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General Comment

See attached file(s)

Attachments

Diesel

AB86-COMM-11

United Mine Workers of America
Comments on the Request for Information on Exposure of Underground Miners to Diesel Exhaust
November 30, 2016

The United Mine Workers of America is happy to see the Agency begin the rulemaking process for an update to an area of the code that has long been in need of such. Many states with regulatory agencies such as West Virginia, Pennsylvania and Ohio have moved forward on regulating diesels because of the outdated federal code. The UMWA has encouraged and supported these individual state efforts to update the diesel rules, but recognize that coal miners in states other than those named are still working under outdated standards. Hopefully, an update to the Diesel regulations will fix that for America's miners.

In 2012 the National Institute for Occupational Safety and Health (NIOSH) and the National Cancer Institute (NCI) completed a 20-year large scientific study that included 12, 215 workers from eight metal non-metal mining facilities in Ohio, Missouri, New Mexico and Wyoming. The Diesel Exhaust in Miners Study (DEMS) was done to further understand whether breathing in diesel exhaust fumes could lead to lung cancer and other health outcomes. The study revealed that there was a strong relationship between level of exposure to diesel exhaust and risk of lung cancer mortality. At higher exposures to diesel exhaust, the mortality rates were 3 to 5 times greater compared to workers who had the lowest exposures. Pennsylvania and West Virginia recognized the shortcomings of the Federal diesel regulations and moved forward with their own standards. Both of these states require state of the art filtration systems, newer engines, higher ventilation requirements, and stringent maintenance and training plans, stricter fuel storage standards, and emission standards that far exceed the Federal Standards.

The state of West Virginia prohibited the use of diesel equipment in underground mines until the year 2004. The state waited until improvements in engine exhaust conditioning equipment was developed before permitting the use of diesel equipment underground. The West Virginia rule also requires the use of an oxidizing catalyst, strictly limiting diesel emissions and regulating both NO2 and

NO. West Virginia Diesel Emission Limits are much stricter than the current Federal Standards. A comparison of the two follows:

MSHA'S CURRENT DIESEL EMISSION LIMITS	WV CURRENT DIESEL EMISSION LIMITS
Carbon Monoxide (CO) ceiling is 50 ppm	Carbon Monoxide (CO) ceiling is 35 ppm
Nitrogen Dioxide (NO2) ceiling is 5 ppm	Nitrogen Dioxide (NO2) ceiling is 3 ppm
Nitrogen Monoxide (NO) not regulated	Nitrogen Monoxide (NO) ceiling is 25 ppm
Diesel Particulate Matter (DPM) is 2.5 g/hr.	Diesel Particulate Matter (DPM) is .12 mg/m3 per minute
Action taken at 50% of ceiling	Action taken at 75% of ceiling

The state of Ohio also sets emission limits similar to West Virginia's with a Carbon Monoxide ceiling of 35 ppm and Nitrogen Dioxide ceiling of 3 ppm. The state of Pennsylvania sets its DPM level at .12 mg/m3 like WV. Some more of these states regulations and requirements include:

- An exhaust emissions control and conditioning system that dilutes the DPM to 0.12 mg when diluted by 100% of the MSHA approved ventilation rate.
- A DPM filter capable of reducing the DPM by at least 75%.
- An oxidation catalyst capable of reducing carbon monoxide emissions to 10 ppm or less.
- A system capable of reducing the exhaust gas temperature below 302 degrees.
- An automatic engine shutdown system that will shut off the engine before the exhaust gas temperature reaches 302 degrees.
- A spark and flame arrestor system.
- A sampling port for measurement of undiluted exhaust gasses as they leave the engine and also before they enter the mine atmosphere.
- An on-board engine performance and maintenance diagnostic system. Capable of monitoring engine speed, operating hours, intake restriction, exhaust backpressure, cooled exhaust gas temperature, coolant temperature, oil pressure and oil temperature.
- The requirement of an operator to develop a detailed and comprehensive maintenance plan.
- Strict record keeping requirements of all emissions tests, preoperational exams, and maintenance and repairs.
- Complete maintenance performed every 100 hours.
- Eight hours of diesel training every year separate from the requirements of 30 CFR Part 48.

These states have had these regulations for many years with much success. As well as produced over 172 million tons of coal in the year 2014. This proves that these regulations can be enforced while at the same time the mines be productive and competitive.

It is our hope that MSHA will take a hard look at what these states have done with diesel regulations and apply them to their own rules and regulations. We firmly believe that the current federal law is nowhere near stringent enough to adequately protect miners from the negative health effects of diesel particulate matter in underground mines. The miners we serve deserve to have better protections in place for their health. Not just protections from pneumoconiosis caused by coal dust, but also from lung cancer caused by diesel particulates.

MSHA indicates that in order to assist in determining whether it is feasible to lower the emissions limits for non-permissible, light-duty, diesel-powered equipment to 2.5 g/hr. of DPM or less they ask specific information through the following questions:

(1) Is there evidence that non-permissible, light-duty, diesel-powered equipment currently being operated in underground mines emits 2.5g/hr. of DPM or less?

Yes. Pennsylvania, West Virginia, and Ohio all require a diesel after-treatment system and all light duty equipment in these three states emit less than 2.5 g/hr. Also, the National Diesel Inventory shows that out of 3400 pieces of light duty equipment only 90 have engines that are listed as emitting less than 2.5 g/hr.

(2) What administrative, engineering, and technological challenges would the coal mining industry face in meeting a 2.5 g/hr. DPM emissions level for non-permissible, light-duty, diesel-powered equipment?

The equipment in Pennsylvania, West Virginia, and Ohio have been built with an exhaust after-treatment system built by the OEM. There has been no issues retrofitting this equipment and there should be no problem doing this in other states.

(3) What costs would the coal mining industry incur to lower emissions of DPM to 2.5 g/hr. or less on non-permissible, light-duty diesel-powered equipment? What are the advantages, disadvantages of requiring that light-duty diesel-powered equipment emit no more than 2.5 g/hr. of DPM?

The cost would be around 20,000 dollars per equipment. However, some of the nation's largest coal producing states are already required to invest this money in their equipment to protect the health of their miners. The cost to not adopting lower emission standards would be far higher for the miners themselves if they were to contract lung cancer.

(4) What percentage of non-permissible, light-duty, diesel-powered equipment operating underground does not meet the current EPA emissions standards?

The UMWA offers no comment on this question.

(5) What modifications could be applied to non-permissible, light duty, diesel-powered equipment to meet current EPA emissions standards? What percentage of this equipment could not be modified to meet current EPA emissions standards? If these are specific types of equipment, please list the manufacturers and model numbers.

The UMWA offers no comment on this question.
These modifications and after-treatment systems were talked about in our opening statement. Oxidation catalyst, DPM filters, and exhaust emissions control and conditioning system are all examples of this.

(6) What are the advantages, disadvantages, and costs associated with requiring all non-permissible, light-duty, diesel-powered equipment operating in underground coal mines to meet current EPA emissions standards? Please be specific and include the rationale for your response.

The UMWA offers no comment on this question.

(7) West Virginia, Pennsylvania, and Ohio limit diesel equipment in the outby areas of underground coal mines based on the air quantity approved on the highest ventilation plate. What are the advantages, disadvantages, and costs of MSHA adopting such an approach?

This helps ensure that the DPM is being moved out of the mine atmosphere properly by not allowing too many machines to operate when there is not sufficient air in the area.
We do not see any disadvantages to this other than the operator not being able to have the flexibility to operate as many diesel machines as they would want on a single split of air.

(8) What would be the advantages, disadvantages, safety and health benefits, and costs of testing non-permissible, light-duty, underground diesel-powered equipment on a weekly basis for carbon monoxide as required for permissible diesel-powered equipment and non-permissible, heavy-duty, diesel-powered equipment?

Testing non-permissible, light-duty, underground diesel-powered equipment on a weekly basis will let you know early on if there is any problems in the engine that would cause it to emit higher levels of DPM. Time and cost would be minimal because the operator is already required to do this testing on all heavy duty and permissible equipment.

(9) Reducing the emissions of nitric oxide (NO) and nitrogen dioxide (NO_2) is one way that engine manufacturer can control particulate production indirectly. What are the advantages, disadvantages and costs of expanding exhaust emissions tests to include NO and NO_2 to determine the effectiveness of emissions controls in underground coal mines? Please provide data and comments that support your response.

The UMWA offers no comment on this question.

(10) Should MSHA require that diagnostics system tests include engine speed (testing the engine at full throttle against the brakes with loaded hydraulics), operating hour meter, total intake restrictions, total exhaust back pressure, cooled exhaust gas temperature, coolant temperature, and engine oil pressure, and engine oil temperature, as required by some states? Why or why not?

MSHA should require all of the diagnostics system tests to include engine speed (testing the engine at full throttle against the brakes with loaded hydraulics), operating hour meter, total intake restrictions, total exhaust back pressure, cooled exhaust gas temperature, coolant temperature, engine oil pressure, and engine oil temperature.

These test would give early indications of anything that may be going on in the equipment that may adversely affect the diesel emissions in areas that you normally wouldn't be looking had it not been required. This will give the operator the ability to make adjustments and perform maintenance in these areas sooner rather than later. This would save them money in downtime and maintenance cost as well as keeping diesel emissions down.

(11) What would be the advantages, disadvantages, and costs associated with requiring additional records to document the testing and maintenance of diesel-powered equipment in underground coal mines, such as the testing described above? Please be specific and include the rationale for your response.

Being able to see trends in the records would be able to give you an advanced notice if something was going wrong as far as the emissions is concerned. The savings in keeping the maintenance up on the equipment would far out way the costs of logging the tests in record books.

(12) If your mine is in West Virginia, Pennsylvania, or Ohio, what is your experience with the resources expended to keep testing records? How have these records been used, *e.g.*, have you

analyzed the records for trends? Have you made any changes in the use of the diesel-powered equipment, emissions controls, or mine ventilation based on the record of emissions testing? If so, please provide examples.

Records are kept in a book similar to any maintenance or examination record book. The resources needed for this would be to just get an additional book for diesel maintenance.

(13) Please provide information related to additional training requirements for persons who operate and maintain diesel equipment. Please be specific on the types of training required, time associated with training, and additional safety and health benefit provided.

A minimum eight hour course should be required to operate diesel powered equipment.

This should include classroom training on diesel fundamentals and equipment-specific hands-on training on the job.

Eight hours of annual diesel equipment operator refresher training, separate from that required by MSHA regulations at 30 CFR Part 48 should be required annually.
The training should include instruction in the following: engine fundamentals, diesel regulations, diesel emissions, factors that affect diesel emissions, emission control devices, diagnostic techniques, preoperational inspection, ventilation, fire suppression systems, operating rules, emergency procedures, and record keeping procedures.

A minimum of sixteen hours of training should be required to perform maintenance on diesel equipment regarding the general function, operation, maintenance and testing of emissions control and conditioning components.

Annual retraining programs of eight hours should be required for individuals performing maintenance on diesel equipment and should include the following subjects:

- **Federal and state requirements**
- **Company policies related to diesel equipment**
- **Emissions control system design and component technical training**
- **On-board engine performance and maintenance diagnostics system design and component technical training**
- **Service and maintenance procedures and requirements for the emissions and control systems**
- **Emissions testing procedures and evaluation and interpretation of test results**
- **Troubleshooting procedures for the emissions control systems**
- **Fire protection systems test and maintenance**
- **Fire and ignition sources and their control and elimination**
- **Fuel system maintenance and safe fueling procedures**
- **Intake air system design and components technical training and maintenance procedures**

- **Engine shutdown device tests and maintenance**
- **Special instructions regarding components, such as the fuel injection system, that shall only be repaired and adjusted by a qualified mechanic who has received special training and is authorized to make such repairs or adjustments by the component manufacturer**
- **Instruction on record keeping requirements for maintenance procedures and emissions testing**

(14) What exhaust after-treatment technologies are currently used on diesel-powered equipment? What are the costs associated with acquiring and maintaining these after-treatment technologies and by how much did they reduce DPM emissions? How durable and reliable are after-treatment technologies and how often should these technologies replaced? Please e specific and include examples and the rationale for your response.

There are both paper and ceramic based filters. Paper filters are typically changed during the 100 hour maintenance of the equipment. Ceramic filters can be cleaned by burning the soot off of the filter and reused. Ceramic filter can last thousands of hours. The disadvantage being; the costs of such systems being around $20,000 to install one of these systems onto a piece of equipment. The advantage being; these systems can reduce the emissions by around 90-95%. Resulting in significantly improved air quality.

(15) What are the advantages, disadvantages, and relative costs of using DPM filters capable of reducing DPM concentrations by at least 75 percent or by an average of 95 percent or to a level that does not exceed an average concentration of 0.12 milligrams per cubic meter (mg/m^3) of air when diluted to 100 percent of the MSHA Part 7 approved ventilation rate for that diesel engine? How often do the filters need to be replaced?

The disadvantage being; the costs of such systems being around $20,000 to install one of these systems onto a piece of equipment. The advantage being; these systems can reduce the emissions by around 90-95%. Resulting in significantly improved air quality.

(16) What sensors (e.g. ammonia, nitrogen oxide (NO), nitrogen dioxide (NO_2) are built into the after-treatment devices used on the diesel-powered equipment?

Carbon Monoxide and temperature are the only sensors that we are aware of that come built into the after-treatment devices. Other sensors such as nitrogen oxide and nitrogen dioxide can be built into the system but are add-ons from state law requirements.

(17) Are integrated engine and exhaust after-treatment systems used to control DPM and gaseous emissions in the mining industry? If so, please describe the costs associated with acquiring and maintaining integrated systems, and the reduction in DPM emissions produced.

The cost of most systems will be around $20,000 and the emission reductions would be anywhere from 75-95%.

(18) What are the advantages, disadvantages, and relative costs of requiring that all light-duty diesel powered equipment be equipped with high-efficiency DPM filters?

The only disadvantage being the cost of such systems being around $20,000 to install one of these systems onto a piece of equipment. The advantage being; these systems can reduce the emissions by 95%. Resulting in significantly improved air quality.