

explains how each critical value listed in Table 70–1 was derived.

Designated Area (DA)

The existing definitions would be modified to certify that the Secretary may identify DAs which is consistent with existing procedures that have been in effect since 1980. Once identified, the location of these DAs and the respirable dust control measures to be used at the dust generating sources for these locations must be contained in the operator's approved mine ventilation plan as provided for under § 75.371(t) of this title. However, the operator would not be required to sample these areas under the proposed rule. MSHA is also proposing to transfer the requirement for identifying each DA as specified in existing § 70.208(e) to revised § 70.2.

Dust Control Parameters

"Dust control parameters" would mean the respirable dust control provisions specified in an approved mine ventilation plan, including specific engineering or environmental controls, maintenance procedures, and other measures designed to control respirable dust levels in the working environment. These may also include, if approved by MSHA, supplementary controls such as powered air-purifying respirators and administrative controls. These measures are required for the protection of miners from excessive levels of respirable dust and must be in use on every production shift.

Engineering or Environmental Controls

"Engineering or environmental controls" would mean methods that are designed to control the quantity of respirable dust that is released into the work environment by affecting the rate of generation or by suppressing it at the source of generation, or by diluting, capturing or diverting the generated dust. Examples include improved cutting tools, deep-cutting, water-spray delivery systems and orientation, air quantities and velocities, dust collectors, and passive barriers. Throughout the proposed rule, the terms "engineering" and "environmental" controls are used interchangeably.

Equivalent Concentration

"Equivalent concentration" would mean the concentration of respirable

dust, as measured by an approved sampling device, converted to an 8-hour equivalent concentration as measured by a Mining Research Establishment (MRE) sampler. This conversion is normally accomplished in two steps, unless powered air-purifying respirators (PAPRs) are used, and then an additional adjustment is made to account for the expected workplace level of respiratory protection being provided the wearer. In the first steps, the concentration measurement is multiplied by a constant factor prescribed by the Secretary specifically for the approved sampling device. In the second step, that result is then multiplied by $t/480$, where t is the sampling time in minutes if longer than eight hours, to make it equivalent in dosage to the concentration as measured by an MRE sampler on an 8-hour work shift. Since verification sampling will be conducted over the course of a full production shift of the MMU only, and not over the miner's entire work shift which includes travel to and from the MMU, except when employing personal continuous dust monitors (PCDM), t will also be equal to the length of a full production shift. If the full production shift is eight hours or less, then t must equal 480 minutes.

In cases where PAPRs are used, the equivalent concentration measurement obtained following step two is adjusted further to account for the expected workplace level of respiratory protection being provided the wearer. This is accomplished by dividing the equivalent concentration by the protection factor specified in the approved ventilation plan for the mechanized mining unit under a PAPR protection program. The result represents a surrogate measure of the respirable dust concentration to which the miner is exposed while wearing the PAPR.

The current U.S. coal mine applicable dust standard is based on epidemiologic studies of British coal miners. In these studies, miners routinely worked 8-hour shifts and their respirable dust exposures were assessed based on 8-hour measurements using an instrument known as the MRE instrument. Work shifts in U.S. coal mines now frequently exceed eight hours. Therefore, to provide the intended level of protection to miners working longer than eight

hours, it is necessary to convert dust concentration measurements to equivalent, 8-hour values as measured by the MRE instrument.

The first step in the conversion from "concentration" to "equivalent concentration" is intended to make the measurement equivalent to the concentration measured by an MRE instrument. This instrument was designed to selectively collect airborne dust in a way that would approximate the deposition of inhaled particles in the lung. Because the MRE instrument was large and cumbersome, other more portable samplers were developed for use in U.S. coal mines. Currently approved sampling devices use a 10-mm nylon cyclone to separate the respirable fraction of airborne dust, instead of the four horizontal plates used in the MRE instrument. Such differences in instrument design lead to systematic differences in the amount of dust collected. Since 1980, measurements made using the currently approved cyclone-based devices operating at a flow rate of 2.0 liters per minute (lpm) were multiplied by the constant factor of 1.38 prescribed by the Secretary for the approved sampling device used. Application of this factor compensates for the difference in dust collection characteristics and makes the measurements equivalent to what would be obtained using an MRE instrument.

Similarly, the second step in the conversion from "concentration" to "equivalent concentration" is intended to compensate for differences between current conditions and conditions under which the existing applicable dust standards were developed. Specifically, it is designed to ensure that miners working shifts longer than eight hours will be afforded the same level of protection as miners working an 8-hour shift. MSHA developed the existing standards from 8-hour shift exposure measurements. Therefore, MSHA will adjust the measured concentration to be equivalent, in its effect on cumulative exposure, to a concentration over an 8-hour exposure period. This is accomplished by multiplying the concentration measurement by $t/480$, where t is the sampling time (*i.e.*, length of the sampled shift) in minutes.

The formula for an equivalent concentration is:

$$\text{equivalent concentration (mg/m}^3\text{)} = 1.38 \times \left(\frac{\text{accumulated dust (mg)}}{t \times \text{airflow rate}} \right) \times \frac{t}{480 \text{ min}}$$