through (d)(8) of §57.5060 .

Respiratory protection is therefore required if you have been granted an extension of time in which to comply with the applicable final limit pursuant to § 57.5060(c). Respiratory protection is also required during the period between the time a citation for DPM overexposure is issued and MSHA resampling verifies the effectiveness of engineering and administrative controls in reducing DPM exposures to or below the final limit. The mine operator may request MSHA resample once the operator has implemented routine and usually effective steps to reduce DPM exposure levels. MSHA will resample at the operator’s request to determine compliance with the PEL and terminate the citation if exposures are reduced to the PEL.

76. What are the requirements for using respiratory protection?

Respiratory protection for compliance would be permitted only after feasible engineering and administrative controls have been implemented. When respiratory protection is required for compliance with the final limit, you must first have a PLHCP make a written medical determination that the miner can wear a respirator. In addition, you must be in accordance with a respiratory protection program that meets the requirements of §57.5060(d). Also, you must use an air-purifying respirator equipped with filters that meet one of the following criteria:

- Certified by NIOSH under 30 C.F.R. Part 11 as high efficiency particulate air (HEPA) filter;
- Certified by NIOSH under 42 C.F.R. Part 84 as 99.97% efficient; or
- Certified by NIOSH for DPM.

NIOSH approved air purifying respirators with R100 or P100 filter or powered air purifying respirators with HEPA filters will comply with the MSHA requirements provided the proper change out frequency is followed. This would apply to the complete range of approved respirators selected following the NIOSH Respirator Selection Logic, using the MSHA permissible exposure limit.

Note that NIOSH issues certificates of approval only for completely assembled respirators. Respirator filters or filter assemblies are not certified as separate parts. A respirator may be approved for use with one or more particulate filters and the entire respirator approved with a protection level, for example, P100 or N95. A filtering facepiece may be approved for P100 or other protections.

R-series filters or respirators cannot be used for more than one work shift. Respirators with N-series filters cannot be used for compliance with the DPM standard. HEPA filters are not currently tested by NIOSH for degradation from oil exposures. HEPA filters should be replaced after a use during a single shift.

77. Are filtering facepiece respirators available?

Yes. Air purifying respirators with particulate filters and filtering facepieces are available in R100 and P100 classes. There are currently no approved R100 filtering facepiece (disposable particulate respirators) respirators approved, and the listing of P100 filtering facepiece respirators can be found on the National Personal Protective Technology Laboratory web page at:

http://www.cdc.gov/niosh/npptl/topics/respirators/disp_part/p100list1.html

Air purifying respirators, including filtering facepieces, may be used providing the protection factor is adequate for the exposure.

78. Can I use a loose fitting powered air purifying respirator (PAPR) helmet?

NIOSH-approved powered air purifying helmets with HEPA filters are acceptable provided the protection factor is adequate for the exposure. Powered air purifying respirators without a tight fitting facepiece are typically assigned a protection factor of 25. This means the DPM concentration in the wearer's breathing zone would be expected to be 1/25 the ambient concentration.

79. What are the key elements of a DPM respiratory protection program?

The key elements of a DPM respiratory protection program are:

- a. a written determination by a PLHCP of the miner's ability to wear a respirator;
- b. respirator selection that is appropriate for hazards; and
- c. respirator use.

Employee training: This training is separate from the DPM training required by § 57.5070. Training must include:

- a. instruction in the nature of the hazard and an appraisal of what may happen if the respirator is not used;
- b. explanation of feasible engineering and administrative controls and the efforts made or being made to eliminate the need for respirators;
- c. a discussion of why this is the proper type of respirator for the particular purpose, and respirator use, capabilities, and limitations; and
- d. having the respirator fitted, including demonstrations in how the respirator should be worn, how to adjust it, and how to determine if it fits properly.

Respirator cleaning and disinfecting: The program must include provision for:

- a. cleaning and disinfecting respirators on a regular basis, or after each use if they are used by more than one person; and
- b. for disposable respirators, a provision for employees to obtain a new respirator when theirs becomes unusable, unsanitary, or exhibits excessive breathing resistance.

Respirator storage: The program must include provision for convenient, clean, and sanitary storage.

Respirator inspection: The program must make provision for respirator inspection before and after each use and during cleaning. Deficiencies identified must be corrected.

Surveillance: The work area must be periodically checked to assure respirator use and to monitor conditions, employee exposure, and employee stress due to breathing resistance.

Program evaluation: The respiratory protection program must be evaluated regularly to assure continued effectiveness.

80. If I have already fit tested the miner, and afterwards I change brands of respirators, do I have to fit test the miner again?

Yes, if the miner is using a tight-fitting facepiece respirator. You must assure that a miner using a tight-fitting facepiece respirator is fit tested prior to initial use of the respirator and whenever a different size, style, model or make of respirator facepiece is used.

81. Now that MSHA requires a medical evaluation of a respirator wearer, how long will MSHA give me to establish a respiratory protection program for a miner that is overexposed to DPM?

Although MSHA will make the determination based on site-specific conditions, in most cases mine operators should not take more than two weeks to implement the primary components of a respiratory protection program. These components include a medical evaluation of the miner's ability to wear a respirator before the miner is required to be fit tested or to wear a respirator at the mine, selecting an appropriate respirator, purchasing respirators, providing respiratory training to miners, and conducting fit testing. Mine operators must make certain that they also implement the other required components of the respiratory protection program.

82. What is a PLHCP?

MSHA intends that a "physician or other licensed health care professional (PLHCP)" be a physician, physician's assistant, nurse, emergency medical technician or other person qualified to provide medical or occupational health services, as MSHA defined a "health professional" under the Hazard Communication standards at 30 C.F.R. 47.11. We will accept the license as proof of qualification to perform the medical evaluation. We specified that the health care worker be licensed to assure an acceptable level of competency, but have not specified which states' licensing to accept.

83. What qualifications does a PLHCP need to have?

The DPM standard does not specify the qualifications of the PLHCP. We will accept a license from a State, national or international medical certification board, etc., as proof of qualification to perform the medical evaluation. We specified that the health care worker be licensed to assure an acceptable level of competency, but have not specified which states' licensing to accept. Although some state licensing requirements are more stringent than others, even the least rigorous of the state requirements will provide an acceptable level of competence.

84. How long do I have to find a PLHCP and conduct a medical evaluation to determine if the miner can wear a respirator, and provide the miner with a respirator if the miner is able to wear one?

You must have a PLHCP test the miner as soon as feasible. You should be prepared to immediately implement the necessary respiratory requirements if controls are not successful in reducing the miner's exposure to within the PEL.

85. Can the medical evaluation of a miner's ability to wear a respirator be part of a company's annual examination?

Yes, as long as it is performed by a PLHCP.

86. Do I have to pay for the PLHCP to test the miner to determine if the miner can wear a respirator?

Yes. These tests are to be conducted at no cost to the miner.

87. What type of test does the PLHCP have to conduct to determine the miner's ability to wear a respirator?

The mine operator must provide a confidential medical evaluation by PLHCP to determine the miner's ability to use a respirator before the miner is required to be fit tested or to use a respirator at the mine. The PLHCP may use any medically valid procedure for making this determination. The final rule does not include a protocol to guide the PLHCP on how to conduct medical evaluations, but places the responsibility on the mine operator to provide an appropriate medical evaluation by a PLHCP to determine the miner's ability to use a respirator before the miner is required to be fit tested or to use a respirator at the mine. Although we have not included a specific protocol for how evaluations must be conducted, we expect the PLHCP to conduct an evaluation based on the individual miner's medical information. If, however, the PLHCP determines that the miner cannot wear a negative pressure respirator, the mine operator must make certain that the PLHCP evaluates the miner's ability to wear a powered air purifying respirator (PAPR).

88. What can the miner do if the miner has concerns with or disagrees with the PLHCP's medical determination?

The miner has the right to submit additional evidence of their medical condition within 30 days of their discussion of the PLHCP's evaluation. Afterwards, the mine operator must obtain a written determination from the PLHCP regarding the miner's ability to wear a

respirator.

89. How much time do I have to provide the affected miner with a copy of the PLHCP's determination as to whether the miner is medically able to wear a respirator?

You must exercise diligence in making certain that the PLHCP provides a copy of the determination to the miner.

90. If I have an existing exam, do I have to provide a copy of the determination of the miner's ability to wear a respirator to the miner?

Yes, you must provide the miner with a copy of the written determination.

91. What do I have to do if I have a pre-existing medical evaluation (before August 16, 2006) and the affected miner requests 30 days to provide additional information to the PLHCP?

You must either give the miner 30 days to provide additional information to the PLHCP, or you may choose to have the miner reevaluated. Of course, if you believe that conditions have changed which could adversely affect the miner's ability to wear a respirator, you must have the miner reevaluated.

92. What happens to a miner who does not yet have a PLHCP's determination on the miner's ability to wear a respirator?

The miner continues to work at the mine but cannot be fit tested or required to wear respiratory protection.

93. If a miner is required to wear a respirator, does the miner have to wear the respirator for the full shift?

Yes, if the miner continues to work in the affected occupation or area of the mine for the entire shift.

94. If the miner is unable to wear a negative pressure respirator, but can wear a powered air purifying respirator, do I have to provide it?

You must either provide the powered air purifying respirator or transfer the miner in accordance with the requirements of this section.

95. How often do I have to conduct a medical evaluation to determine if the miner can wear respirator?

You must conduct a medical evaluation of a miner's ability to wear a respirator before a miner is required to be fit tested or required to wear a respirator in your mine.

96. When does the miner have to be reevaluated?

The miner must be reevaluated when you have reason to believe that conditions have changed which could adversely affect the miner's ability to wear the respirator.

97. If I change brands of respirators, does the miner have to be reevaluated?

If it is the same type of respirator for which the medical determination was made, you do not need to have the miner reevaluated. However, the miner will have to be fit tested again.

98. When and where do I have to transfer a miner?

You must transfer the miner to an existing job within 30 days of the final determination of the PLHCP that the miner is unable to wear a respirator. The miner must be transferred to an area of the same mine where respiratory protection is not required.

99. What if I do not have a position where I can transfer the miner that is within the PEL?

The DPM standard does not require you to create a job for purposes of transferring a miner, but you cannot require a miner to wear a respirator who has been found by the PLHCP to be unable to wear a respirator. In addition, you cannot allow the miner to continue to work in an occupation or area of the mine where the miner's exposure exceeds the applicable limit.

100. Can I transfer a miner to a job at another one of my properties?

The DPM standard requires you to transfer a miner to an existing job in an area of the same mine where the miner will not need to wear respiratory protection, if you have a job to which the miner can be transferred. However, if another job is not available, the standard does not require you to transfer the miner, but you cannot allow the miner to continue to work in an area of the same mine where the miner would be overexposed to DPM.

101. Do I have to transfer a miner who is medically unable to wear a respirator, if the miner does not want to transfer?

Yes, if you have a job to which the miner can be transferred.

102. What salary do I have to pay a transferred miner?

You must continue to pay the miner no less compensation than the miner received for their regular rate of pay in the job classification that the miner held immediately before the transfer.

103. If I increase a transferred miner's salary, are the increases based on the previous job classification or the new job classification to which the miner was transferred?

Wage increases for transferred miners must be based upon the new work classification.

104. What happens to a labor/management contract that conflicts with the Mine Act determination to compensate the miner?

You must compensate the miner at no less than the regular rate of pay in the job classification that the miner held immediately before the transfer, or you will be in violation of the standard.

105. Are transferred miners entitled to bonuses they received in their previous job that were in addition to their regular rate of pay?

If the bonus is discretionary, it is not considered part of the miner's regular rate of pay. If the bonus is nondiscretionary, it is considered to be part of the miner's regular rate of pay.

106. Do I have to keep any records related to medical evaluation and transfer of a miner?

Yes. You must keep a record of the identification of the PLHCP and the PLHCP's written determination of the miner's ability to wear a respirator.

107. How long do I have to keep the record?

You must keep the record for the duration of the affected miner's employment plus six months.

108. What will MSHA do if I have begun to implement a required respiratory protection program, but before it is fully implemented, the miner's exposure is reduced to the final limit?

If MSHA sampling results determine that the miner's exposure no longer exceeds the final limit, the citation will be terminated and that miner is no longer required to wear a respirator.

109. If I receive a citation for a violation of the final limit, does the miner who was overexposed need to wear a respirator even if that miner is working in a different part of the mine?

No, provided that you did not rotate the miner to reduce the miner's DPM exposure. A citation for a violation of the final DPM limit will specify the occupation and the area of the mine affected. You cannot, however, allow the miner to work without a respirator in an area of the mine where the miner's exposure exceeds the applicable limit.

110. I received a citation for a miner's overexposure to DPM. Do I have to keep the miner in a respirator until MSHA returns to the mine to check the abatement of the citation?

If you remove a miner from a required respiratory protection program and MSHA confirms that the miner is no longer overexposed, MSHA will terminate the citation. If the miner is still overexposed, and not using appropriate respiratory protection meeting the requirements of § 57. 5060(d), MSHA will take stricter enforcement actions. In an abatement inspection, MSHA will base this determination on an additional single sample.

§57.5061. COMPLIANCE DETERMINATIONS

111. What sampling and analytical method will MSHA use to determine compliance with the final DPM limit?

MSHA will utilize a standard sampling pump operated at a flow rate of 1.7 liters per minute, 10 mm nylon cyclone, and a specialized submicron impactor and quartz fiber

filter to obtain a personal, full-shift DPM sample that will be analyzed per NIOSH Method 5040 to determine the subject miner's average eight hour equivalent full shift exposure to airborne elemental carbon. MSHA has included on its website the sampling procedures used by its inspectors.

112. Are the equipment and supplies that MSHA will use for sampling DPM available to the general public?

Yes. All equipment and supplies, including the specialized DPM sampling cassettes, are commercially available.

113. Will MSHA compliance sampling be done only on the basis of personal sampling?

Yes. This will result in a permissible exposure limit (PEL) rather than a concentration limit.

114. Whom will MSHA inspectors select for DPM sampling?

MSHA inspectors will treat DPM similarly to other airborne contaminants when developing a sampling strategy. Based on observations made in the mine, evaluation of the mine's ventilation plan, and knowledge of DPM emission sources, MSHA inspectors will select miners most likely to have the highest exposure to DPM. This includes miners who work underground during the entire shift, as well as miners who travel in and out of the mine during the shift, such as haulage truck drivers who pick up their load underground and dump it on the surface of the mine. MSHA will sample as many miners on as many shifts as necessary to fully document "worst case" DPM exposures at a given mine.

115. How many samples will MSHA take to demonstrate a miner's exposure?

One. To implement § 57.5061(a), MSHA will consider a single personal sample an adequate basis for a compliance determination. MSHA will issue a citation as it does for all other contaminant sampling under the metal and nonmetal standards.

116. What will MSHA do if I disagree with MSHA's sampling determination?

MSHA would consider information presented by the mine operator in determining the validity of its sampling results. For example, MSHA would consider the results of simultaneous sampling conducted by the mine operator, unusual or abnormal conditions encountered during the work shift, or other factors that would raise question as to the validity of the sample. Based on the evaluation, MSHA may decide to resample.

117. How will MSHA determine when to issue a citation for a miner's overexposure to DPM?

Upon finding a DPM overexposure, the MSHA District office will review your efforts towards compliance and determine whether there are feasible engineering or administrative controls available that you failed to utilize which can achieve a significant reduction in the miner's DPM exposure. Such determination will involve having personnel from the District office contact you to discuss controls utilized and feasibility concerns unique to your mining operation. It may also involve personnel from the

District office and/or MSHA's Directorate of Technical Support visiting your operation. If MSHA subsequently identifies feasible controls that you have not utilized, and which can significantly reduce the miner's exposure, MSHA will issue a citation. In determining the gravity of the violation, MSHA will consider the extent and duration of the overexposure and whether the miner was utilizing respiratory protection consistent with the requirements of the standard.

118. How will MSHA determine when to terminate a citation for an overexposure to the DPM final limit?

MSHA will resample to see what progress has been made to reach compliance levels at the request of an operator who has begun the abatement process by at least taking routine steps to improve DPM exposure levels. If an operator has taken additional samples which indicate possible compliance, MSHA will resample with an additional single sample and if that sample is in compliance, MSHA will accept that the condition has been abated. If routine and usually effective steps such as improved maintenance, administrative controls or the implementation of a standard DPM exhaust filter program do not achieve compliance, MSHA, at the operator's request, will assign the mine for a technical compliance evaluation. That evaluation will include a mine visit, observation of mining equipment including installed controls and multiple samples to determine what additional feasible steps will achieve compliance or achieve substantial reductions toward compliance. However, if Technical Support has previously evaluated the same piece of equipment in substantially similar circumstances, it will make an abbreviated evaluation of the steps needed to reasonably assure compliance.

§57.5065, FUELING PRACTICES

119. Is low sulfur diesel fuel commercially available?

Yes. Both number 1 and number 2 diesel fuel meeting the sulfur content requirement of this rule are commercially available at local gas stations. Fuel used in over-the-road diesel engines is currently required by EPA regulations to meet the same 0.05% sulfur content limit that has been implemented for underground metal and nonmetal mines.

120. Can low sulfur fuel be differentiated by color (dyed or undyed)?

No. Undyed fuel is for on-highway use and has a low sulfur content. Dyed fuel can be either low sulfur or high sulfur (greater than 0.05%).

121. How will I know the sulfur content of the diesel fuel I purchase?

Ask the fuel distributor to give you a specification sheet that documents the fuel sulfur content. You should keep this sheet with the DPM records for your mine.

122. Can underground mines use diesel fuel for on-highway vehicles?

Yes, all diesel fuel sold in the U.S. for on-highway vehicles is low sulfur.

123. Can I use bio-diesel fuel or a blend of bio-diesel and standard diesel in my underground equipment?

Yes, as long as the fuel is low-sulfur.

124. Does EPA's Tier 4 standard require a change in fuel?

Starting in 2007, EPA regulations require that fuel sulfur levels in all nonroad diesel fuel be limited to a maximum of 500 ppm (0.05%), the same as MSHA requires in § 57.5065(a) for underground MNM mines. Starting in June 2010, EPA requires that fuel sulfur levels in all nonroad diesel fuel be reduced to 15 ppm (0.0015%) to enable the use of advanced emission control systems needed for meeting the Tier 4 standards. Although MSHA will continue to enforce its 0.05% fuel sulfur limit, you may have to change your fuel to meet the 2010 EPA standards.

125. Why must I use fuel additives that are registered by the EPA?

Using a fuel additive that has not been thoroughly tested and registered with the EPA may increase DPM concentrations or expose miners to other toxic contaminants.

126. How can I determine whether an additive I wish to use is registered with the US EPA?

Mine operators should ask the supplier of the additive for evidence that the additive is registered with the US EPA. Operators can check the status of any fuel additive directly by referring to the following EPA Internet website:
<http://www.epa.gov/oms/regs/fuels/additive/web-dies.txt>
Operators can also ask their MSHA inspector or check with MSHA Technical Support with questions regarding diesel fuel additives.

127. May I use diesel fuel blended with ethanol?

Yes. Ethanol has been registered with the US EPA as a diesel fuel additive. Therefore, ethanol-blended diesel fuel can be used in underground MNM mines. Mine operators are encouraged to check either the MSHA or EPA internet web sites to find out whether other blended fuels have been registered with EPA before using such fuel in their underground equipment.

§57.5066, MAINTENANCE STANDARDS

128. Is equipment that is maintained or repaired off-site and then brought back to the mine still subject to the maintenance requirements of the standard?

Yes.

129. In what condition must I maintain my diesel engines?

MSHA-Approved engines must be maintained in approved condition, emission related components of non-approved engines must be maintained to manufacturer specifications, and emission control devices must be maintained in effective operating condition.

130. What are the important items to look at on an MSHA-Approved engine?

The important features of an MSHA-Approved engine are the emission-related components. These components include the piston, cylinder head, valves, fuel pump and governor, injectors, and turbocharger (if applicable). Engine settings, such as fuel injection pump settings, governor settings, and injection timing, can all adversely affect emissions. Specifications that derate the engine for altitude must be followed. Locks and seals must not be removed except by a person qualified to work on fuel pumps that can reinstall a seal or lock.

131. What items must be maintained on a diesel engine that is not MSHA-Approved?

Emission related components of engines that are not MSHA-Approved must be maintained according to manufacturer specifications. These are basically the same components which MSHA examines for "approved" engines.

132. Will an MSHA inspector require me to tear down an engine to verify that all maintenance is performed in strict accordance with the standard?

No. However, if it becomes evident during an inspection that engines are not being maintained to the correct specifications, an inspector may discuss maintenance procedures with the person performing maintenance and ask to see the manuals to confirm that the right manuals are being used.

133. Why should the miner operating a piece of diesel equipment be authorized and required to tag a machine for a suspected emissions related maintenance problem?

Diesel engine exhaust emissions, especially carbon monoxide, carbon dioxide, and DPM, are normally higher when the engine is operating at full load. Since engines are seldom operated under heavy load in the shop, a shop mechanic may be unaware of an emissions related engine fault on a machine, or a problem with an emissions control system that occurs only when the machine's engine is under full load. Since the fault may only be seen when the engine is heavily loaded, the machine operator might be the best person to detect it.

Examples of problems that could be missed by a mechanic are black smoke coming from the outlet of the exhaust system or leaking around exhaust joints upstream from a control device. The black smoke may only be visible when the engine is being worked hard. During light loads or idle, the black smoke may not be evident due to the excess air in the combustion system (lower fuel:air ratio).

A system of tagging machines with suspected emission problems does not depend on potentially unreliable word-of-mouth communication. A visible tag will also alert other miners who might subsequently use the machine that a potential emission problem might exist.

134. What is the meaning of the term “evidence” as it is used in the standard relative to the conditions that would constitute sufficient cause to tag a piece of diesel equipment having a suspected emissions related maintenance problem?

MSHA has defined “evidence” in the context of this provision to mean visible smoke or odor that is unusual for that piece of equipment under normal operating procedures, or obvious or visible defects in the exhaust emissions control system or in the engine affecting emissions.

135. Would black smoke being emitted by a machine that is equipped with a DPM filter constitute “evidence” of a maintenance-related emissions problem that could be tagged by an equipment operator?

Yes, if visible smoke is unusual for that piece of equipment under normal operating procedures.

136. What is the meaning of the term “promptly” as it is used in the standard relative to how soon a tagged piece of diesel equipment would need to be examined by an authorized person?

MSHA has defined “promptly” in the context of this provision to mean before the end of the next shift during which a qualified mechanic is scheduled to work.

137. Does a piece of diesel equipment that has been tagged for a suspected emissions related maintenance problem have to be immediately removed from service?

No. This requirement is different from MSHA’s § 57.14100(c) regulation that requires self-propelled mobile equipment to be taken out of service if safety defects make continued operation hazardous. The piece of equipment must be examined before the end of the next shift during which a qualified mechanic is scheduled to work, and will need to be removed from service, at least briefly, for that examination.

138. What information needs to be included on this DPM emissions tag?

The only requirements are that the tag indicates a possible emissions problem related to engine maintenance, and that the tag be dated. The requirement is performance oriented, and any system that conveys the required information would be acceptable. The specific nature of the maintenance problem need not be included on the tag. For example, a mine may choose to use color coding, so that whenever a dated tag of the specified color is attached to a piece of equipment, it means the operator believes a possible emissions problem related to engine maintenance exists on that piece of equipment.

139. What is the meaning of the term “qualified” as it is used in the standard relative to persons authorized by the mine operator to maintain diesel equipment?

The term, “qualified” means the person performing a maintenance task must have training or experience commensurate with the maintenance task performed.

140. Will MSHA check the qualifications of persons performing maintenance if there does not appear to be a maintenance problem affecting DPM emissions?

No.

141. If a piece of diesel-powered equipment requires frequent maintenance, will MSHA automatically cite a mine operator for having an unqualified person perform maintenance?

No. The fact that an engine requires frequent maintenance does not necessarily mean that maintenance was performed by an unqualified person.

142. What evidence does an operator have to have to show a person is qualified to perform specific maintenance tasks on diesel equipment?

The standard does not specify the type of record that is required. A record of employment experience or a certificate of training would be appropriate.

143. If an independent contractor performs diesel-powered equipment maintenance, does the person performing the maintenance need to satisfy the same qualification requirements as a person employed by the mine operator?

Yes, if the diesel-powered equipment is used in an underground metal or nonmetal mine.

144. Do these maintenance standards apply only to MSHA-Approved and engines that meet or exceed the applicable EPA particulate matter emission requirements outlined in Table 57.5067-1)?

No. These maintenance standards apply to all diesel engines used in the underground areas of metal and nonmetal mines.

§57.5067, ENGINES

145. Does my existing fleet of diesel equipment and engines have to meet the requirements of the standard?

MSHA conducted an inventory of diesel engines at each underground metal and nonmetal mine. This inventory was completed in September 2002. The purpose of this inventory is to enable MSHA inspectors to determine which engines are newly introduced. Engines introduced after September 2002 must either be MSHA-Approved or comply with the EPA specified emissions limits contained in Table 57-5067-1.

By introduced, MSHA means any engine added to the underground inventory of engines of the mine in question. This includes engines in newly purchased equipment, engines in used equipment brought into the mine, and replacement engines that have different serial numbers from engines they are replacing.

MSHA does not consider certain engines that are brought into a mine to be “introduced” for purposes of enforcing the engine standards. These exceptions include engines that were previously part of a mine’s inventory, but were removed, rebuilt, and then returned

to the same mine (but only if the engine retains the same serial number), and engines that are transferred into an underground mine from a different underground mine operated by the same mine operator.

146. Do the engines in customer vehicles, delivery vehicles, or contractor vehicles that enter my mine need to be MSHA-Approved or meet or exceed the particulate matter emission requirements outlined in Table 57.5067-1?

Delivery and customer vehicles are not covered by the engine or maintenance requirements of this standard. Independent contractor vehicles and equipment will be considered on a case-by-case basis. Independent contractor vehicles and equipment that enter into a mine on an infrequent, irregular, or nonrecurring basis would not be considered to be a part of that mine's diesel equipment fleet, and would therefore not be covered under the engine requirements of this standard.

Independent contractor vehicles that enter a mine on a frequent, regular, and recurring basis would be considered part of that mine's diesel equipment fleet, and would therefore be covered under the engine requirements of this standard.

147. Do engines in equipment that is operated by a mine development contractor for such jobs as shaft sinking or driving a slope, and that may be used in a given mine for a year or more, need to be MSHA-Approved or meet or exceed the particulate matter emission requirements outlined in Table 57.5067-1?

Such mine development contractors' equipment is not considered to be part of a mine's inventory of equipment, and therefore, this equipment does not need to be approved or meet or exceed the particulate matter emission requirements outlined in Table 57.5067-1. However, these contractors are considered to be mine operators under the Mine Act, and they must therefore comply with the other provisions of the rule, such as using low sulfur diesel fuel, providing DPM training to affected miners, and conducting DPM exposure monitoring. The contractor's employees are also subject to being sampled by MSHA for compliance with the DPM final limit.

148. Does surface equipment that is stored underground (e.g. during the winter months) have to be compliant?

No. The rule applies only to equipment that is used underground and is therefore part of the underground equipment inventory.

149. Does surface equipment that is taken into an underground repair shop (with a mine ID) have to have a compliant engine?

No. The rule applies only to equipment that is used underground and is therefore part of the underground equipment inventory.

150. How will MSHA determine when a non-approved, non-EPA compliant engine was "introduced" underground for determining compliance with §57.5067(a)?

MSHA conducted a physical inventory of engines at every underground MNM mine, which was completed in September 2002. Any engine entered onto this inventory will be considered compliant with § 57.5067(a)(2). Engines introduced after September 2002

need to be MSHA-Approved or meet or exceed the particulate matter emission requirements outlined in Table 57.5067-1.

151. If I transfer an engine from one underground mine to another underground mine operated by the same mine operator, does it need to be MSHA-Approved or meet the EPA DPM emission specifications contained in Table 57.5067-1?

Section 57.5067(b)(3) allows an engine to be transferred from one underground mine to another underground mine operated by the same mine operator without being considered “introduced” into the inventory of engines for that mine. However, if the engine was introduced into the first mine after the inventory of engines at that mine, it would have to be MSHA-Approved or meet the relevant EPA emissions requirements from Table 57-5067-1 regardless of whether it is operated in that mine or transferred to another mine operated by the same mine operator.

152. Can an engine that is not MSHA-Approved and does not meet the relevant EPA emissions requirements from Table 57.5067-1 be transferred from an underground mine in another country to an underground mine in this country if both mines are operated by the same mine operator?

No. The inventory of engines is completed.

153. Are there exemptions from the engine or maintenance requirements for non-production equipment like personnel transports, fuel and lube trucks, utility vehicles, and welding trucks?

No. Only ambulances and fire fighting equipment that are used in accordance with the mine’s fire fighting and evacuation plan are excluded from the engine requirements of §57.5067.

154. Can I introduce a non-compliant engine (an engine that is not MSHA-Approved and does not meet the relevant EPA emissions requirements from Table 57-5067-1) if the engine is provided with a DPM filter such that the filtered exhaust meets the relevant EPA emissions requirements from Table 57.5067-1?

No. The emission requirements apply to the engine itself, not to the engine plus devices installed on the equipment on which the engine is used.

155. What is an MSHA-Approved engine?

A diesel engine that is approved under Part 7 or Part 36, Title 30 Code of Federal Regulations (C.F.R.) is considered an approved engine.

156. Can an engine certified under MSHA’s old approval program, 30 C.F.R. Part 32 (schedule 24), be introduced into the mine?

Not on the basis of it being an MSHA-Approved engine. This standard defines MSHA-Approved as an engine that is approved under Part 7 or Part 36, Title 30 Code of Federal Regulations only. If the engine in question meets or exceeds the relevant EPA emission requirements listed in Table 57.5067-1, that engine could be introduced into the underground areas of a mine on that basis, but not on the basis of its being MSHA-

Approved.

157. Where can the list of MSHA-Approved engines be found?

MSHA lists all approved engines on their homepage at:
<http://www.msha.gov/S&HINFO/DESLREG/1909a.HTM>

158. How do I know if a given diesel engine is MSHA-Approved?

MSHA-Approved engines have an MSHA approval tag attached to the engine. The approval tag lists the engine's approval number and other pertinent information. The engine manufacturer issues the tag when the engine is sold. The engine manufacturer may be contacted to provide a tag for an engine as long as the engine is built to the MSHA approval specifications for that engine model.

159. How do I know if a given diesel engine meets the necessary EPA DPM emission specifications?

MSHA will accept an engine with an EPA label if the information on the label matches the requirements in Table 57.5067-1 of §57.5067. If the engine does not have an EPA label, the engine manufacturer should be contacted to determine if the engine meets the PM limits specified in the table.

160. Is "tailpipe" emission testing required at the mine site?

No. The mine operator is not required to conduct "tailpipe" emission testing, and MSHA will not conduct such testing to determine engine emission compliance. However, a mine operator may wish to conduct such testing as a maintenance diagnostic tool, or as a way to identify "problem" equipment.

§57.5070, MINER TRAINING

161. Who needs to receive DPM training?

All miners "who can reasonably be expected to be exposed to diesel emissions" in the underground areas of a mine are required to be trained.

162. Am I required to give DPM training to miners who work on the surface at an underground mine?

No, unless those miners can reasonably be expected to be exposed to diesel emissions in the underground areas of a mine.

163. Do surface miners that occasionally drive equipment into an underground mine need to receive DPM training?

No.

164. Do employees of independent contractors, customer truck drivers, and delivery truck drivers need to be trained on DPM?

Certain independent contractors are mine operators and must be trained on DPM. Delivery truck drivers and customer truck drivers are not covered by the training provisions of this standard, but they should be provided with information on DPM exposure hazards as a part of hazard-training under MSHA's comprehensive training standard.

165. When should initial and annual DPM training be provided?

Initial training should have been provided before July 5, 2001, the effective date of the training provision. For new miners, such training must be provided prior to his/her assignment to work that may expose the miner to DPM. Annual training must be provided within every 12 months thereafter.

166. What topics have to be covered in DPM training?

- the health risks associated with exposure to diesel particulate matter;
- the methods used in the mine to control diesel particulate matter exposures;
- identification of the personnel responsible for maintaining those controls; and,
- the actions miners must take to assure the controls operate as intended.

167. Is there a required format for DPM training?

No. The rule places no constraints on the operator as to how to accomplish this training. Instruction could take place at safety meetings before the shift begins. Providing miners with a copy of MSHA's "Toolbox" and holding one-on-one discussions that cover the required topics is another approach that can be used. The Toolbox is available on MSHA's website:

<http://www.msha.gov/S&HINFO/TOOLBOX/TBCOVER.HTM>

168. Can DPM training be combined with Part 48 training?

Yes, but it doesn't have to be.

169. If DPM training is combined with Part 48 training, do I need to submit a Part 48 training plan modification to the District Manager?

Yes.

170. Do I need to retain a record of DPM training?

Yes, for 1 year after completion of training.

171. If I provided initial DPM training for a new miner on September 1, 2004, what is the latest date that miner may receive annual DPM training?

September 30, 2005.

172. Must training be given by MSHA-Approved instructors?

No. The rule does not specify instructor qualifications. However, if DPM training is combined into Part 48 training, the Part 48 regulations regarding MSHA-Approved instructors would apply.

173. Where can I get assistance with DPM training?

These Questions/Answers can be used in miner training, as well as the 1997 MSHA publication, "Practical Ways to Reduce Exposure to Diesel Exhaust in Mining – A Toolbox." The Toolbox is available on MSHA's website:
<http://www.msha.gov/S&HINFO/TOOLBOX/TBCOVER.HTM>

Assistance is also available through MSHA's Educational Field Services.

§57.5071, EXPOSURE MONITORING

174. What is the purpose of exposure monitoring for DPM?

Mine operators are required to conduct exposure monitoring for DPM for several reasons. Exposure monitoring enables the mine operator to determine whether DPM exposure levels are in compliance with the final DPM limit on a continuing basis. The mine operator can use the information gathered through monitoring to determine whether corrective action is necessary to achieve or maintain compliance and to assess the ongoing effectiveness of DPM control measures. This requirement also assures special attention will be focused on conditions most likely to result in overexposure to DPM.

175. How often do I need to conduct monitoring for DPM exposures?

A specific DPM monitoring schedule is not included in the standard. Mine operators are required to monitor as often as necessary to verify continuing compliance. Once compliance has been verified, MSHA would not anticipate that extensive additional monitoring would be required. However, if conditions affecting DPM emissions or in-mine DPM concentrations change significantly, such as by the addition of new equipment or changes in the ventilation system, the mine operator would be expected to verify that these changes have not resulted in any DPM overexposures. Generally, once monitoring has verified that these changes have not caused the exposure limit to be exceeded, the mine operator could likely return to the practice of occasional spot checking.

176. Who can observe operator monitoring, and does MSHA restrict the number of persons observing monitoring?

The opportunity to observe monitoring extends to both miners and their representatives. MSHA does not intend to limit the number of miners who may observe monitoring.

177. Will I be paid for observing the operator's monitoring?

No. Section 103(f) does not authorize "walk around pay" for time spent by a representative of miners observing a mine operator's monitoring program.

178. Do I need to monitor DPM exposures using the same method MSHA will use for compliance determinations (respirable dust sampler equipped with a submicron impactor, analyzed for elemental carbon using the method described in NIOSH Analytical Method 5040)?

No. This requirement is performance oriented, and any method that would indicate whether compliance with the DPM limit is being maintained on an on-going basis would be acceptable.

179. What other methods are available for DPM monitoring? What are their advantages and disadvantages?

Generally, the advantages of using a method other than that specified for compliance determinations in the standard are simplicity and cost. Three alternatives to MSHA's compliance sampling and analytical method are summarized below:

Sampling can be conducted as specified for MSHA compliance, but without the cyclone or specialized submicron impactor. Analytical results may be influenced by mineral dust interference, and would probably indicate higher DPM levels than would have been the case using the cyclone and impactor.

Sampling can be conducted as specified for MSHA compliance, but sample analysis can be gravimetric (by weight) instead of employing the thermo-optical method of analysis specified in NIOSH Method 5040. Since the impactor removes all particulates greater than 0.9 µm in size, all non-DPM particulates are removed before reaching the filter. A disadvantage of the gravimetric approach is that it is less accurate at low DPM concentrations than thermo-optical analysis.

Another common DPM sampling and analytic method is the RCD method. RCD refers to respirable combustible dust. In this method, a respirable dust sample is collected, weighed, heated to 400° C in an oven to burn off all carbonaceous material (including DPM), and then weighed again. The difference in weight pre- and post-heating represents the DPM collected on the filter. Since this method relies on weighing for analysis, its accuracy is limited at low DPM concentrations.

180. How do I convert a time weighted average concentration to a shift weighted average concentration for comparison to MSHA compliance sampling results?

When DPM concentrations have been computed using the actual sampling times, the result is a time weighted average (TWA) concentration. This is the form that commercial industrial hygiene laboratories usually report analytical results. To convert a TWA concentration to a shift weighted average (SWA) concentration, the TWA is multiplied by the ratio of actual shift length (in minutes) to the 8-hour shift equivalent (480 minutes) using the following equation:

$$\text{SWA} = \text{TWA of DPM as measured} \times \frac{\text{actual shift length (in minutes)}}{480 \text{ minutes}}$$

181. Would area sampling be considered an acceptable sampling strategy for compliance with the exposure monitoring provisions ?

Yes, provided the area sampling provides reasonable assurance that no miner's personal exposure to DPM exceeds the limit.

182. Will MSHA issue a citation for a miner's overexposure based on the mine operator's sampling results?

No. MSHA's citations for a miner's overexposure to DPM will be based on an MSHA sampling result. MSHA may use an operator's sampling results as the basis for other enforcement action. For example, if an operator's sampling results indicate that a miner was overexposed but the operator failed to take corrective action by the next work shift, as required by §57.5071(c), MSHA would issue a citation for violating that standard.

183. Are there any commercial analytic laboratories that are equipped to analyze DPM samples for elemental carbon in accordance with the method described in NIOSH Method 5040?

Yes. At the time this Compliance Guide was written, MSHA was aware of at least 10 commercial industrial hygiene laboratories that were equipped to analyze DPM samples per the NIOSH Method 5040. SKC, the manufacturer of the DPM sampling cassette, maintains a list of laboratories accredited by the American Industrial Hygiene Association (AIHA) that provide analytical services per NIOSH Method 5040: <http://www.skcinc.com/labs/225-317-labs.asp>

184. What do I need to do if my exposure monitoring results indicate that any of my miner's exposure to DPM exceeds the DPM limit?

If a mine operator's sample results indicate that the DPM limit has been exceeded, the operator must promptly post a notice indicating the corrective action to be taken, the corrective action must be initiated by the next shift, and the corrective action must be promptly completed.

185. Do I have to post the results of each sampled miner even if there is no overexposure?

Yes. MSHA intends for mine operators to post monitoring results for all affected miners, including those results from MSHA sampling.

186. What is meant by the term "promptly" that is used twice in §57.5071(c)?

Promptly means without delay. In the context of posting notice, promptly means the mine operator must post notice as soon as it has been decided what corrective action will be taken. Since the corrective action must be initiated by the next work shift, the time frame for posting notice is quite short.

In the context of completing the corrective action, promptly means that fully implementing the corrective action cannot be delayed. The time frame for completing the corrective action depends on the nature of the action being taken. For example, retraining a miner on proper work practices to reduce DPM emissions may not take as

long as retrofitting a new, low emission engine on a piece of equipment. Whatever the action taken, it must not be unduly delayed.

§57.5075, DIESEL PARTICULATE RECORDS

187. What records do I need to keep, and for how long?

Record	Section reference	Retention time
1. Approved application for extension of time to comply with exposure limits.	57.5060(c)	Duration of extension
2. Identity of PLHCP and most recent written determination of miner's ability to wear a respirator.	57.5060(d)	Duration of miner's employment plus 6 months.
3. Purchase records noting sulfur content of diesel fuel	57.5065(a)	1 year beyond date of purchase
4. Maintenance log	57.5066(b)	1 year after date any equipment is tagged
5. Evidence of competence to perform maintenance	57.5066(c)	1 year after date maintenance performed
6. Annual training provided to potentially exposed miners	57.5070(b)	1 year beyond date training completed
7. Record of corrective action	57.5071(c)	Until the corrective action is completed
8. Sampling method used to effectively evaluate a miner's personal exposure, and sample results	57.5071(d)	5 years from sample date

188. Do the records have to be kept at the mine?

Records do not have to be kept at the mine site, but if they are maintained off-site, they need to be immediately accessible at the mine site by electronic transmission.

189. Once MSHA requests DPM records, how much time will I be given to provide them?

MSHA expects mine operators to be diligent in providing required records. Records are important in guiding inspection decisions. There must be no unnecessary delay in providing them. If the records are maintained at an offsite location, whether in hard copy or electronic format, they must be accessible from the mine site by electronic file transfer, e-mail, fax, or similar means.

190. How do I obtain compliance assistance from MSHA on this rule, including DPM control methods and sampling?

Mine operators, miners, miner's representatives, and independent contractors who work on mine property can check MSHA's Internet web site (www.msha.gov) for a variety of compliance assistance materials such as a list of approved engines, a list of particulate filters for installation on diesel engines (with filter efficiencies), Program Information Bulletins and Policy Letters, and information on DPM sample cassettes with integral submicron impactor. Other information that is available specifically for this standard

includes the “Estimator” (a computer spreadsheet program that permits the user to estimate the effectiveness of proposed, user specified DPM controls). MSHA has developed a trouble-shooting guide, a decision tree to aid in the selection of filters, examples of written compliance strategies, and other aids. MSHA’s Internet site also has links to other sites containing useful information, such as those of NIOSH and EPA.

Requests for compliance assistance on this or any MSHA standard may also be made directly to any MSHA Metal and Nonmetal Inspector, Field Office, District Office, National office, MSHA Educational Field Services, or MSHA’s Directorate of Technical Support.