

**Pennsylvania Technical Advisory Committee
On Diesel Powered Equipment**

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Joseph Scaffoni, Director
Bureau of Mine Safety
Fayette County Health Center
100 New Salem Road, Room 167
Uniontown, Pa. 15401

RECEIVED

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BUREAU OF MINE SAFETY

RE: TAC recommendation on exhaust gas temperature sensor accuracy.

Dear Mr. Scaffoni:

Article II-A of the Pennsylvania Bituminous Coal Mine Act (the act) provides for the use of diesel-powered equipment in underground bituminous coal mines. Section 224-A of the act created a Technical Advisory Committee ("TAC") for the purpose of advising the Department regarding implementation of Article II-A.

Background

Article II-A Section 203-A (b)(5) of the Act identifies what is included in the emissions control and conditioning system. Among other things, this includes an automatic engine shutdown system that will shut off the engine before the exhaust gas temperature reaches 302 degrees F.

Section 203-A (c) of the Act describes on-board engine performance and maintenance diagnostics system requirements to continuously monitor and give readouts to the operator. The diagnostics system shall identify levels that exceed the engine and/or component manufacturer's recommendation or the applicable MSHA or Bureau requirements as to several operating parameters, including monitoring the "cooled exhaust gas temperature" [Section 203-A(c) (5)].

The on-board engine performance and maintenance diagnostics system typically monitors the "cooled exhaust gas temperature" by using a temperature probe installed near the end of the engine exhaust pipe. This probe is connected by a wire to a temperature gage located in the operator's compartment which is marked to warn the operator if the "cooled exhaust gas temperature" exceeds 302 degrees F. Proper calibration of the temperature gage and probe is

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important to insure that the reading on the gage accurately represents the actual "cooled exhaust gas temperature".

Investigation

On a recent equipment approval the TAC became aware of a potential problem with the accuracy of the temperature reading the operator was seeing on the gage in the operator's compartment.

While measuring the exhaust gas temperature for the equipment approval the TAC noticed that the actual exhaust gas temperature as measured at the end of the exhaust pipe differed from the temperature shown on the gage in the operator's compartment by as much as 45 degrees F, a 15% difference. We felt that this was outside the permissible accuracy limit for the measurement, so a more detailed inspection was necessary to determine the problem. After changing out the temperature gage and probe and seeing no improvement, the TAC identified what seemed to be causing the inaccurate reading. The temperature probe was installed in a protective bushing such that the probe was not directly in the exhaust gas stream. The bushing seemed to be insulating the probe from the exhaust gas and thus was causing the lower reading on the gage. Upon removal of the protective bushing and placing the probe in the exhaust gas stream, the TAC was satisfied with the accuracy of the gage reading which was now within 20 degrees F, a 7 % difference. Since the engine shut down was set around 280 degrees F. the TAC believed that the accuracy of the temperature gage will still provide the protection as required by Section 203-A-(b) (5) of the Act.

During another equipment approval at a mine site the TAC noticed a piece of equipment that was also equipped with the protective bushing on the exhaust gas temperature probe.

The concern of the TAC is that there may be pieces of diesel equipment operating in Pennsylvania that are not adequately protected due to inaccurate readings on the "cooled exhaust gas temperature" indicator in the operator's compartment.

Recommendation

The TAC recommends to the DEP that this information should be communicated to the operators and equipment manufacturers, and the accuracy of the temperature gage readings be verified by comparing the gage reading in the operator's compartment to the actual exhaust gas temperature as measured at the end of the exhaust pipe. Corrections should be made as necessary to insure compliance with Section 203-(b) (3) of the Act.



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