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SUBJECT: Reissue of P08-15 - Fire Suppression Systems Used to Protect
Battery Charging Stations and Other Unattended Electrically
Powered Equipment in Underground Coal Mines

Who needs this information?

This Program Information Bulletin (PIB) applies to underground coal mine operators, fire suppression manufacturers, miners' representatives, independent contractors, and Coal Mine Safety and Health (CMS&H) enforcement personnel.

What is the purpose of this PIB?

This PIB informs the mining industry and CMS&H enforcement personnel of some of the regulations governing the use of fire suppression systems used for protection of unattended battery charging stations and other unattended electrically powered equipment used underground.

What is the background for this PIB?

As a result of the fatalities at Aracoma Alma Mine #1, the Mine Safety and Health Administration (MSHA) is reviewing the fire protection regulations and is evaluating the fire suppression systems used in underground coal mines to determine their compliance with existing regulations. As a result of such evaluation, MSHA has become aware of inconsistency among the various coal districts in the enforcement of existing regulations governing the use of fire suppression devices used to protect unattended electrically powered equipment in underground coal mines. In conducting this review, the agency has also become aware that some systems, such as the ECKO 341/ADX1141, are not in compliance with the regulations, as explained below.

The ECKO 341 and ADX 1141 are dry chemical systems equipped with individual pressurized dry chemical containers or canisters filled with a dry chemical agent. Each canister is equipped with a dual purpose pressure switch and a heat sensitive fusible link spray nozzle located at the base of each unit. Each canister usually contains 16 pounds of monoammonium phosphate based dry chemical. Upon detection of a predetermined rise in heat, the fusible link would melt (open) and allow the chemical in the container to be discharged into the intended protected area. Simultaneously, the pressure switch should detect the decrease in container pressure and cause the power to the equipment to be de-energized. The switch is also designed to activate an audible and visual alarm. The system actuates automatically and does not have manual actuation capability.

Other fire suppression systems used to protect unattended electrically powered equipment in underground coal mines may also not be in compliance with existing regulations. These systems must also be checked to determine if they meet the regulatory requirements such as those discussed in this PIB.

Information

The 30 C.F.R. § 75.340 requires that unattended underground transformer stations, battery charging stations, substations, rectifiers, and water pumps not housed in noncombustible structures or areas be equipped with a fire suppression system that meets the requirements of §§ 75.1107-3 through 75.1107-16. In addition, § 75.1107-1(a)(2) requires that within 24 production shift hours after being installed, unattended electrically powered equipment used underground is to be equipped with a fire suppression device that meets the applicable requirements of §§ 75.1107-3 through 75.1107-16 (certain exceptions apply) .

“Noncombustible structure or area” is defined in § 75.301, which describes the applicable fire test. Most battery charging stations are not housed in such structures or areas, although MSHA does classify them as “noncombustible” if they are enclosed in substantial metal housings, are used to charge batteries that are also enclosed in substantial metal housings, and remain on the machine during charging. MSHA Program Policy Manual (PPM), Vol. V § 75.340. Therefore, most of these stations must be protected by a fire suppression system that meets the requirements of §§ 75.1107-3 through 75.1107-16.

For the purposes of the provisions of §§ 75.1107 through 75.1107-16, § 75.1107-1(c) defines “attended” underground equipment as follows:

- Any machine or device regularly operated by a miner assigned to operate such machine or device; or
- Any machine or device which is mounted in the direct line of sight of a jobsite which is located within 500 feet of such machine or device and which jobsite is

regularly occupied by a miner assigned to perform job duties at such jobsite during each production shift. "Unattended" equipment is therefore, equipment which does not meet one of these two situations. In addition, § 75.1107-1(d) requires that machines and devices described under § 75.1107-1(c) ("attended") be inspected for fire and the input power de-energized when workmen leave the area for more than 30 minutes.

Below are a few of the requirements for fire suppression systems protecting such unattended underground electric equipment:

Section 75.1107-3(a) requires components of fire suppression devices required to be installed in accordance with the provisions of § 75.1107-1 to be approved by the Secretary or, where appropriate, be listed as approved by a nationally recognized agency approved by the Secretary (Underwriters' Laboratories, Inc., or Factory Mutual Research Corporation); see PPM Vol. V § 75.1107-3. It should be noted that MSHA has not approved any fire suppression devices (see Technical Compliance Evaluation of ECKO 341 Dry Chemical Fire Suppression Devices report issued May, 2008).

Section 75.1107-4(a) requires that fire suppression devices installed on unattended underground equipment must comply with the following:

- One or more point-type sensors or equivalent shall be installed for each 50 square feet of top surface area, or fraction thereof, of the protected equipment;
- Each sensor shall be designed to activate the fire suppression system and disconnect the electrical power source to the equipment protected; and
- At least one manual actuator shall operate the system, except where sprinklers are used. Where sprinklers are used, provision is to be made for the manual application of water to the protected equipment in lieu of manual actuator.

Section 75.1107-4(b) requires that sensors, where practicable, be installed in accordance with the recommendations of National Fire Code No. 72A (NFPA No. 72A-1967). The MSHA PPM under § 75.1107-4 specifies that "[s]ensors, as addressed in paragraph (b) shall, where practicable, be installed above the area of the equipment that is likely to produce the most heat in the event of a fire." For example; if the UL listing requires that the outlet of the nozzle (and sensor) must be within a distance between 4.5 and 7.5 feet above the hazard, the fire suppression system must be installed accordingly.

Section 1107-4(c) requires that on unattended equipment the fire suppression device is to operate independently of the power to the main motor (or equivalent) so it will remain operative if the circuit breaker (or other protective device) actuates. The PPM under § 75.1107-4(c) requires that "where the fire-suppression system is dependent on the mine power supply, the power supply to the fire suppression system must originate on the line side of the overload protection of the equipment being protected." PPM Vol. V § 75.1107-4. This can be accomplished by a backup battery power source.

Section 1107-4(e) requires the sensor system to have a means to determine its operative condition. This includes indicators for (a) normal operating status, (b) “fire detected” condition, and (c) conditions that can render a fire suppression sensor system inoperative. Inoperative conditions are also referred to as malfunction conditions. Examples of inoperative conditions include loss of main or backup power to the system control unit, discontinuity (wiring break) in any sensor circuit or actuation circuit, and short circuit in any sensor circuit or actuation circuit. For example, on battery charging stations, when the sensor actuates as a result of a fire or a short circuit, the control circuit activates an audible and visual alarm. This indicates a fire or a malfunction of the sensor circuit.

Section 1107-6(a)(1) requires fire suppression devices to be adequate in size and capacity to extinguish potential fires in or on the equipment protected. Fire hazards in underground coal mines are typically Class A combustibles. Therefore, fire suppression devices must be adequate in size and capacity to extinguish Class A fires and those systems approved for Class B fires only do not meet this provision.

Section 1107-9(a) requires dry chemical fire extinguishing systems used on underground equipment to be of the multipurpose powder-type. According to the NFPA Handbook (19th edition), “[m]ultipurpose dry chemical refers to powders that are listed for use on Class A, B, or C fires.” However, utilizing an ABC powder does not mean the fire suppression system utilizing such powder is rated for Class A, B and C fires.

Section 75.1107-13 provides that, notwithstanding the provisions of §§ 75.1107-1 through 75.1107-12, the District Manager may approve any other fire suppression system which provides substantially equivalent protection as would be achieved through compliance with those sections provided that no such system shall be approved which does not meet the criteria stated in §§ 75.1107-13(a) through (m). For example, § 75.1107-13(f) requires that an automatic and a manual actuator be provided for fire suppression devices on unattended equipment. Therefore, any fire suppression system protecting unattended equipment that is not equipped with a manual actuator does not meet the applicable requirements and also could not be approved by a District Manager under § 75.1107-13. Because the ECKO 341/ADX1141 fire suppression system does not have a manual actuator, it does not meet the applicable requirements and also could not be approved by a District Manager.

Section 75.1107-16(b) requires fire suppression systems to be maintained and tested in accordance with the requirements specified in the appropriate National Fire Code listed therein. Item 1412 of NFPA 17 (NFPA No. 17-1969) requires that automatic dry chemical extinguishing systems “have a readily accessible means for manual actuation.”

What is MSHA's authority for this PIB?

The Federal Mine Safety and Health Act of 1977, as amended, 30 U.S.C. § 801 et seq., and 30 C.F.R. §§ 75.340, 75.1100, and 75.1107.

Where is this PIB on the Internet?

This information may be viewed on the World Wide Web by accessing MSHA's home page (www.msha.gov), then choosing "Compliance Info" and "Program Information Bulletins."

Who are the MSHA contact persons for this PIB?

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Who will receive this PIB?

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