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PROGRAM INFORMATION BULLETIN NO. P09-36

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SUBJECT: Re-Issue of P05-05 - Use of Magnets near Remote Control Operated
Equipment

Who needs this information?

Mine Safety and Health Administration (MSHA) enforcement personnel, underground mine operators, electrical equipment manufacturers, repair shops and independent contractors working at underground mines need this information.

Why is MSHA issuing this bulletin?

An incident was reported in which a magnet caused a mining machine's remote control unit to induce an unintended movement of the machine. The magnet was rated with strength of 190 pounds pull and was typically used to attach a methane detector bracket to a continuous mining machine. This device, commonly referred to as the "Gizmo," permitted miners to take methane readings at the face areas of working places where extended cut mining was approved.

Unintended movement of remote-controlled equipment can pose a significant hazard to personnel. In order to evaluate the extent of this hazard, a survey was conducted to determine the type of magnets used in underground coal mines that use remote-controlled equipment. The survey was limited to equipment where unintended movement would pose a hazard. The results of the survey indicate that there are

various types of magnets used in close proximity to remote-controlled equipment in underground coal mines. These magnets vary in size, strength, and pole configuration.

What needs to be done?

Permanent magnets, except for small magnets (e.g. pocket screwdriver-type), should not be used on any equipment in the same mining section as remote control equipment using Hall-effect switches unless the remote control system complies with one of the following two conditions:

1. The remote control system requires a two-switch operation to produce machine movement. One of the switches, in this two-switch operation, must be a mechanical switch. Inactivity of both switches for a period of 5 seconds should require a new sequential operation. An example of this would be a mechanical tram enable switch with a Hall-effect tram switch.
2. The remote control enclosure is designed so that a magnet placed anywhere on the outside surface of the enclosure will not affect the operation of the Hall-effect switch.

In addition, the following remote control transmitters, commonly used to control continuous mining machines, were tested and evaluated with a determination of the acceptability of using each of these tested models in proximity to a permanent magnet:

1. The Structured Mining Model TXCM100 has Hall-effect switches for the tram function on the remote unit but this system uses a mechanical switch to activate the tram function. This remote control system complies with Condition 1. Magnets can be used in the same section where this remote control system is operating.
2. The Structured Mining Model TX942 remote control system does not use any Hall-effect switches. Magnets can be used in the same section as this remote control system.
3. The Cattron Model C01MCMJ-1 remote control system does not use any Hall-effect switches. Magnets can be used in the same section as this remote control system.
4. The Matric Type TX1 and the Matric P/N 603120-0035 (Plastic Station) remote control systems do not use any Hall-effect switches. Magnets can be used in the same section as these remote control systems.
5. The Forced Potato Type U-XXX/L0KA01 has Hall-effect switches which operate the tram function and the cutting head function. This system uses a tram enable

switch with an inactivity timer for the tram function. The inactivity timer can be programmed for 5 seconds. This complies with Condition 1. However, a second switch is not required to operate the cutting head function. Magnets should not be used in the same section as this remote control system.

6. The Matric TX3 remote control uses Hall-effect switches and does not comply with either Condition 1 or 2. Magnets should not be used in the same section as this remote control system.

For explanation of how magnets affect other remote control transmitters not specified above, please consult the remote control transmitter manufacturer.

What is the background of this bulletin?

Laboratory tests were conducted to determine the effect of magnets on the remote control systems from four manufacturers: Structured Mining models TXCM100 and TX942; Matric Ltd. Type TX3, Plastic Station, and Type TX1; Forced Potato Type U-XXX/L0KA01; and Cattron Model C01MCMJ-1. The results of the tests follow:

1. The permanent magnets tested can cause unintended operation of a Hall-effect switch of the type used on some remote control units. Magnets have no effect on mechanical switches.
2. The permanent magnets tested do not interfere with the operation of the rest of the circuit.
3. When spaced 1 inch or more from the surface of the enclosure of any of the tested remote control units, the magnets had little or no effect on any Hall-effect switch.

What is the authority for this bulletin?

Federal Mine Safety and Health Act of 1977; 30 CFR §§ 75.520, 77.507, 57.12030.

Who are the MSHA contact persons for this program information bulletin?

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