

control devices, evaluating ventilation systems or filtration of cabs. Commenters stated that MSHA should be providing guidance in all areas that involve control technologies. MSHA agrees and will continue to assist mine operators, however, MSHA expects mine operators to make good faith efforts in attempting to achieve compliance, such as beginning to order control technology to reduce DPM exposures.

### VIII. Summary of Costs and Benefits

The provisions in this proposed rule will assist mine operators in complying with the existing rule, thereby reducing a significant health risk to underground miners. This risk includes lung cancer and death from cardiovascular, cardiopulmonary, or respiratory causes, as well as sensory irritation and respiratory symptoms. In Chapter III of the Regulatory Economic Analysis in support of the January 19, 2001 final rule (2001 REA), the Agency demonstrated that the rule will reduce a significant health risk to underground miners. This risk included the potential for illnesses and premature death, as well as the attendant costs to the miners' families, to the miners' employers, and to society at large. Benefits of the January 19, 2001 final rule include reductions in lung cancers. MSHA estimated that in the long run, as the mining population turns over, a minimum of 8.5 lung cancer deaths per year will be avoided. MSHA noted that this estimate was a lower bound figure that could significantly underestimate the magnitude of the health benefits. For example the estimate based on the mean value of all the studies examined in the January 19, 2001 rule was 49 lung cancer deaths avoided per year.

The proposed rule results in net cost savings of approximately \$15,641 annually, primarily due to reduced recordkeeping requirements. All MSHA cost estimates are presented in 2001 dollars. This represents an average savings of \$86 per mine for the 182 underground metal/non-metal mines that would be affected by this proposed rule. Of these 182 mines, 65 have fewer than 20 workers, 113 have 20 to 500 workers; and 4 have more than 500 workers. The cost savings per mine for mines in these three size classes would be \$102, \$77, and \$77, respectively. In the 2001 REA, the Agency estimated that the costs per underground dieselized metal or nonmetal mine to be about \$128,000 annually, and the total cost to the mining sector to be about \$25.1 million a year, even with the extended phase-in time. Nearly all of those anticipated costs would be

investments in equipment to meet the interim and final concentration limits.

### IX. Section-by-Section Discussion of the Proposed Rule

#### A. Section 57.5060(a)

Existing § 57.5060(a) establishes an interim DPM concentration limit of 400 micrograms of TC per cubic meter of air ( $400_{TC} \mu\text{g}/\text{m}^3$ ). In the settlement agreement, MSHA agreed to propose to change the surrogate from TC to EC, and to propose to establish an interim limit based on a miner's personal exposure rather than an environmental concentration. Accordingly, the proposed rule would establish an interim permissible exposure limit (PEL) of 308 micrograms of EC per cubic meter of air ( $308_{EC} \mu\text{g}/\text{m}^3$ ). This proposed EC-based limit represents the existing TC limit divided by a conversion factor of 1.3, as established in the settlement agreement. MSHA believes that the proposed limit is equivalent to the existing interim concentration limit of  $400_{TC} \mu\text{g}/\text{m}^3$ .

MSHA's position at this time is that a limit of  $308 \mu\text{g}/\text{m}^3$ , based on EC, is both technologically and economically feasible for the metal and nonmetal mining industry to achieve. Although the risk assessment indicates that a lower interim DPM limit would enhance miner protection, it would be infeasible for the underground metal and nonmetal mining industry to reach a lower interim limit.

MSHA is not reducing the protection for miners afforded by the existing interim TC concentration limit. MSHA intends to finalize an interim EC limit that provides at least the same degree of protection to miners as the existing interim limit. MSHA believes that establishing a standard that focuses control efforts on diminishing the DPM level in air breathed by the miner is at least as protective as the interim concentration limit.

The basis for this position is found in the 31-Mine Study, which concluded that the submicron impactor was effective in removing the mineral dust, and therefore its potential interference, from the DPM sample. Remaining carbonate interference is removed by subtracting the 4th organic peak from the analysis. No reasonable method of sampling was found that would eliminate interferences from oil mist or that would effectively measure DPM levels in the presence of environmental tobacco smoke (ETS) with TC as the surrogate.

Using EC as the surrogate would enable MSHA to directly sample miners, such as those who smoke or load ANFO,

for whom valid personal sampling would be difficult when TC is the surrogate.

Because EC comprises only a fraction of the TC, a conversion factor must be used to convert the interim concentration limit to an EC exposure limit. To convert the interim TC concentration limit in § 57.5060(a) to an equivalent EC exposure limit, MSHA is proposing to use a factor of 1.3, to be divided into  $400_{TC} \mu\text{g}/\text{m}^3$ . Thus, the measured value of EC times 1.3 produces a reasonable estimate of TC. This 1.3 factor was specified under the terms of the settlement agreement to convert an EC measurement into an estimate of TC without interferences and is based on the median total carbon to elemental carbon (TC/EC) ratio observed for valid samples in the 31-Mine Study. The 1.3 factor is also consistent with information supplied by NIOSH indicating that the ratio of TC to EC in the 31-Mine Study is 1.25 to 1.67. Most commenters to MSHA's ANPRM supported an interim EC PEL of  $400_{TC} \mu\text{g}/\text{m}^3 \div 1.3 = 308_{EC} \mu\text{g}/\text{m}^3$ .

Commenters representing the metal and nonmetal mining industry and labor strongly supported a change in the surrogate from TC to EC. These commenters stated that, given the interferences known to be present in underground mining environments, using EC as the surrogate would improve the validity of samples. They also pointed out that this change is consistent with the settlement agreement. Other commenters opposed changing the surrogate. Some of these commenters stated that since DPM has many components, and there is no formula for the exact amount of EC in diesel exhaust, TC is a more accurate measure of DPM than is EC, presumably because it includes more of the DPM.

Some commenters also stated that there is no evidence in the rulemaking record to support this change. According to these commenters, NIOSH must provide a clear statement that EC is an accurate surrogate over the full range of mining conditions and must also provide a formula for converting EC to DPM that meets the NIOSH accuracy criterion. In response, the existing DPM rulemaking record contains NIOSH's position on an appropriate surrogate, and NIOSH recommended that EC rather than TC should be used as the surrogate for DPM. MSHA agrees.

MSHA has found that EC more consistently represents DPM. In comparison to using TC as the DPM surrogate, using EC would impose fewer restrictions or caveats on sampling strategy (locations and durations), would produce a measurement much