

Information bulletin

MINE SAFETY AND HEALTH ADMINISTRATION

Information:

After a battery has been in operation for some time, dust mixed with spilled electrolyte may collect on top of the battery cells. If this occurs, a number of low-resistance electrical paths may form between the various cell terminals and the battery tray. Because the terminals are at different potentials, stray currents may be formed that will tend to circulate across the battery top and through the tray where insulation is defective or missing. These stray currents (commonly referred to as *surface leakage*) can cause the battery to overheat and may result in a fire. This hazard, in the presence of the hydrogen and oxygen that are produced in a lead-acid battery while it is being charged, could result in an explosion.

The surface leakage problem can be eliminated if batteries are properly maintained. MSHA is making the following recommendations in an effort to minimize the potential for surface leakage that could lead to a fire or explosion hazard.

1. Routine cleaning of the battery should be done on an average of one month to remove any contaminants. More frequent cleaning may be needed if batteries are being operated in a dusty environment or if electrolyte is spilled on top of the batteries. The batteries should be cleaned using a neutralizer/detergent solution made in accordance with the manufacturer's recommendations. The solution should be applied with a non-metallic brush, so that it can be worked under the terminals and intercell connectors to remove dirt and neutralize any excess acid. A low pressure water hose should be used to rinse the battery with water until all traces of the solution and loose dirt are removed.
2. Generally, a certain amount of water loss is normal in all batteries and it must be replaced with distilled or demineralized water. The water level in each cell should be maintained about 1/4 inch below the bottom of the vent well. When charging, the water levels should be above the plates, but care should be exercised not to overfill prior to spill over of the electrolyte, leading to tracking shorts and tray corrosion.
3. Title 3, Code of Federal Regulations (30 CFR), Section 7.44 (h), requires the battery box and cover to be either constructed from or lined with an insulating material. The insulating material eliminates dangerous surface leakage currents between the cell terminals and the battery tray. The mine environment, however, can be detrimental to the integrity of the insulation. Chipping and abrasion of the insulation can occur in this environment, thus increasing the likelihood of surface leakage currents. Routine inspection of the battery boxes should be performed and any noted damage should be repaired.

Background:

A recent investigation of a battery fire on a scoop that was being charged has identified a problem of poor battery maintenance leading to dangerous surface leakage currents. These currents caused heating, resulting in a fire and subsequent ignition of hydrogen within the battery cells. Although no one was hurt and no damage occurred to the scoop or mine, this accident had the potential to cause major injury or damage.