

filter installation, and the possible need for either on-board or off-board active or active/passive filter regeneration.

MSHA would also consider certain traditional methods for control of exposure to airborne contaminants to be technologically feasible for controlling exposures to DPM, such as improved ventilation (main and/or auxiliary) and enclosed cabs with filtered breathing air. Improving ventilation may involve upgrading main fans, use of booster fans, and use of auxiliary fans that may or may not be connected to flexible or rigid ventilation duct, as well as installation of ventilation control structures such as air walls, stoppings, brattices, doors, and regulators. At most mines, cabs with filtered breathing air are technologically feasible for many newer model trucks, loaders, scalers, drills, and other similar equipment. However, use of enclosed cabs with filtered breathing air may not be feasible as a retrofit to certain older equipment or where the function performed by miners using a particular piece of equipment is inconsistent with any type of cab (e.g., loading blastholes from a powder truck, installing utilities from a scissors-lift truck) or where the height of the mine roof is not sufficient for cab clearance. Other examples of engineering controls that MSHA would consider to be technologically feasible include certain alternative fuels, fuel blends, fuel additives, and fuel pre-treatment devices, and replacement of older, high-emission engines with modern, low-emission engines.

In determining economic feasibility, MSHA would consider whether the costs of implementing the control are disproportionate to the expected DPM concentration or exposure reduction, and whether the costs are so great that it would be unreasonable to require its use to achieve those results. MSHA would, for example, expect ceramic DPM filters ranging in cost from \$5,000 for smaller engines to \$20,000 for larger engines to be economically feasible, particularly given the significant reduction these filters can achieve.

In the ANPRM, MSHA asked for comments on the appropriate role for respirators. Most commenters indicated that respirators with some restriction on their use should be permitted as a means of compliance with the DPM limits. Some commenters disagree on the types of restrictions that MSHA should place on their use, while other commenters believe that PPE may be far more effective in protecting miners from suspected DPM health effects than any available and feasible engineering control technology. According to still other commenters, respirators are

uncomfortable and difficult to properly use over an extended period of time. They restrict visibility and create breathing resistance, thereby causing an additional hazard to miners. Finally, MSHA was notified that if the final rule allows respirators at all, such respirators should only be used with approval of the Secretary, and only as a supplemental control for other feasible controls.

Generally, commenters agreed with proposing MSHA's current hierarchy of controls for reducing miners' exposures to DPM. Some commenters to the ANPRM stated that MSHA properly prohibited the use of PPE in the current rule and no change should be made to this provision. Others stated that MSHA should state and enforce its preference for engineering controls rather than personal protective equipment, and that standard industrial hygiene practice supports this position. In response to these commenters, MSHA agrees that engineering controls should be included in the first tier of the agency's methods of compliance. The proposed rule reflects this position but does not place preference for engineering controls over use of administrative controls for reducing miners' exposure to DPM. Mine operators would be required to use all feasible engineering and administrative controls as a first response to miners' overexposures. MSHA intends for mine operators to have the flexibility to choose to start with engineering or administrative controls, or a combination of both, as the control method that best suits their circumstances.

Engineering controls are very effective in altering the sources of miners' DPM exposures in the underground mining environment, thereby decreasing DPM exposures. Unlike respiratory protection, engineering controls do not depend upon individual performance or direct human involvement to function. Based on its observations and experience in underground metal and nonmetal mines, MSHA continues to believe that feasible engineering and administrative controls exist to adequately address most DPM overexposures to the interim limit. However, MSHA is not persuaded that all DPM overexposures can be eliminated through implementation of feasible engineering and administrative controls alone, and that extra protective measures should be taken to protect miners in such circumstances.

Some commenters suggested that various commercially available respirators, including those with filtering facepieces, were suitable for protection against particles smaller than

DPM, and would therefore be suitable for DPM as well. NIOSH recommended that respirators used for protection against DPM have an R-100 or P-100 certification per 42 CFR part 84. NIOSH recommended against using N-rated respirators since diesel exhaust contains oil, and aerosols containing oil can degrade the performance of N-rated filters. MSHA agrees.

Proposed § 57.5060(d)(1) would require that respirators be NIOSH certified as a high-efficiency particulate air (HEPA) filter, certified per 42 CFR part 84 (approval of Respiratory Protection Devices) as 99.97% efficient, or certified by NIOSH for diesel particulate matter. Proposed § 57.5060(d)(2) would require that non-powered, negative-pressure, air purifying, particulate-filter respirators shall use an R- or P-series filter or any filter certified by NIOSH for diesel particulate matter. The proposal further specifies that R-series filters shall not be used for longer than one work shift.

NIOSH also recommended that combination filters capable of removing both particulates and organic vapor be specified, since organic vapors and gases can be adsorbed onto DPM. The proposal does not require respirators to be certified for organic vapor because MSHA does not have data substantiating that a DPM overexposure would necessarily indicate an associated overexposure to organic vapors. If simultaneous sampling for DPM and organic vapors indicate overexposure to both contaminants, any subsequent citation(s) relating to the overexposures would require that respirators be used and equipped with a filter or combination of filters rated for both DPM and organic vapors.

MSHA also asked for information as to whether mine operators should be required to implement a written respiratory protection program when miners must wear respiratory protection. Commenters were divided on this issue. Some commenters stated that MSHA should require that the respiratory protection program be in writing. NIOSH recommended in its comments that "mine operators be required to have a written respiratory protection program, analogous to that required by OSHA for general industry in 29 CFR 1910.134 Respiratory protection, that is work-site specific and includes administration by a trained program administrator, respirator selection criteria, worker training, a program to determine that the workers are medically able to use respiratory protective equipment, and provisions for regular evaluation of the program's effectiveness."