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Filter Fires!
Permissible Equipment

The installation of combustible (generally paper) filters on permissible equipment can increase the likelihood of fires. Other *Best Practices* have discussed the hazard of hot surfaces from the addition of filter piping and housings and the potential for uncontrolled regeneration (fire) in a ceramic filter on nonpermissible equipment. However, even on temperature controlled permissible equipment filter fires can and have occurred. Filter fires on permissible equipment can result in catastrophic consequences and must be prevented.

Filter fires on permissible equipment are primarily the result of the failure to maintain the safety features provided on this equipment. These failures may be rooted in designs that use components with poor reliability. The failure of the safety system creates a fire and explosion hazard regardless of whether a filter is installed. The consequences of a filter fire, however, are more apparent and are much more likely to have catastrophic consequences compared to just the release of exhaust gases at high temperatures. In addition to a clear failure of the safety system, a delay in engine shutdown resulting from an out-of-calibration sensor can also result in a filter fire.

A failure of the safety system can result in a fire or explosion.

The safety systems on 30 CFR part 36 permissible equipment are not designed to be totally fail-safe, but they do incorporate a number of fail-safe features. They have redundant temperature sensors, spring controlled fuel rack shutdowns, and an automatic shutdown on loss of safety system air or hydraulic pressure. However, multiple defective sensors, out-of-calibration sensors, and willfully disabling the safety system can lead to filter fires and catastrophic consequences. Also, failures of components that are not fail-safe, such as pressure regulators (not limiting pressure to the safety system) and fuel racks (hang ups) can cause the safety system to fail.

MSHA evaluates the design of safety systems during the approval process to ensure the safety system is well designed and meets the applicable regulations. Regulations also specify weekly maintenance checks and shift maintenance checks that must be performed by the mine operator to ensure the system functions as designed over the life of the machine. MSHA had considered that these tools were sufficient to prevent filter fires. Continued reports of filter fires brings this into question. *MSHA requests mine operators notify MSHA of any filter fires.* MSHA recommends the following:

Action Items-

- Perform regular maintenance. If safety system failures are frequently found during weekly checks then daily checks, improved training, or contacting MSHA and the equipment manufacturer may be required. MSHA inspectors will focus additional attention on the performance of safety systems.
- Do not jumper-out the safety system. If the safety system needs to be by-passed for ***maintenance*** it can only be by-passed in areas of the mine where nonpermissible equipment can be used and in accordance with a written procedure developed in consultation with the equipment manufacturer.

- Train machine operators and other mine personnel how to respond to filter fires. Review the fire risk assessment of the machine to determine if fire suppressant coverage of the filter element is necessary.
- MSHA will contact equipment manufactures to discuss the need to revise the approval requirements to improve the reliability of safety systems and whether higher levels of maintenance should be required. MSHA encourages mine operators discuss reliability and maintenance concerns with the equipment manufacturer.
- Do not use combustible filters until other means (such as increased maintenance, higher reliability components, or fail-safe system designs) are proven to prevent fires. Use fire resistant filters. Reference Micro Fresh Filters and EIMCO LLC.
- MSHA is evaluating new ways for preventing filter fires. These currently include faster reacting and more reliable temperature sensors, tamper-resistant shut down systems, and low scrubber water warning systems.

Reference: *Diesel Faults/Causes List*, and *Failure Analysis of Diesel Exhaust-Gas Water Scrubbers*, hardcopy available upon request.