

Non-Conforming Rock Dust

Summary: In September 2011 as part of an ongoing investigation, the National Institute for Occupational Safety and Health (NIOSH) determined that rock dust not conforming to the requirements in 30 CFR § 75.2 for particle size and caking properties is being used in U.S. underground coal mines. The use of non-conforming rock dust reduces the protection from potential dust explosions. Mines should ensure through accepted test methods that rock dust they receive from their suppliers meets the regulatory requirements. Rock dust suppliers should assure their customers that their product meets the regulatory requirements for use in underground coal mines.

DESCRIPTION OF HAZARD

Underground coal mining produces finely divided coal dust which deposits throughout an underground coal mine and creates an explosion hazard. Mines use a suite of control strategies to prevent methane and dust explosions. The primary control strategy for preventing dust explosions is to create an inert mixture of dusts throughout the mine by applying incombustible rock dust to the coal dust.

In 2011, the Mine Safety and Health Administration (MSHA) issued new regulations [76 Fed. Reg.^{*} 119 (2011)] requiring the percent incombustible content of dusts in all areas of the underground coal mine to be at least 80% by applying rock dust. This requirement is based on NIOSH full-scale explosion test research [NIOSH 2010]. However, to be effective at the 80% incombustible level, rock dust must conform to the specifications in 30 CFR[†] § 75.2 (emphasis added):

Rock dust: *Pulverized limestone, dolomite, gypsum, anhydrite, shale, adobe, or other inert material, preferably light colored, 100 percent of which will pass through a sieve having 20 meshes per linear inch and 70 percent or more of which will pass through a sieve having 200 meshes per linear inch; the particles of which when wetted and dried will not cohere to form a cake which will not be dispersed into separate particles by a light blast of air; and which does not contain more than 5 percent combustible matter or more than a total of 4 percent free and combined silica (SiO₂), or, where the Secretary finds that such silica concentrations are not available, which does not contain more than 5 percent of free and combined silica.*

^{*}Federal Register. See Fed. Reg. in references.

[†]Code of Federal Regulations. See CFR in references.

RESULTS

In September 2011, the NIOSH Office of Mine Safety and Health Research investigation of rock dust revealed two significant concerns with the supply of rock dust to U.S. mines:

1. **Insufficient particles <200 mesh(75 µm):** In a population of 393 rock dust samples, which were collected by MSHA personnel from 278 underground coal mines, 47% were found to contain less than the minimum specification of 70% passing through a 200-mesh (75-µm) sieve. Noncompliant rock dust was found at 51% of the mines sampled.
2. **Tendency to form a cake:** Examinations of the tendency of the rock dust samples to cake when wetted and subsequently dried revealed that all ten of the examined samples formed cakes and were not easily dispersed with the subjective requirement of a *light blast of air*. The rock dust samples NIOSH analyzed contained very fine (<10-µm) particles. Fine particles enhance the caking potential of rock dust when wetted.

The low temperature ash test procedure used by MSHA to determine the incombustible content of coal dust samples does not detect oversized particles nor measure the tendency of the particles to form a cake. Although the mine operator may be applying sufficient rock dust to achieve an 80% or greater incombustible content as confirmed by the MSHA test procedure, if the rock dust does not conform to all of the requirements described in 30 CFR § 75.2 the mixture may not reduce the coal dust explosion risk.

RECOMMENDATIONS

1. NIOSH recommends that mine operators test their supply of rock dust upon receipt to assure that it meets the requirements of 30 CFR § 75.2. Rock dust that does not meet the requirements should be returned to the supplier and must not be used in the mine.
2. NIOSH recommends that rock dust manufacturers test their rock dust product and provide documented assurance to their customers that rock dust intended for use in underground coal mines meets the requirements of 30 CFR § 75.2.

A recognized method for testing particle size should be used. The qualitative test for caking is described in 30 CFR § 75.2.

NIOSH will continue to examine the issues associated with the use of rock dust for explosion prevention. Periodic updates will be posted at [www.cdc.gov/NIOSH/mining].

REFERENCES

76 Fed. Reg. 119 [2011]. Maintenance of incombustible content of rock dust in underground coal mines, pp. 35968–35978.

NIOSH [2010]. Report of Investigations 9679: Recommendations for a new rock dusting standard to prevent coal dust explosions in intake airways. DHHS (NIOSH) Publication No. 2010–151, [<http://www.cdc.gov/niosh/mining/pubs/pubreference/outputid2825.htm>]

CFR. Code of Federal Regulations. Washington, DC: U.S. Government Printing Office, Office of the Federal Register.

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