



U.S. Department of Labor Mine Safety and Health Administration

SAFETY ALERT

RFI and EMI with Electric Equipment Used in Underground Mines

MSHA has investigated and confirmed that Radio Frequency Interference (RFI) and Electromagnetic Interference (EMI) generated by portable radios have adversely affected the performance of remote control transmitters, atmospheric monitoring systems, machine-mounted methane monitors, and miners' cap lamps. RFI and EMI are electromagnetic disturbances from an external source that affect the performance of an electrical circuit.

MSHA has determined that high and low-power VHF (very high frequency) and UHF (ultra-high frequency) handheld portable radios can affect electric equipment used in underground mining. Sources that emit RF or EM energy in underground mines include but are not limited to portable radios, electrical power systems, variable frequency drives, remote control transmitters, tracking tags and readers, and communication systems.

BEST PRACTICES

- Mine operators should be aware of the potential effects of RFI and EMI and review their existing electrical/electronic systems and equipment that may be susceptible.
- Mine operators should consider the cumulative effect of RFI and EMI when acquiring new equipment, especially systems or equipment operating in the same frequency bands.
- Mine operators should discuss the vulnerabilities with the manufacturers or providers and incorporate mitigation techniques to minimize potential for EMI and RFI.
- Some possible mitigation techniques include:
 - Maintaining manufacturer recommended separation distances between electrical equipment and radiating sources.
 - Using lower power levels on portable radios.
 - When purchasing new electronic equipment, research the frequencies that may be emitted or to which equipment is vulnerable.
 - Purchase equipment that does not operate in any frequency range that is already present in the mine.
- Equipment manufacturers should design equipment for immunity to RFI and EMI. The International Electrotechnical Commission (IEC) standards for electrical and electronic equipment immunity to electromagnetic energy are provided in IEC 61000-4-3 and IEC 61000-4-6.

Coal mine operators should contact their local MSHA district office when they identify RFI or EMI that adversely affect the proper operation of systems or equipment.