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EXPIRATION DATE: 03/31/2010

PROGRAM POLICY LETTER NO. P08-IV-01



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SUBJECT: Enforcement of Diesel Particulate Matter Final Limit at Metal and
Nonmetal Underground Mines

Scope

This Program Policy Letter (PPL) is addressed to underground metal and nonmetal mine operators and independent contractors, underground metal and nonmetal miners and miners' representatives, Mine Safety and Health Administration (MSHA) personnel, and other interested parties.

Purpose

This PPL addresses MSHA policy concerning the enforcement of 30 CFR § 57.5060(b)(3), establishing the final DPM permissible exposure limit of 160 micrograms of total carbon (TC) per cubic meter of air ($160_{TC} \mu\text{g}/\text{m}^3$), effective May 20, 2008.

Policy

To validate a determination of a miner's exposure to the 160 TC PEL based on a personal TC sample, MSHA will analyze a non-citable area sample taken from an area of the mine without organic carbon (OC) interferences. To check for non-diesel OC interferences on the personal sample, MSHA will multiply the elemental carbon (EC) component of the personal TC sample by the ratio of TC to EC obtained from the area sample. MSHA will use this procedure when EC on the miner's personal sample is less than 160 micrograms per cubic meter of air times the error factor (EF) for EC, and TC on the miner's personal sample is greater than 160 micrograms per cubic meter of air times the EF for TC. MSHA will obtain both personal and area samples using the same type of sampling cassette used previously for its compliance sampling. This cassette

incorporates an integral submicron impactor and tandem quartz fiber filters. MSHA will use NIOSH Analytical Method 5040 to determine TC and EC on both personal and area samples. Beginning May 20, 2008, MSHA will sample and analyze a miner's exposure to DPM as follows:

- MSHA will determine a miner's exposure to DPM based on the TC content of a single personal sample taken over the miner's full shift as specified in existing 30 CFR § 57.5061 of the DPM standard.
- MSHA will collect area samples for the miner's full shift on the same shift during which the Agency takes the corresponding personal samples.
- MSHA will take the area sample in the main exhaust air course downstream from the miner's work location, where OC contributions from non-diesel sources are likely to be negligible. At a minimum, MSHA will locate the area sampler at least 25 feet downstream from smoking miners and at least 500 feet downstream from oil mist sources.
- If more than one miner is working upstream from the area sampler, MSHA will apply the TC to EC ratio from the area sample to each miner's personal sample.
- If the ventilation passing through the miner's work area or multiple work areas is coursed to more than one main exhaust, MSHA will locate an area sampler in each of these main exhausts.
- When it is necessary for MSHA to check a miner's personal sample for OC interferences based on multiple area samples, MSHA will average the TC to EC ratios of the area samples to determine the composite TC to EC ratio to apply to the personal sample.
- The miner is overexposed when:
 - EC on the personal sample exceeds $160 \times EF$; or
 - EC on the personal sample is less than $160 \times EF$, TC on the personal sample exceeds $160 \times EF$, and EC on the personal sample times the ratio of TC to EC from the area sample exceeds $160 \times EF$.

Background

MSHA measures a miner's personal exposure to DPM by analyzing the sample for a DPM surrogate, TC. TC is the sum of EC and OC. The DPM rulemaking record established that a miner's exposure could not be validated simply by adding the EC and OC of a TC sample due to the potential for non-diesel exhaust sources to deposit on the OC part of the sample and interfere with the MSHA sample analysis. These interferences include environmental tobacco smoke, drill oil mist, and ammonium nitrate/fuel oil (ANFO) vapors. When measuring EC, interferences are not a factor in assuring the accuracy of the sample analysis.

Currently, MSHA determines a miner's exposure to the PEL of $350_{TC} \mu\text{g}/\text{m}^3$ (350 TC) by conducting an EC analysis to validate that the miner's overexposure to TC is not the result of interferences. In each analysis, MSHA incorporates an error factor to account for variability in sampling and analysis resulting from such things as pump flow rate, filters, and the NIOSH Analytical Method 5040. If the TC measurement is above 350 TC times the error factor for TC, MSHA looks at the EC measurement from the sample obtained through the NIOSH Analytical Method 5040, and multiplies EC by a conversion factor of 1.3 to produce a statistically valid estimate of what the TC result is without interferences. MSHA issues a citation when the EC measurement times the multiplier is above 350 times the error factor for EC. The 1.3 multiplier that MSHA uses to estimate TC (i.e., $EC \times 1.3 = \text{estimated TC}$) is the median value of all TC to EC ratios obtained from valid TC samples (i.e., without OC interferences) collected by MSHA during the 31-Mine Study, and it is consistent with NIOSH's determination that TC is 60-80% EC.

In the 2006 final rule (71 FR 28924, May 18, 2006), MSHA retained the 2001 final limit of 160 TC but determined that it should be phased in over a two-year period and stated that:

Consequently, on May 20, 2006, the initial final limit will be 308 micrograms of EC per cubic meter of air ($308_{EC} \mu\text{g}/\text{m}^3$), which is the same as the existing interim limit; on January 20, 2007, the final limit will be reduced by 50 micrograms and will be a TC limit of $350_{TC} \mu\text{g}/\text{m}^3$; and on May 20, 2008, the final limit of $160_{TC} \mu\text{g}/\text{m}^3$ will become effective. Note that the $350_{TC} \mu\text{g}/\text{m}^3$ final limit and the $160_{TC} \mu\text{g}/\text{m}^3$ final limit are established as TC-based limits in this final rule. (*Id.* at 28934).

Also in the 2006 final rule, MSHA discussed its concerns regarding the relationship between TC, EC and OC at lower concentrations and its intent to conduct a separate rulemaking to determine the most appropriate way to convert the 160 TC PEL to a comparable EC PEL by stating:

Moreover, we intend to convert the final limits of $350_{TC} \mu\text{g}/\text{m}^3$ and $160_{TC} \mu\text{g}/\text{m}^3$ in a separate rulemaking by January 2007. As we said in the 2005 NPRM, if we do not complete this rulemaking by that time, we will use the EC equivalent as a check to validate that an overexposure to the $350_{TC} \mu\text{g}/\text{m}^3$ final limit is not the result of interferences. This enforcement policy, which is based on the Second Partial Settlement Agreement and data in the rulemaking record, would be the same that we used to implement the $400_{TC} \mu\text{g}/\text{m}^3$ interim limit before we converted it to $308_{EC} \mu\text{g}/\text{m}^3$ in the June 2005 final rule. Whereas we have evidence that we can obtain an accurate sample analysis of the final limit of $350_{TC} \mu\text{g}/\text{m}^3$, there is no evidence in the rulemaking record suggesting that the 1.3 conversion factor is appropriate for substantially lower limits, such as the final limit of $160_{TC} \mu\text{g}/\text{m}^3$. (*Id.* at 28976).

Although in the 2006 final rule MSHA acknowledged the limitations of sampling a miner's exposure to TC and preferred EC rather than TC as a DPM surrogate, the Agency did not conclude that TC could not be used as an appropriate surrogate for measuring a miner's exposure to DPM. In addition, the court in Kennecott Greens Creek Mining Company v. Mine Safety and Health Administration, 476 F.3d 946, 956 (D.C. Cir. 2007), upheld MSHA's selection of TC and EC as appropriate surrogates for DPM enforcement.

Subsequent to the DPM court decision, MSHA decided to wait for further scientific evidence regarding whether MSHA could reasonably convert the 160 TC PEL using a fixed conversion factor such as the 1.3 conversion factor currently used. The latest available scientific evidence is the study titled "Relationship between Elemental Carbon, Total Carbon, and Diesel Particulate Matter in Several Underground Metal/Non-metal Mines" which was published on February 1, 2007 (J. D. Noll; A. D. Bugarski; L. D. Patts; S. E. Mischler; L. McWilliams, Environ. Sci. & Technol., Vol. 41, No. 3: February 1, 2007, 710-716). The authors concluded that the variability of the TC-to-EC ratio increases below 230 TC and is high at 160 TC. Therefore, MSHA could not identify a single, constant conversion factor for EC at any level below 230 TC.

In March 2007, MSHA hired an outside expert with experience in DPM sampling methodology and analysis to advise the Agency in developing an enforcement strategy for accurately determining a miner's exposure to TC. The expert also reviewed the latest available data to attempt to devise a scientific method for converting the 160 TC PEL to a comparable EC PEL. The expert was unable to recommend such a method. As an alternative to developing a conversion factor, the expert recommended sampling strategy options for the Agency's consideration in enforcing the DPM final limit in a September 2007 report. MSHA was reviewing the expert's recommendations when it published its December 10, 2007 Semi-Annual Regulatory Agenda in which the Agency

continued to state its intent to propose a rule to convert the 160 TC limit. MSHA is not issuing a proposed rule to uniformly convert the 160 TC limit to a comparable EC limit. Instead, MSHA provides a protocol for calculating a location-specific adjustment for situations in which the EC on the miner's personal sample is less than 160 micrograms per cubic meter of air times the error factor (EF) for EC, and TC on the miner's personal sample is greater than 160 micrograms per cubic meter of air times the EF for TC. The decision not to issue a uniform conversion factor is based on MSHA's assessment that there is still insufficient evidence suggesting an appropriate conversion factor, and the latest available scientific evidence regarding the relationship between TC and EC at levels as low as 160 TC. MSHA will continue to monitor and encourage research in this field.

MSHA's compliance sampling procedure for the 160_{TC} µg/m³ final PEL is similar to MSHA's past practice of personal exposure sampling for TC, in which MSHA used a check for potential OC interferences by estimating TC based on EC multiplied by a single, fixed conversion factor for all mines. Rather than use a single, fixed conversion factor for all mines, however, MSHA will determine the TC to EC conversion factor for the personal sample in question based on one or more non-citable area samples taken in main exhaust air courses of the mine in question where OC interferences are expected to be negligible. Based on sampling data from the 31-Mine Study, MSHA believes that area samples obtained in the mine's main exhaust air courses at specified distances downstream from known sources of OC interferences, including sampling at least 25 feet downstream from smokers and at least 500 feet downstream from a source of drill oil mist, will provide a reasonable basis for estimating a miner's personal TC exposure without OC interferences.

MSHA's compliance sampling experience since July 2003 indicates that the majority of miners' personal samples will not need validation by an area sample analysis. For example, when EC on the personal sample is greater than 160 micrograms per cubic meter of air times the error factor for EC, the miner's exposure must have exceeded the PEL, regardless of OC interferences, so validation by an area sample would not be necessary. Similarly, when TC on the personal sample is below 160 micrograms per cubic meter of air times the error factor for TC, the miner's exposure could not have exceeded the PEL, so validation by an area sample would also not be necessary.

MSHA will continue to enforce the DPM standard on May 20, 2008, and will provide improved health protection for miners at underground MNM mines. In light of MSHA's enforcement policy, set forth above, MSHA's decision not to proceed with further rulemaking to convert the DPM final limit will not reduce health protection for underground MNM miners.

Authority

The Federal Mine Safety and Health Act of 1977, as amended,
30 U.S.C. § 801 et seq., and 30 CFR § 57.5060(b)(3).

Internet Availability

This program policy letter may be viewed on the Internet by accessing MSHA's homepage at www.msha.gov and choosing "Compliance Info" and then click on Program Policy Letters."

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