

MSHA-NIOSH Diesel Exhaust Partnership 2nd Meeting (9-19-17) Transcript Excerpts Nov 9 2017.xlsx

Comment Code	Comment Code Description	DCN	Commenter Name	Comment
F2	Diesel emissions partnership	MSHA-2014-0031-0079	Patricia Silvey (MSHA):	<p>I don't know where this partnership is going relative to rulemaking, and if some of you know, you have a better crystal ball than I do.</p> <p>But one of the things I know that we promised each other was that we would share information. We would share information on best practices, on strategies, and I think innovations with respect to control in diesel exhaust, and if we come out with anything, that will be good, that if one partner has innovations and another partner -- if that person's organization can make it available to another partner, then those are the kind of things we want to make sure that come out of this partnership, best practices and strategies, and we can also post those kinds of things on our website, as well as NIOSH's website, and people can send their best practices to us.</p>
F2	Diesel emissions partnership	MSHA-2014-0031-0079	Dr. Kogel (NIOSH):	<p>This is our second meeting, and it's built on a model of partnerships that NIOSH has had for a number of years. And through our partnership experiences, we've learned that it's a really great forum for bringing together all of our stakeholders and exchanging information and giving you all an opportunity to provide feedback to us. And that's something that comes into really informing our research and how our research goes forward....</p> <p>one of the things that's very different about this partnership and it's actually something I'm personally very excited about is the fact that it is co-chaired by MSHA and NIOSH. And this is the first time we've done this, and that was done strategically. That wasn't something that we did by accident. And what it does is it really reflects the commitment that our two agencies have for promoting and advancing mine worker health and safety.</p> <p>Each of us, you know, has a different role in this process. NIOSH is really involved in and very much focused on the research piece of it, whereas MSHA plays much more in that regulatory space. And as two different federal agencies that have a common mission and goal, you know, we've realized that in order for us to be successful and to really advance that mission and help mine workers, we need to work together.</p>
G1	Comments outside scope	MSHA-2014-0031-0079	Roslyn Fontaine (MSHA):	<p>The RFI was published in June of 2016, and, of course, since then, the President has issued two Executive Orders. In Executive Order 13771, Reducing Regulation and Controlling Regulatory Costs, Section 2-A requires MSHA to identify at least two existing regulations to be repealed before we publicly propose for notice and comment or otherwise promulgate a new regulation.</p> <p>In Executive Order 13777, Enforcing the Regulatory Reform Agenda, Section 3-A directs MSHA to seek comments on its recommendations to repeal, replace, or modify existing regulations from the public and entities significantly affected by Federal regulations, including state, local, and tribal governments, small businesses, consumers, non-governmental organizations and trade associations.</p> <p>MSHA is informing our stakeholders that the agency is seeking stakeholder input on its regulatory reform initiative during forums such as these, partnership and alliance meetings, quarterly training and stakeholder calls, walks and talks, and conferences. Information provided by stakeholders will help improve the health and safety of miners and assist MSHA in determining the appropriate regulatory action. <i>For a list of Specific Questions for Comment in the 6/6/16 RFI see: <a href="https://www.msha.gov/sites/default/files/SingleSource/Diesel%20Partnership/28-questions-asked-in-june-6-2016-rfi.pdf">https://www.msha.gov/sites/default/files/SingleSource/Diesel%20Partnership/28-questions-asked-in-june-6-2016-rfi.pdf</a></i></p>
E	MNM Miners Personal Exposure Limit (PEL)	MSHA-2014-0031-0079	Dr. Bugarski (NIOSH) :	<p>... we are starting this new project which is going to have five specific aims. And we discussed quite a bit what we can as NIOSH do to address existing exposures and what we can do to advance our knowledge.</p> <p>The first specific aim is related to development of evaluation technologies and strategies to prevent overexposures to DPM over critical affected occupations in underground metal/non-metal mines. What we have heard today pretty much and in the past is discussion, how are we going to reduce general levels and average levels. We want to look a little bit deeper and try to address some of these specific occupations because we have seen from MSHA data that, on average, industry is okay. But we are still seeing a relatively large number of overexposures.</p>
C	Exhaust After-Treatment and Engine Technologies	MSHA-2014-0031-0079	Dr. Bugarski (NIOSH) :	<p>And then specific aim two is actually going to evaluate in laboratory, in the fields and implement novel and emerging advanced engine technologies for heavy- and light-duty underground mining applications. That's exactly how long of this Tier 4 final engines and how we can get more advanced engines in underground mining industry.</p>
F4	Environmental enclosures and air curtains	MSHA-2014-0031-0079	Dr. Bugarski (NIOSH) :	<p>Specific aim three is develop and evaluate canopy air curtains for mobile underground mining equipment as a control strategy for diesel aerosols. And I'm going to talk little bit about that, but it's one way to address some specific occupations.</p> <p>Develop and evaluate filtration and pressurization systems for environmental enclosures for mobile pieces of underground mining equipment as a control strategy, because we see now egress a lot of equipment these days have environmental enclosures and we want to work on existing and newly developed enclosures.</p>

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C	Exhaust After-Treatment and Engine Technologies	MSHA-2014-0031-0079	<i>Dr. Bugarski (NIOSH) :</i>	But what we focused on is diesel particulate filter systems. We promote those for almost two decades, and I guess that technology's advancing and is getting better and better, but it's not universal way of dealing with DPM emissions in underground applications, so they have some downsides too.
C	Exhaust After-Treatment and Engine Technologies	MSHA-2014-0031-0079	<i>Dr. Bugarski (NIOSH) :</i>	Diesel oxidation catalytic converters, we looked into those issues. Particularly, there's some issues with NO2, for example, because those which were good -- DFEs which are good for on-road applications might not always be good for the underground applications. We looked into those issues, how to address that and how to develop products which are suitable for underground mining industry.
E	MNM Miners Personal Exposure Limit (PEL)	MSHA-2014-0031-0079	<i>Dr. Bugarski (NIOSH) :</i>	<p>Let me talk first about what actually made us think about these specifically targeting certain occupations. I looked through MSHA, I mean, thanks to you guys, we have some information on exposures of underground miners that's pretty hard to come by because, you know, even your database on the DPM is relatively, I would say, limited compared, for example, to dust sampling. Very few samples are collected. But you can still draw some general conclusions about the trends in the mining industry.</p> <p>And for those of you who are not real familiar with the DPM sampling, three types of samples were collected in underground metal/non-metal mines and they are under Contaminant Code (CD) 560, 561, and 16 562. Two first codes are compliant samples. The one on 562 is noncompliant samples, which is ambient sampling used to establish this ratio. We analyze all that data, and I think Monique also is going talk more about, you know, trends, but I'm going just to grab some aspects of that. ....</p> <p>this is not random samples collected. This is something what, you know, inspectors do on their discretion. And then, typically, they're trying to target those which are the, you know, potentially expose the highest concentrations.</p>
D	Monitoring MNM Miners Exposures to DPM	MSHA-2014-0031-0079	<i>Dr. Bugarski (NIOSH) :</i>	<p>What bothers me to some extent is that we have all this information for metal/non-metal mines, but we don't have any information what all coal miners are exposed to. And I think that was written in a law basically, that we should not sample in the coal mines. Some hypothesis were introduced when regulations were introduced that controlling DPM emission at the source is going to help reducing exposures. But I still believe as a researcher that we should verify that.</p> <p>There's very limited data available around the world, and probably one of the largest sets is now from northwestern Australia and a recently published paper by Peters, et al. So, basically, MSHA collects about 50 -- 500 -- 460 to 560 samples a year. I looked through a period between 2012 and 2016. And, basically, on the left-hand side graph, it's showing basically spread of that data. When you do averaging, you know, and I think statistically it might not be kosher, but you can do averaging and you'll see that these trends are showing, as probably MSHA on the website is also showing, that we have this trend where TC and EC concentrations are continuously dropping ever since regulations were introduced. And dramatic drop occurred after 160 micrograms per meter cubed level was established.</p> <p>On the right-hand side graph, you can see the averages for industry. And we are talking about averaging over 500 whatever samples were collected per year. And, you know, we're below 123 micrograms per meter cubed what is basically of EC, what is equivalent to 160 micrograms per meter cubed. So, basically, if you talk about motivation of a general industry, what we need to do more to be in compliance, they don't need to do much more. They're already there.</p> <p>But there is something to consider that, you know, about 18 to 28 percent of 560, that mean elemental carbon samples, are exceeding concentrations of 123 micrograms per meter cubed. That mean that in this period, as you can see on right-hand graph, we have pretty high concentration -- high percentages of, you know, these overexposures basically, all concentrations over 160 micrograms per meter cubed to be explicit.</p> <p>...it's important to notice when you analyze this for occupation. You will find that certain occupations definitely are exposed more than the others, and the reason for that is, for example, when we looked for 2015 and 2016, we found, for example, that 30 percent in 2016 of all the samples on the blasters showed concentrations above 160 micrograms of elemental carbon.</p> <p>...that's a pretty good chance that if you've blasted that you're overexposed.</p>

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F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Dr. Bugarski (NIOSH) :</i>	<p>...our exposures in underground mines since 2001 are dropping ... although these averages of below PELs, relatively large fraction of the observed samples still indicate overexposures. Overexposures were more frequent for some occupations than for the others, and ... additional solutions specific to the operations and occupations are needed to protect all occupations.</p> <p>... we'll need to solicit participation from industry because, again, as NIOSH is a government, we have no really direct access to the workers. So we need to find willing partners in our industry which are going to help us to assess first what these people are exposed to. ... we are hoping that through these types of venues, including this partnership or MSHRAC or mining associations like NMA, IMA, or NSSGA, we can get access to these mines.</p> <p>... we will actually have to mount, basically, a study where we would bring sophisticated instrumentation and characterize aerosols and gases in that environment. So, basically, we can basically formulate our solutions. And then, basically, we will find or hopefully find solutions. We'll use an array of multi-faceted engineering and administrative workplace solutions. And we'll apply that, and eventually we have to re-evaluate the situation and see how effective those solutions are.</p> <p>And then, of course, we are hoping that industry would benefit with these novel technologies and workplace strategies and we'll be able to reduce exposures of these specific occupations, and we're talking about drill operators, front-end loaders, blasters, whoever we identify as highly exposed occupations. And as a usual way, we are going to produce and disseminate this information through partners and wider mining industry.</p>

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C	Exhaust After-Treatment and Engine Technologies	MSHA-2014-0031-0079	<i>Dr. Bugarski (NIOSH) :</i>	<p>we want to prevent potential introduction of the engines which introduce new, unwanted emissions. We have seen that with the catalyzed diesel particulate filters when we saw [a] sudden spike in NO2 emissions. We have seen that with the platinum catalyzed DOCs.</p> <p>... we need to weed out those products which are not suitable for [the] underground mining industry. ... we have two engines in scope to test....[At least one representative engine for HD applications ... and one for LD applications will be evaluated.] ... we are planning to test here for final engine, which is using SCR-based solutions, so there's no DPF on it. And those type of solutions are more palatable for the mining industry because DPFs are still relatively difficult to operate in difficult environments like underground environment.</p>
C	Exhaust After-Treatment and Engine Technologies	MSHA-2014-0031-0079	<i>Dr. Bugarski (NIOSH) :</i>	<p>on light-duty, we would like to test engines which are equipped with DOC and DPFs just to show that some of the Tier 4 final engines which are currently coming on the market which do not have those control strategies are not really that clean. So the evaluation would take place in the NIOSH PMRD diesel laboratory. And on the right-hand side, you have two pictures of it.</p> <p>The engine will be operated at selected steady state in transient conditions. Detailed characterization of regulated and unregulated emissions will be produced. And special attention will be given to potential generation of undesired secondary emissions, like NO2, N2O, nucleation mode aerosols, metallic aerosols, and other pollutants.</p> <p>So then, if we successfully find engines which can be implemented and we find partners in industry, we would like to put same engines or similar engines in underground environment and test those in isolated zone or even directly in a production scenario. And then, as usual, we would publish this in peer-reviewed journals, conferences, and workshops and disseminate information to the parties.</p>

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F4	Environmental enclosures and air curtains	MSHA-2014-0031-0079	<i>Dr. Bugarski (NIOSH) :</i>	<p>Specific aim three is ... [evaluating] canopy air curtains ... as a control strategy .... we know from experience with enclosures with cabs that, basically, filtration systems which are typically used on cabs to control dust exposures are not efficient in controlling DPM exposures. ... we would like to try is to evaluate this technology, improve it, develop it and improve performance to provide better protection from DPM. We see this as a potential of this as a control strategy for some ... occupations like scalers or somebody who ... cannot be put in environmental closure, but it can -- it has some workspace where we can form this canopy air curtain. ... we are probably going to fund some of those efforts under contract.</p> <p>Environmental enclosures are extensively used by a number of the mines to control not only exposures to DPM but also to the elements, noise, dust. ... our group of researchers ... found that certain improvements could be done to these enclosures to make them suitable for protecting underground miners from DPM.</p>
F4	Environmental enclosures and air curtains	MSHA-2014-0031-0079	<i>Dr. Bugarski (NIOSH) :</i>	<p>So primarily, you know, filtration system would need to be upgraded. We need also to work on better pressurization of the cabs and preventing leaks. And then, of course, education of the operators to prevent -- to actually maximize benefits of enclosing them in the cabs.</p> <p>... people are not really taking full advantage of those cabs. There's a lot of openings on the cabs which are unnecessarily open and provide leak points and penetration of the dust, and the DPM occurs there. And then, of course, just behavioral issues. So, basically, we have to work on those to improve them.</p>
F4	Environmental enclosures and air curtains	MSHA-2014-0031-0079	<i>Dr. Bugarski (NIOSH) :</i>	<p>So specific aim will be executed in a partnership with OEMs and aftermarket filtration and pressurization companies because we want to find solutions for the existing cabs because there are a large number of existing cabs which are not suitable really to provide any protection to DPM. And then, of course, we need to work on defining what the brand new cab which is supposed to protect miners from DPMs should constitute. ...</p> <p>The effectiveness of enclosures in reducing exposure of operators to diesel and other aerosols will be tested in an underground environment in cooperation with industry partners. And then, of course, findings will be disseminated to the partners.</p>
C	Exhaust After-Treatment and Engine Technologies	MSHA-2014-0031-0079	<i>Dr. Bugarski (NIOSH) :</i>	<p>... disposable filter elements, that's something what we are wrestling for a long period of time. DPFs, basically, are the workhorse of ... coal mining industry. All the permissible, heavy-duty, vehicles and substantial fraction on non-permissible, heavy-duty, vehicles and small fraction even of light-duty vehicles, those primarily retired heavy-duty vehicles, which are turned into light-duty vehicles, are equipped with DFEs.</p> <p>... this is technology which is very critical to the controlling DPM in underground coal mines.... which in the 1990s was ... introduced by U.S. Bureau of Mines and basically allowed controlling DPM emissions from heavy-duty pieces of equipment below 2.5 grams per hour.</p> <p>... in all our testing, we found that HDDFEs with accumulated DPM in them are very effective. You know, we know that those filters can reach, ... even 99 percent efficiency. ... The only problem is ... we see continuously ... certain products ... that might have some deficiency.... there are more expensive, better products, but it's very hard to decide why they should pursue those. ...</p> <p>... we noticed that a couple issues of gassing process during the heating up, first initial heating up of the filter ... a large concentration of aerosols happen in the ambient air. ... also we noticed that efficiency of these filters at very beginning when they ... don't have any DPM collected on them and over the extended period of time ... you're talking about first couple hours of operation, are not as stellar as they are in the later hours of that.</p>
C	Exhaust After-Treatment and Engine Technologies	MSHA-2014-0031-0079	<i>Dr. Bugarski (NIOSH) :</i>	<p>Work would be done at PMRD diesel laboratory and we'll evaluate effectiveness of these selected DPF systems. We will benchmark them against existing products just to demonstrate, you know, differences, what new products can do. And we will work also with some of these manufacturers to develop better products. And then, of course, we are hoping to put this technology in some metal/non-metal mines because we have limitation how much evaluation we can do in coal mines. ... there are gassy mines in this country which use similar technology, and we can introduce this technology in those mines and try to demonstrate that also to underground coal mining industry.</p> <p>... So what we are doing currently, and I think this is part of that effort, is we are looking for partners. We are looking for the comments, suggestions and ideas.</p>

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E	MNM Miners Personal Exposure Limit (PEL)	MSHA-2014-0031-0079	<i>Link Bowers (MSHA):</i>	<p>First of all, on control strategies, DPM reduction depends on exposure controls and emission reduction. Your exposure controls are ventilation, environmental cabs, and administrative controls. Emission reduction depends on the diesel engines, which is your source, engine maintenance, biodiesel fuel, and after-treatments. ... almost all mines will require a combination of these controls to obtain compliance. So it's the suite of controls to help you out.</p> <p>... ventilation [effectiveness] would depend on the nature to upgrade, whether it be increasing your air or fan or maybe even just tightening up your ventilation controls. And improvement will be roughly proportional to the increase in your air flow increase.</p>
F4	Environmental enclosures and air curtains	MSHA-2014-0031-0079	<i>Link Bowers (MSHA):</i>	<p>Environmental cabs can give up to 80 percent reduction, so 800 micrograms per cubic meter we have seen reduced to 160 inside a properly maintained and sealed cab. The only problem with cabs is some people's job requires them not to work in the cab, so they can't use them for that condition.</p>
F5	Ventilation, equipment allocation	MSHA-2014-0031-0079	<i>Link Bowers (MSHA):</i>	<p>And then the third one is administrative controls, which are defined as specified changes in the way work tasks are performed that reduce or eliminate the hazard. One example is restricting the amount of diesel-powered equipment and total engine horsepower operating in a given area so that you [don't] bowl over, tax your ventilation system that's in place.</p>
F5	Ventilation, equipment allocation	MSHA-2014-0031-0079	<i>Link Bowers (MSHA):</i>	<p>Now on to a little bit more detail about ventilation. Your DPM reduction is basically proportional to air flow. So, if you double your air flow, you're going to cut your DPM in half. So you'll have a reduction in your DPM. Increasing the ventilation, though, can be costly, especially if you use major upgrades.</p> <p>But sometimes you can just change the conditions in the mine or your ventilation controls to make your ventilation system more efficient. But if you were just increasing power itself, when you increase the airflow by 25 percent, you're going to double your cost. And if you increase your air flow by two, you're going to have eight times your electricity cost. But usually, you can just make your system that's in place more efficient is the best way. Place your fans in the right positions, advance your tubings, make sure that you have everything the way it should be.</p>
F5	Ventilation, equipment allocation	MSHA-2014-0031-0079	<i>Link Bowers (MSHA):</i>	<p>One factor for diesel engines is called the Particulate Index, which is defined as the air flow quantity needed to dilute DPM emissions to 1,000 micrograms per cubic meter of diesel particulate matter. So, for example, if your PI for one engine is 1,000, then if you double the PI, you're going to cut it [in] half. And if you take it by five, you're going to divide it by five. So, if you increase your air flow, you're going to basically cut down on your diesel particulate emissions. And we have the listing of the PIs for each engine on this website at the bottom of the screen.</p> <p>And just as an example, if you had two engines, one's basically -- they're both 150 horsepower engines, one's a Tier 1, one's a Tier 3, and the PI for the first engine's 23,000 CFM, the PI for the second engine is 4,000 CFM, as you can see, to get to your 160 DPM concentration, you're going to have to have 115,000 CFM for the Tier 1 engine, as opposed to 20,000 CFM for the Tier 3 engine.</p>
F5	Ventilation, equipment allocation	MSHA-2014-0031-0079	<i>Link Bowers (MSHA):</i>	<p>And while boosting your airflow is a good start, you also need to direct where the air is going with wall stopping doors, et cetera. And you also want to make sure that you don't have re-circulation or short circuits and that you ensure that your air reaches the working areas and faces of the mine.</p> <p>In the ventilations system layouts, you want to try avoid adjacent intake and exhaust openings so you don't have re-circulation. You want clean air to come in, pick up the diesel particulate and move it on. You don't want re-circulation, or the concentration will just keep on going up throughout the day because you're not sweeping the air out.</p>
F5	Ventilation, equipment allocation	MSHA-2014-0031-0079	<i>Link Bowers (MSHA):</i>	<p>And then, for distributing air underground, auxiliary fans and ducts, rigid or flexible, for development ends. You need your end one to be on fresh air and you want to maintain your duct work, make sure it's advanced to where you need it to be. Plus, make sure it doesn't have leakage. Maintenance is a big thing on some of these mines to keep up.</p> <p>And you also, if you're using free-standing fans without tubing, you want to make sure they're properly placed so that you move the air where you want it to go to sweep across and move your diesel on. And also, in some mines, make sure your brattice lines are properly maintained so you're moving the air where you want it to move. And here's an example of a free-standing fan. You want to make sure to set up where it's going to sweep over the operator and back out. So the angle off the rib and fan placement are critical parameters for a free-standing fan.</p> <p>And on an auxiliary fan that has duct work, you can bring the duct work up closer to the miner where it's needed. And your critical parameters are your fan placement, your fan horsepower, the duct length and diameter. Duct bends, corners and leakage also come into effect when you're calculating what size fan you may need.</p>

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F4	Environmental enclosures and air curtains	MSHA-2014-0031-0079	<i>Link Bowers (MSHA):</i>	And another way to reduce [exposure] ... is to use environmental cabs, and they help silica, DPM and other dust exposures, but they also can help with noise exposure reductions. And some things to consider when you're looking at environmental cabs is you want them to be tightly sealed with no openings. If you have something broken, you want to maintain, like a window, you need to fix it when it gets broken or seals on the doors.  You want to make sure it's pressurized with filtered breathing air, and usually the change-out schedule for those filters is about ... 250 hours, and you want to basically design them for one air change per minute. So, if you have a 100 square foot cab, cubic foot cab, you want a 100 CFM fan to do that change-out. And you also want to make sure they're being operated with the windows and doors closed because, if you have the windows and doors open, you're basically negating the use of the environmental cab. And you also just want to make sure they're maintained in good condition.
F4	Environmental enclosures and air curtains	MSHA-2014-0031-0079	<i>Link Bowers (MSHA):</i>	One way that we test a cab for positive pressures is we will close all the doors and windows in the cab, turn on the A/C fan blowers that's pulling the air out so it's pressurizing the cab. Then we'll take a Magnehelic Gage and attach flexible tubing to it, open up the door on the cab, and then close the door to make sure that the hose doesn't pinch so you can see the differential pressure. We'll usually use a half inch mag to do that with, and we want to see about a .1 inch water gauge or more pressure differentials that show that air can't infiltrate the cab. You have positive pressure trying to keep the air outside out.
E	Existing controls - most effective	MSHA-2014-0031-0079	<i>Link Bowers (MSHA):</i>	And another set of controls are administrative controls, and that's controlled DPM exposures through operating procedures and work practices. And some examples of those are minimize engine idling and lugging so you're not making DPM that you don't need to. You want to keep your fuel and lube oil clean. That'll help DPM emissions go down. And if you can, utilize traffic control and production scheduling so you can keep heavy traffic downstream from miners who work outside of cabs. Like your powder crew, since they're not protected by a cab, usually it would be good if you can schedule where they're not getting the exhaust from other equipment going by if you can. And route haul trucks in return air is another one that you can do.  And also schedule blasters on non-load haul shifts so that they could be working when there isn't as much diesel haulage going, but that just depends on the mine itself and its mining cycle.
E	MNM Miners Personal Exposure Limit (PEL)	MSHA-2014-0031-0079	<i>Link Bowers (MSHA):</i>	And also limit the horsepower in the area based on available CFMs so you don't stress the ventilation system for helping dilute the DPM. And also to keep cabs and doors and windows closed on environmental cabs so that they're doing what they should be doing, protecting the miner.
C	Exhaust After-Treatment and Engine Technologies	MSHA-2014-0031-0079	<i>Link Bowers (MSHA):</i>	And emission reductions, this is basically reducing the amount of emissions coming from the engine itself, so the source -- now you're looking at the source instead of trying to protect somebody from what's being produced. Now you're trying to just reduce what is being produced as far as diesel particulate matter. And some of the ways our newer engines produce lower DPM, diesel particulate filters can be used to remove DPM. Alternative fuels like biodiesel can be used to reduce DPM emissions. And maintenance programs to ensure that what you're doing is staying properly maintained and working properly.
C	Exhaust After-Treatment and Engine Technologies	MSHA-2014-0031-0079	<i>Link Bowers (MSHA):</i>	Here's an example of a newer engine compared to some of the older Tier engines over the past few years. Of course, newer Tier engines produce lower DPM emissions, and this example of engines that are in the 175 to 300 horsepower class, in 1996, a Tier 1 engine would produce about .54 grams per kilowatt hour of DPM. The Tier 2 and 3s are similar for DPM emissions and they would be at .2 grams per kilowatt hour. And then, as you can see, in 2011, when the Tier 4s are coming out, that you're down to .024, I mean .02 grams per kilowatt hour, which is 27 times less than a Tier 1 from just several years before. So you can see the reduction over the course from '96 to 2011 of what's available. But, of course, you also have to consider the financial cost and if you're going to buy a new piece of equipment, you can keep that in mind.
C	Costs/advantages/disadv for 3 filter efficiencies	MSHA-2014-0031-0079	<i>Link Bowers (MSHA):</i>	And another way to reduce emissions of diesel particulate is using diesel particulate filters, and there are several types. You have throw away paper filters, and then you have other filters that can be regenerated, which means cleaning off the diesel particulate matter either passively, which means it does it itself, or you have to actually physically go in and do it. And you have passive regenerative ceramic filters and they self regenerate based on duty cycle. Active regenerative ceramic filters, they need a regeneration station, so you've got to take that into consideration that you're taking off and the time to put it on something, clean it and then put it back on. So different mines, some are more suited than others depending on their mining cycle.
C	Exhaust After-Treatment and Engine Technologies	MSHA-2014-0031-0079	<i>Link Bowers (MSHA):</i>	You also have a fuel burner with ceramic filter, and that one creates a temperature as in a passive type system. You have sintered metal fiber filters, which actually use electrical heating on board for onboard regeneration. Then you have disposable paper filters. But the paper filters, you have to have a cooled exhaust in order to use those because they can burn if they get to too high of a temperature. And then you have a high temperature disposable filter and its filter life is based on the duty cycle and operating time. And we actually have a MSHA filter listing also on our website and it's located below.

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F3	Low sulfur fuels, additives	MSHA-2014-0031-0079	<i>Link Bowers (MSHA):</i>	<p>...biodiesel fuel blends is another way to reduce DPM emissions from an engine. And biodiesel is a registered fuel with the EPA. It's a fuel additive -- has fuel additives added in. It has ultra-low sulfur diesel fuel. It is made and dried from vegetable oils and animal fats. And sometimes it's blended with standard petroleum based diesel. So sometimes you'll have a B20, which is a 20/80 mix, or you'll have a B10, which is a 10/90 mix, different mixes, and they significantly lower your elemental carbon emissions. Just that some people have also seen NOX's go up with using it, so you've got to be aware of that when you are thinking about using that.</p> <p>And if you transition from standard petroleum to a biodiesel product or a high biodiesel blend, you have to consider cost, the quality and availability, its low temperature properties because some of them will gel up earlier than they would with normal diesel, solvent effects on some of your equipment. There may be some scrubbers that it'll react with that regular diesel wouldn't. And microbial growth, that means bacteria can actually grow in the biodiesel, so usually they'll put an additive in for that than it would in a normal diesel. So that's your long-term storage stability also.</p>
F3	Low sulfur fuels, additives	MSHA-2014-0031-0079	<i>Link Bowers (MSHA):</i>	<p>Energy content usually doesn't have as high of a energy content so you're going to use more gallons of biodiesel than you would with regular diesel in some cases. And also, maybe your oil change intervals may go down because of using biodiesel. And, basically, you had the three exposure controls that you need and four emission production controls, which are your, for the exposure controls, the ventilation, environmental cabs, and administrative controls, and your emission reduction or the type of diesel engine you're using, the engine maintenance, your biodiesel fuel and your after-treatments, which are your filters. And usually you're going to have to use a combination of these seven things to get in compliance.</p>
F6	MSHA diesel information and requirements	MSHA-2014-0031-0079	<i>Jeff Moninger (MSHA):</i>	<p>MSHA regulates diesel engines differently in underground mining for coal mines. Underground coal mines must use an MSHA approved engine, Part 7. And in addition to that, the engines also must meet the Part 72 health standards for the diesel particulate matter. Underground metal/non-metal mines have the option, they can use a Part 7 MSHA approved engine or they can use an engine that meets the particulate matter in Table 57.5067-1, which is basically a Tier 1 or Tier 2 DPM limit for the engines depending on the horsepower.</p> <p>What's an MSHA approved diesel engine? MSHA approves diesels underground into two categories, Category A being used in the gassy areas of the mine or permissible areas, Category B engines being outby or all the other areas. A listing of the engines for Category A and Category B are available on our website. You can go under this link or through the support and resources equipment Approval and Certification Center and then the Approved Diesel Engines.</p> <p>DPM emission limits for underground coal mines dates back to the health standard, Part 72, require permissible equipment and heavy-duty equipment be limited to 2 and a half grams an hour. Basically, that means a diesel engine underground, as everyone's talked about, would have to be filtered to get down to that 2 and a half grams an hour limit. Light-duty equipment is limited to 5 grams an hour or it can meet the table listed in Part 72.502, which is a DPM limit based on Tier 2 engines. So, if you have a Tier 2 engine, Tier 3 or Tier 4, it's going to exceed that and be okay to use, along with being Part 7 approved.</p>
C	Exhaust After-Treatment and Engine Technologies	MSHA-2014-0031-0079	<i>Jeff Moninger (MSHA):</i>	<p>New technology diesel engines include exhaust after-treatment devices to reduce tailpipe emissions. By this, I'm talking your Tier 4 engines. Basically, they use either a diesel particulate filter that usually incorporates a diesel oxidation catalyst and some EGR or exhaust gas re-circulation with the engine to help lower the DPM. Or the other system used frequently is a selective catalytic redemption system, which injects diesel exhaust fluid or urea into the exhaust stream to help lower the NOX emissions.</p>
C	Exhaust After-Treatment and Engine Technologies	MSHA-2014-0031-0079	<i>Jeff Moninger (MSHA):</i>	<p>This is a quick example of some diesel engines that MSHA has approved. The first one up here, I'm trying to show a 185 horsepower engine at 2200 RPMs. The first engine up here, a Category B, emits about .22 grams of horsepower hour, which exceeds the Tier 2 limit for that horsepower rating, which would be .15 grams of horsepower hour. However, we have some of those engines approved for Category A use basically using a -- going through a dry system technology or dry system scrubber, basically, a radiator to cool the exhaust and then the exhaust is then filtered. So, with a diesel particulate filter, the DPM is lowered to about .009 grams per horsepower hour, you know, exceeding or being below what the Tier 4 limit is for that, which is like .015. Also, we have a similar system that incorporates a diesel particulate filter and a diesel oxidation catalyst, which we believe, based on the calculated values, would drop it down to about .007. So even though, you know, permissible engines, Category A engines may exceed may -- the engine themselves may be, in this case, you know Tier 1, Tier 2 or Tier 3, once you throw a filter on there, you're going to reduce the DPM and lower it below the Tier 4 limits.</p>

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C	Exhaust After-Treatment and Engine Technologies	MSHA-2014-0031-0079	<i>Jeff Moninger (MSHA):</i>	This is just another example. This is a straight Category B engine showing at 200 -- this one didn't quite turn out as well because the Category B engine's a 215 horsepower 2200 RPMs. It's .13 grams per horsepower hour engine, which is, basically, it's either a Tier 2 or Tier 3 engine, but we have a similar engine approved under Tier 4 using diesel -- which incorporates a diesel particulate filter and a diesel oxidation catalyst. DPM goes down to about .010 grams per horsepower hour. Similarly, the same horsepower rating, 200 horsepower, we have a system that incorporates the diesel exhaust fluid, which injects the urea into the exhaust, also comes out with the same number for the DPM of .010. I'll point out these Category B engines on this slide are all actual values from the test data. The Category A engines are usually more based on calculated data on what we expect the particulate filters to do.
C	Exhaust After-Treatment and Engine Technologies	MSHA-2014-0031-0079	<i>Jeff Moninger (MSHA):</i>	New technology diesel engines are available for metal/non-metal mines in pretty great numbers. Simply, as I stated before, because they're not confined to using a MSHA approved engine, they can just use any engine that's going to meet the health table out there, which is limited to Tier 1 and Tier 2. So, if you have a Tier 4 engine, you can buy it and bring it in.
C	Exhaust After-Treatment and Engine Technologies	MSHA-2014-0031-0079	<i>Jeff Moninger (MSHA):</i>	Coal mines are starting to have some newer technology diesel engines available. Unfortunately, it's a limited number just because of what the industry has brought in or diesel engine manufacturers have brought in to be approved. But we are starting to see some of that newer technology brought in for MSHA approved Part 7 engines.
C	Exhaust After-Treatment and Engine Technologies	MSHA-2014-0031-0079	<i>Jeff Moninger (MSHA):</i>	Effective controls to reduce DPM emissions, some of what Link was saying, new technology diesel engines produce lower DPM emissions. If you have lower DPM emissions, you have lower issues. The diesel particulate filters work to remove the diesel particulate matter.
F3	Low sulfur fuels, additives	MSHA-2014-0031-0079	<i>Jeff Moninger (MSHA):</i>	Alternative fuels reduce DPM emissions. Most of the time people think of alternative fuels, they're thinking of biodiesel fuel. The higher concentration of biodiesel fuel you have, the greater reduction you're going to see in total carbon. However, if you're going to use like a B99 or B100 biodiesel fuel, I'd recommend that you use a diesel oxidation catalyst and incorporate that into your system to help remove the organic carbon or organic compounds that you're going to have with the biodiesel.
F3	Low sulfur fuels, additives	MSHA-2014-0031-0079	<i>Jeff Moninger (MSHA):</i>	Tier 4 approved diesel engines that incorporate diesel particulate filters and the diesel exhaust fluid, basically, they're coming from the manufacturer with very low DPM, so there's not much, if anything, to be gained by using biodiesel fuel in those type of engines because they already have low DPM. Along with that, we recommend with the Tier 4 diesel engines, if you're going to incorporate fuel additives, even though MSHA's guidelines require it to be EPA certified fuel additives, that you check with the manufacturer to see if it's going to have any alternative effect with the after-treatment system.
B	Maintenance, Recordkeeping Underground Coal Mines	MSHA-2014-0031-0079	<i>Jeff Moninger (MSHA):</i>	[A] maintenance program ensures methods are working properly. Basically, if you have a maintenance program that measures the diesel emissions when the engine comes in or during its working life, you know how it's being maintained and if you have issues with the engine or increased DPM during that engine's life.
F3	Low sulfur fuels, additives	MSHA-2014-0031-0079	<i>Question for Mr. Moninger from Mr. Raymer:</i>	I was just wondering if they had done any tests with the fuel additives and some feedback that you can possibly extend some regeneration cycle times and reduce some DPM filter issues by having some additives with the fuels.  MR. MONINGER: Yeah, there's been some testing done, more just in general with the fuel additives, but there's never been enough extensive research done to show, you know, one way or the other if they would increase or decrease the life. Again, we do know there's some issues with the Tier 4 engine possibly with fuel additives maybe being a little detrimental to their after-treatment. So that would be, you know, something to look out for, maybe something NIOSH could put on one of the things to look at with their testing.
F6	MSHA diesel information and requirements	MSHA-2014-0031-0079	<i>Greg Meikle (MSHA):</i>	This presentation ... is a snapshot in time and that time was in May of 2017. At any given time that we would take a look at the information in the diesel inventory, it's a dynamic inventory. By regulation, the mine operators have a seven day time frame to make corrections in that diesel inventory. ... The inventory can include errors of input from the mine operators. It could have even errors in the information that was given. We'll talk about some of that that might even show up on this snapshot and our review of the information that is in there.  It'll also just be a presentation of the raw numbers. The information in the diesel inventory is not necessarily correlation to exposure to DPM by underground coal miners. And I say that by saying the information of the pieces of equipment does not indicate how that equipment is utilized, how long, where, so the information in there is a potential. We should use that information and be educated to what it represents.
F6	MSHA diesel information and requirements	MSHA-2014-0031-0079	<i>Greg Meikle (MSHA):</i>	Let's look at the diesel particulate or the diesel-powered equipment by state or by district and by the numbers of pieces of equipment. And when you look at this information, the numbers of diesel-powered equipment by far fall into two different districts: District 8 and District 9. And then it is broken down by the numbers in the light-duty, heavy-duty, and permissible categories. We also have a category that we say is a number of other diesel-powered equipment, and other diesel-powered equipment would be equipment that shows up in the inventory, but when considering some of the time lags and other things that we find in the inventory, they really don't fall into a particular category.

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F6	MSHA diesel information and requirements	MSHA-2014-0031-0079	<i>Greg Meikle (MSHA):</i>	<p>When you sort by district, where the equipment in numbers are and how they're being categorized. So the top 10 types of underground diesel-powered equipment, 90 percent of which is represented by 10 different types. Now, in the inventory during this snapshot, we've inventoried 36 different types. But the majority of the equipment fall into 10 different types, and you can see personnel carriers far and above all the other categories or different types are the numbers of equipment that we have in underground coal mines.</p> <p>Now, when you take that information and bring it into the types of diesel-powered equipment categorized as light-duty, you can see the personnel carrier again is the highest number of pieces of equipment in underground coal mines. It then potentially would represent the highest number of advances in protections. And you can see then utility trucks, forklifts. But these five different types represent 91 percent of the light-duty equipment or those that are categorized as light-duty equipment in the diesel-powered inventory.</p> <p>For heavy-duty equipment, this is just heavy-duty equipment, and there's 10 different types of heavy-duty equipment that represent 92 percent of the heavy-duty equipment in the inventory. Load-haul-dumps represent the lion's share of it, but then locomotives and so on and so forth. So, for heavy-duty equipment, we see this sorted by the numbers of equipment we find in the underground coal mines.</p>
F6	MSHA diesel information and requirements	MSHA-2014-0031-0079	<i>Greg Meikle (MSHA):</i>	<p>Permissible equipment, those that were inventoried as permissible. There are five types that represent 92 percent of the diesel equipment in underground coal mines. And, again, load-haul-dump is the largest number of equipment that we have in underground coal mines.</p>
F6	MSHA diesel information and requirements	MSHA-2014-0031-0079	<i>Greg Meikle (MSHA):</i>	<p>Now we want to look at the numbers of mines, with diesel-powered equipment and after-treatments by state. We sort these by the percentage of the diesel-powered equipment with after-treatments, and what you find is those three states that's been previously mentioned in the prior presentations would lead the way. So, in West Virginia, Pennsylvania, and Ohio, they require diesel-powered equipment going underground to have after-treatments. And so we would then expect that those pieces of equipment going in to mines in those states to be compliant. ... when we see these by percentages for after-treatments, we see the potential that can be utilized in trying to protect or increase the protections for miners that are working in underground coal mines.</p> <p>When we look at the after-treatment filters on light-duty equipment, we see that, again, the personnel carriers is at the top of the list. And you see what those filters look like, what they're categorized. And so we see, you know, after-treatment manufacturers are unknown. Again, getting back to the input information given by the mine operators, did they know that information and fail to convey that information or some other explanation. Now we added that last column to represent those that did not have after-treatment, and that would tell us that light-duty personnel carriers, 1743 didn't have after-treatment. Again, the potential where we might help with protections to underground coal miners given that these pieces of equipment are still in the coal mines and can be utilized maybe just as stringently if you want to call it that or as much as heavy-duty.</p>
F6	MSHA diesel information and requirements	MSHA-2014-0031-0079	<i>Greg Meikle (MSHA):</i>	<p>on heavy-duty equipment, we see the load-haul-dump as that, on the top of the list. There's 12 different types, though, that represent 95 percent of the heavy-duty equipment with after-treatment, and you see how they have been classified and, again, the total number that do not have filters. We would expect that number to be much lower, but, again, there are some problems in the transfer of information in this diesel inventory and the requirements then that are specified in 72.520.</p>
F6	MSHA diesel information and requirements	MSHA-2014-0031-0079	<i>Greg Meikle (MSHA):</i>	<p>Permissible. There are six different types that account for 95 percent of the permissible equipment that have after-treatments. Now we see that permissible and ceramic may be somewhat conflicting because, in previous presentations, we said, well, okay, these things, they actually operate at temperatures that wouldn't be conducive to permissibility. Again, the information on this inventory is what has been supplied by mine operators. Now there's a lag in us verifying, getting it cleaned up. So, again, you know, we understand those things. But here, we have permissible, we have with after-treatment, and what classifications of these applications that mine operators are actually utilizing. So we see what works if you use this information and look at it.</p>
F6	MSHA diesel information and requirements	MSHA-2014-0031-0079	<i>Greg Meikle (MSHA):</i>	<p>For the engine manufacturers, we see that Deutz is the number one, and the second leading manufacturer that's being utilized is less than half of what Deutz has got in the underground coal mines. Does that necessarily say anything? I'm not sure. For those of you who know the economics, who know the performance, who know the longevity, all of those different input factors of why that engine manufacturer is being selected would be a good thing to start if you're trying to make an informed decision. And the top 10 manufacturers represent 97 percent of the diesel equipment, powered equipment underground in coal mines.</p>

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F6	MSHA diesel information and requirements	MSHA-2014-0031-0079	<i>Greg Meikle (MSHA):</i>	<p>So now we want to look at what does the inventory say about heavy-duty diesel engines and how they equate to the diesel particulate and the Tier system that EPA has. Now 90 percent of all engines in heavy-duty diesel-powered equipment meet DPM levels for EPA Tier 4 engines, but that's based upon the package that includes the after-treatment. And we see a Tier 0, and a Tier 0 would represent equipment that really pre-dates the Tier system or before that designation or definition was set forth. Now what does that tell us from the inventory? Well, coal mines have a way of utilizing their equipment, they get good equipment that'll last and they keep it. So, for future, when we put it in a coal mine, they want to use it a long, long time. So a good choice up front for a long, long time, it would be a really good choice.</p> <p>Same thing for light-duty diesel engines and their designations, the difference being that 22 percent of all engines in light-duty DPM meet DPM levels for the EPA Tier 4 engines based upon after-treatments. Getting back to an earlier slide, not many of the light-duty personnel carriers have an after-treatment. Now they can meet our standards, 502, 72.502, and be utilized. How it relates to miner exposure, it's a potential. Seventy-seven percent of all engines in light-duty DPE meet the DPM levels for EPA's Tiers 2 and 3.</p>
F6	MSHA diesel information and requirements	MSHA-2014-0031-0079	<i>Greg Meikle (MSHA):</i>	<p>For permissible diesel engines and EPA engine standards, we see that 98 percent of all the engines in permissible DPE meet the standards based upon Tier 4 engines based upon their after-treatment. And, again, you know, four of the permissibility and being on this section, it's a requirement. So we see a high percentage of those meeting those standards, and for those that do not, we understand that it could be some complication with the conveyance of that information to the inventory and some other things.</p>
F6	MSHA diesel information and requirements	MSHA-2014-0031-0079	<i>Greg Meikle (MSHA):</i>	<p>The last slide we want to look at, it relates to another presentation slide, is okay, now understanding what is being used, what is needed I expect in underground coal mines, is what size of a motor do I need or an engine in order to do the work I want it to do? And we see, for 97 percent of the diesel-powered equipment being utilized underground, they have an engine of 250 horsepower or less. So it's the new engine technologies being introduced, smaller engines and what not. It will be that the industry can utilize those smaller engines at least in the coal mines.</p>
F6	MSHA diesel information and requirements	MSHA-2014-0031-0079	<i>Question for Greg Meikle (MSHA) from Mr. Betar:</i>	<p>MR. BETAR: I just wanted to point out, I guess this is both a question and a statement, but three times you mentioned that personnel carriers represent perhaps the largest potential for environmental exposure to diesel particulate. And your basis, it seemed, was simply due to them being the largest number of units in operation. But I think what you probably need to consider is, is that those units by their very nature are also operated at the very lightest duty cycles in the mine, as opposed to a piece of equipment that's engaged in actively moving materials or rock or things like that. And, in fact, several years ago, I studied the fleet of personnel carriers at one of the largest operators of these types of units in the west, and, on average, those engines were operating at 12 percent of their rated load. So I guess I would just want to include the fact that simply by nature of the sheer numbers of units and the fact that these units are not equipped with after-treatment doesn't necessarily mean that you can conclude that they may be an opportunity to greatly reduce diesel particulates because of the fact that these units are operating at such light-duty cycles.</p> <p>MR. MEIKLE: I agree. And I would add to that in many of the mines that I've gone to, you know, the personnel carrier will take men and materials to the section and then be shut off, and then they will reverse that in the evening or the end of the shift. So it's not only the duty cycle, but it also would then have to consider, okay, the time of use. But it even goes further than that. The potential could include, okay, these others that are already meeting Tier 4, though, are very, very low and how they are being utilized, the time frames and where and when and all the other things. So duly noted, what you just said. These are just numbers of equipment.</p>
F6	MSHA diesel information and requirements	MSHA-2014-0031-0079	<i>Question for Greg Meikle from Dr. Bugarski:</i>	<p>My question would be related with your estimate that your Tier 0 engine, after 20 years standing in the mine, just by applying their fee on it would meet Tier 4 final standards. That's a little bit of a stretch, because, I mean, end use emissions from those engines are probably twice as bad as the new engines. And they are rebuilt like three times meanwhile, and nobody checks on the parts that are rebuilt, for example. So basically it's kind of a little bit of a stretch to say that they're equivalent to Tier 4 final engines.</p> <p>MR. MEIKLE: If I did equate them to Tier 4, I didn't mean to. Now they're in our inventory as not 2, 3, or 4. Okay. Zero one, that's where we put them just to say, okay, this is what we have in the inventory. But as to what controls can be applied to them, what controls are being applied to them, we only have in the inventory what we have. And again, you know, I think that my, I guess, way of thinking is, as we pick equipment, looking at how old that equipment is probably could be an indication of how long the equipment being purchased now will be utilized.</p> <p>As to, you know, its miners exposure source, you can't look at the inventory and even estimate that, other than we know the sheer numbers of those that are in the inventory at any given point in time.</p>

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F6	MSHA diesel information and requirements	MSHA-2014-0031-0079	<i>George Saseen (MSHA):</i>	<p>to expand a little bit further on I think what you were saying and then to tie in what the gentleman on the phone just said. Yeah. As far as the duty cycle on those personnel carriers, a lot are pickup trucks and they are used lightly, and also, you know, mines have reported, the record showed years ago in the original rule, mines reported a lot of use of their light-duty equipment and a lot of mines reported very little use on their equipment.</p> <p>But remembering that the rule, the coal rule slide was based off of technological feasibility. And I think what you were trying to say, Greg, to enhance that is any effort that we have as the technology has advanced since, obviously, 2001, where we were talking only about Tier 2 engines because 3 and 4 didn't exist, but now they do. So any advancement on the technological front of advancing that will help exposures, like you were alluding to.</p> <p>So, yeah, it may not be because, yeah, we don't see a high duty cycle made with these machines. Some of these trucks, pickup trucks have larger engines in them, so it does not take a lot for them to haul, you know, a man or a crew in and out because if it's, you know, not a steep climb in or out of the mine. But as far as technological feasibility, any advancement will help, as you alluded to, help the exposure, lowering exposure to the miners. Thank you.</p>
E	MNM Miners Personal Exposure Limit (PEL)	MSHA-2014-0031-0079	<i>Monique Spruill (MSHA):</i>	<p>... today, we'll be discussing our DPM levels that we actually have for exposure in our metal/non- metal underground mines. ... Let's look at our average concentrations.... The top blue line, being total carbon, and the bottom line that's red, is actually elemental carbon. So let's look at 2008 when our final rule was actually coming into being implemented for 160 micrograms per meter cubed [in metal/nonmetal mines?] for total carbon, and that would be your top line there. We can actually see that, from 2008 to 2016, there was actually a 42 percent decrease in total carbon levels. This is also consistent with our elemental carbon levels that have been decreased. That was actually by 47 percent. So over time, if you actually look at it as we keep having our average concentrations of DPM, they keep declining over time.</p>
E	MNM Miners Personal Exposure Limit (PEL)	MSHA-2014-0031-0079	<i>Monique Spruill (MSHA):</i>	<p>Now this next slide ... the number of samples that we actually collect for DPM and this is actually in calendar year ... So our percentages were ranging in between 14 to 19 percent of our samples that are actually exceeding the PEL. But we're collecting around about 500 samples per year. And over this five-year period, ... a lot of our samples, we can say they're really compliant.</p> <p>And so now let's go over our miner occupations. So here we're going to concentrate on the first five occupations. The number of samples that actually have exceeded the PEL, there were actually 438 samples that were actually collected. Now, for your blasters, 31 percent of our samples exceeded the PEL. Your front-end loader operator, 11 percent, your scalers, 9 percent, your truck drivers, 7 percent, and your mucking machine operators, these miners were actually 6 percent.</p>
E	MNM Miners Personal Exposure Limit (PEL)	MSHA-2014-0031-0079	<i>Monique Spruill (MSHA):</i>	<p>But what's actually different among these operators? For blasters that are also known in other parts of the country as powder gangers, they actually have direct exposure. So, with this being direct exposure, where are they working at? They're working in the face. They're working in areas with poor ventilation. They're working in areas where they're not in those enclosed cabs which we're normally seeing. Also, they work in areas where equipment is running right next to their work location. A major big thing? They're working at the dead and the de-stress with more stagnant air.</p>
E	MNM Miners Personal Exposure Limit (PEL)	MSHA-2014-0031-0079	<i>Monique Spruill (MSHA):</i>	<p>Now let's go on to look at our front-end loader operators. They're also working at the production phase. They're spending time mucking and they're actually spending time idling while they're actually loading and while they're dumping. Another thing, they're working down through the motor while they're dumping. They work in open, also in enclosed cabs. But we want to see why would they still be actually number two of our number of samples that exceeded this PEL. So they also work with these machines called skid stairs and they actually are completely open without a windshield. So that level of protection that you would actually get in an enclosed cab, we're not seeing those.</p>
E	MNM Miners Personal Exposure Limit (PEL)	MSHA-2014-0031-0079	<i>Monique Spruill (MSHA):</i>	<p>Also, let's go on to our third category, a mechanical scaler. They're also working what? At the face. They're working in both open and enclosed cabs. They're working areas with poor ventilation, and they also spend time idling with this equipment while they're scaling.</p>
E	MNM Miners Personal Exposure Limit (PEL)	MSHA-2014-0031-0079	<i>Monique Spruill (MSHA):</i>	<p>Now we'll go on to our fourth category for truck drivers, still being 7 percent of our overexposures. They're primarily exposed to diesel equipment, one. They spend time idling while they're actually loading. They work downwind from the motor and they're also passing other trucks. So our truck drivers actually are exposed to other diesel exhaust and other engines while they're actually passing other trucks.</p>
E	MNM Miners Personal Exposure Limit (PEL)	MSHA-2014-0031-0079	<i>Monique Spruill (MSHA):</i>	<p>Now let's go on to our mucking machine operators. They also, what's the commonality? They work at the face. They actually have their engines idling while they're actually dumping. They work downwind from the motor and while they're tramming. So, if you're going from point A to point B, you're going to actually have your engine idling at point A and also at point B.</p>
E	MNM Miners Personal Exposure Limit (PEL)	MSHA-2014-0031-0079	<i>Monique Spruill (MSHA):</i>	<p>Now we're going to go on to look at commodities. So first we're going to look at, in particularly, four different commodities: our crushed and broken limestone, and also gold ore, zinc, and also our lead zinc. Now 47 percent of our samples actually exceed the PEL for crushed or broken limestone, but they also make up 31 percent of our underground mines. Also gold mines. We go here where they actually make up 21 percent of our underground mines, whereas our lead zinc and zinc mines, they actually make up 3 percent of our underground mines.</p>

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E	MNM Miners Personal Exposure Limit (PEL)	MSHA-2014-0031-0079	<i>Monique Spruill (MSHA):</i>	<p>So, for crushed and broken limestone mines, what have we noticed? They're large-scale underground productions, these mines. Why do they have ventilation challenges? We've noticed they have some older equipment and with this poor ventilation, as this mine size actually expands, we know that the main fan is actually having problems getting air flow all the way back to the production face. Also, a few of our mines, yes, they still do have natural ventilation that they're using. Natural ventilation, what is it affected by? Seasonality. So, therefore, we know there are temperature changes, we also know that there are barometric pressure changes.</p> <p>The next thing they're using is this room and pillar extraction method. So you get these large open excavated areas in which ventilation is actually -- you'd have to overcome this challenge. And also they're normally working on a year-round basis. So, if they're working on a year-round basis, our miners are constantly being exposed. And also we know that some -- right after we looked at these mines, we know that some maintenance procedures, that they actually need to have in place, that we need to actually increase looking at helping our operators look at their maintenance schedules with these mines.</p>
E	MNM Miners Personal Exposure Limit (PEL)	MSHA-2014-0031-0079	<i>Monique Spruill (MSHA):</i>	<p>Next, we'll go on to gold mines. We've actually noticed that they've had poor engine maintenance and ventilation. A lot of our gold mines are using some older engines. They're operating diesel equipment with no filtration and with open cabs. And they're actually having some direct exposure. And actually, one of the processes that they're using is the ore is extracted through tunneling or shafts. So that's another ventilation challenge. And also, we have to keep remembering about altitude. So, with our engines, where are they going to maximally, actually, where do we optimize our engines for altitude? So that's normally at 3,000 feet per max altitude designation. So, when you're doing particulate matter or maintenance schedules, we also have to consider altitude for our gold mines. It's another challenge that they actually have to overcome.</p>
E	MNM Miners Personal Exposure Limit (PEL)	MSHA-2014-0031-0079	<i>Monique Spruill (MSHA):</i>	<p>Now let's look at also lead zinc ore mines. Actually, more or less with these mines, the biggest thing that we're looking at is the single entry drifts that we actually have as a ventilation challenge. The miners need to access ore core deposits commonly known as chasing the ore, and this is along chasing across your vein. So what are you doing? You're actually creating tunnels and drifts along the vein. This is the major cause of the ventilation challenge. And there are also elevation changes that we see within the same drift.</p> <p>Now the lack of ventilation at the face, we've also noticed that. So we say when you're obtaining air, you're trying to bag off air off the main ventilation using booster fans. Ventilation tubing may not be adequately sweeping the face, and that's another ventilation challenge that we've noticed. Now zinc mines also have this -- just like lead zinc mines, they have the same type of mining activities that go on. We're still chasing this vein. However, our zinc mines were actually shut down for a while. When our zinc mines reopened, we noticed that they did have some newer equipment running at that time. So, for fleets with this newer equipment, zinc mines are actually overcoming a lot of their challenges.</p>
E	MNM Miners Personal Exposure Limit (PEL)	MSHA-2014-0031-0079	<i>Monique Spruill (MSHA):</i>	<p>But what do we have to do? Our biggest thing is have this multi-faceted approach, as we mentioned earlier. We need to control DPM actually at the source. And we're controlling our gases also and also controlling other pollutants.</p> <p>So we've noticed that scrubbers are using our smaller metal/non-metal mines and they may produce DPM concentrations up to 20 percent. Our operators are also using filters. Paper filters may reduce your DPM concentrations by 85 to 90 percent, we've noticed. And then also, your sintered metal filters may reduce your DPM concentrations by 50 to 90 percent. And our ceramic filters that they're actually using may reduce your DPM concentrations by 85 to 95 percent. We've also noticed that generally they're using diesel oxidation catalyst, which may reduce your DPM concentrations by 20 percent.</p> <p>Let's go on and see what other things that they're doing successfully. They're using selective catalytic reduction, which is actually reducing your nitrogen by up to 90 percent. And another thing they're using would be low emission engines. The majority of our mines right now, we know from what we've actually been speaking with our health specialists that they're using Tier 3 engines or actually higher. And actually, also, we've said this earlier, there are environmental cabs on removable equipment.</p>

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F5	Ventilation, equipment allocation	MSHA-2014-0031-0079	<i>Monique Spruill (MSHA):</i>	<p>But one thing that we want to explore a little bit deeper would be ventilation because they're actually exploring our operators, looking at both passive and active ventilation. So, with this, we've noticed that when you're actually placing booster fans that are actually out there and when they're placed at the face, which is a really important change, we've noticed that that's actually been for a lot of our operators that are actually able to lower their DPM levels. And they're making sure ventilation does not pass through a working area too many times. So they're directing this active ventilation. They've replaced a lot of their rigid tubing. So the tubing that they actually have now is actually installed around the working area. So we're actually channeling this fresh air to the operating face.</p> <p>There has been a removal of ventilation bags to a hard line smooth vent to reduce friction that's lost over time. And another thing that they're doing are ventilation studies with our single entry drifts because this has been one of the things we actually needed to look at.</p> <p>What are they actually also doing? They're installing curtains, brattices, tubings, stoppings, and bulk heads. They're also adding fans or they're actually increasing the number of fans that they actually have. So this would be for main fans, auxiliary fans, booster fans, and also exhaust pulling fans. And also, they're filtering any type of re-circulated air.</p> <p>And, again, ventilation studies not just in a single open -- single drifts, but we're actually looking at others. And all of our mines now are starting to look at ventilation studies. And they're also looking at open mines. We actually have noticed that they're installing some that might be more permanent solutions where they're using steel duct work.</p>
F3	Low sulfur fuels, additives	MSHA-2014-0031-0079	<i>Monique Spruill (MSHA):</i>	They're also using ultra-low sulfur diesel fuel and your cetane improvers, what they're actually doing is measuring that at 42 or greater and that's our target. They're using oxygenated additives, detergent, dispersant, surfactants, and for biodiesel, we've seen in metal/non-metal mines that they're actually using a blend up to 75 percent.
E	MNM Miners Personal Exposure Limit (PEL)	MSHA-2014-0031-0079	<i>Monique Spruill (MSHA):</i>	Let's go on to compare some of our success stories. I want to tell you about three different mines. We have a crushed and broken limestone mine that was a multi-level mine. Back in 2008, this mine had concentrations that were over 230 parts per million. So we would look at for DPM for micrograms per meter cubed, they were able to actually lower their DPM concentrations and also their exhaust concentrations. And we noticed their DPM concentrations actually fell below 100. How did they do this? They placed DPM filters on older equipment. They replaced and rebuilt their fuel pumps. They actually went out and they actually refurbished their engines and actually really did go about re-tooling them. They also purchased newer equipment. They actually purchased fans and tubings actually to ventilate those actual dead areas.
F5	Ventilation, equipment allocation	MSHA-2014-0031-0079	<i>Monique Spruill (MSHA):</i>	<p>How did they actually go through? They contracted actually a ventilation specialist and actually mine engineers. And what did they do? They went and they reviewed all their ventilation plans and they made modifications to their ventilation systems. Also, with this particular mine, they were doing four directional mining there, and so they had to develop some type of connection system. And in that connection system, they actually used bidirectional fans. And they actually repaired and established new ventilation controls. They used stoppings and curtains.</p> <p>This particular mine is also using low-sulfur diesel fuel, biofuel, and they're actually also -- they conducted ventilation surveys. So from going from levels that were greater than 230 to actually being below 100 after that, they actually did actually place in a lot of work, and they worked with us.</p>
E	MNM Miners Personal Exposure Limit (PEL)	MSHA-2014-0031-0079	<i>Monique Spruill (MSHA):</i>	Another mine that was actually a crushed and broken limestone mine, but instead of being multi-level, it's a single level. And they actually had the largest room of pillar mining method. They had concentrations of DPM that were over 250. But after 2009, they had no DPM concentration actually exceed 111. And their average DPM concentration by that time was actually at 41. So what did they do? One of their steps, they had actually purchased newer equipment. They actually put in improved mine ventilation. They tightened all their stoppings. They added auxiliary fans behind the shot crew. They moved production faces from the back of the mine closer to the portals. They're using biodiesel fuel. They're also using the ultra-low sulfur diesel fuel. They actually did have rebuilt engines to improve engine performance, and they're using diesel particulate filters. But this one in particular, what they were doing is they're actually changing them out and they're actually using their filters for 500 hours. And they were finding that, before that, they were actually leaving their filters on.
E	MNM Miners Personal Exposure Limit (PEL)	MSHA-2014-0031-0079	<i>Monique Spruill (MSHA):</i>	<p>Now let's go on to a lime mine. This is another mine that's a multi-level mine. Back in 2009, they had concentrations that were actually higher than 267. They were actually able to now after that point go below 40, which they had a really nice degree. So we wanted to find out exactly what everything that they actually do.</p> <p>So, for the curtains, they did a lot of repair and maintenance work. And instead of actually having stripped curtains, they actually installed these full-size curtains. They also put fans into their stoppings. They use biodiesel fuel. They also use ultra-low sulfur diesel fuel. And they actually ventilated their deadhead areas and all of their stagnant areas for air.</p>

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D3	Advances in exposure assessment to reduce PEL	MSHA-2014-0031-0079	<i>Monique Spruill (MSHA):</i>	One other remarkable thing that they were actually able to do was use a real-time DPM analyzer. And if you're able to use a real-time DPM analyzer, they were actually able to go and say, how is our equipment functioning on a day-to-day basis. They were able to then monitor their ventilation and they actually corresponded this with exposure monitoring.
F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Dr. RJ Matetic (MSHA):</i>	<p>The good news is I'm last. The bad news is you're going to have to discuss some things before you walk out that door. You know, one of the things you heard today was, you know, partnerships are great, but partnerships only are productive if people in the partnership provide input and guidance toward where things need to go next. And that's kind of what we're going to talk about a little bit for a couple minutes and then we'll break. ...</p> <p>Ms. Silvey spoke about the first partnership meeting for the diesel health effects was in, I think it was December 8 of last year at the Meadowlands. One of the couple things that we discussed there if you weren't there was the charter for the partnership. And if any partners or members of the partnership had any input to that charter, we can consider it there at the meeting or they can provide responses later on to add to the charter. ...</p> <p>how do we want to move forward? You know, you heard today from a lot of people. ...</p> <p>So now we're at this crossroads of, you know, this partnership and the members of, where should we go next? ... what are the things that keep you up at night that need to be addressed? What are the topics that this partnership needs to move forward with for it to be successful and for the ultimate outcome to be the health and safety of the mine workers?</p>
F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Dr. RJ Matetic (MSHA):</i>	I think we all have a similar goal and that's that, meaning we're all looking at the health and safety of the miners. We have different roles in that on how that actually happens. But, ultimately, that's why we're here. So, with that and the significance of input, I'm begging you to open up and provide some input into the partnership on some topics, things that you're thinking about, and on the phone as well, that we need to like think about moving forward. So I'll start within the room and then we'll go to the phone. ... So what is it that you're thinking about that maybe wasn't addressed today that the partnership truly needs to think about?
F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Dr. Bugarski (NIOSH):</i>	... we have heard from NIOSH, we have heard from MSHA about the problems, and, you know, I would like to hear from industry, you know, because I always believed in the past when we achieved some success that input from industry was most important one, because industry is the one which is facing the problems and they can point us in direction of the real necessity to do some issue.
F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Dr. Bugarski (NIOSH):</i>	<p>For example, we have heard from Monique this high altitude issue and we dealt with this. You know, within MSHA and NIOSH, we dealt with this like 10 years back. But then it falls off the cliff and it's nowhere. So, basically, and you know I visited some metal/non-metal mines on high altitude last year -- this year, actually, and they all tell me how we have no clue, you know, how high altitude affects our engines.</p> <p>So some of the issues, you know, like this emerge occasionally and I think it's the best if it can hear for the issues and the problems directly from industry and then we try to address things. And we will get partners. That way we'll be on the right, you know, page with them.</p>
F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Dr. RJ Matetic (MSHA):</i>	Other partnerships, we provide opportunities for operators to come up and provide best practices, things that work for them that maybe we haven't thought about as a research organization or MSHA, that they bring things to the table that truly advance the science, which we didn't even really know about.

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F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Mark Ellis (IMA-NA):</i>	<p>I'm with the Industrial Minerals Association, North America, and I want to thank you for a productive meeting. I compliment the speakers and the topics that they covered. I think they helped set the stage for this discussion now and the discussion going forward.</p> <p>At the outset, I think I'm going to offer a challenge to the premise that typically dictates that partnerships end up in a regulatory outcome. Roz Fontaine mentioned two executive orders that had been issued by the President. The partnership was started under one administration, but it's progressing under another administration that's substantially different in its outlook. And so part of what I would like to suggest for the partnership is that regulations should not be the end game.</p> <p>We all bring something different to the table. Jessica mentioned the silos that we're in and we tend to operate in silos. But when it comes to the issue that we're here to address, which is diesel exhaust health effects, everybody has a common interest in that, although they come at it from a slightly different direction, and I think that that's healthy. We need to try to make sure that we bring different perspectives to the issue, but we should focus in not on regulatory responses but really on improving miner health.</p> <p>I happen to be a big fan of getting the biggest bang for the lowest buck, and I think that that could fit in with this partnership if we look at things like results-oriented prioritization. What equipment is out there producing the greatest contribution to diesel exhaust emissions? What occupations have the highest exposure?</p> <p>Try to target where our problems are, the biggest problems, and try to find solutions for those problems. I happen to think that the idea of looking at best practices, what has worked in the past for some people to see whether they can work for other situations is a good way to go. I think that one of the challenges that we face is that there's a lot of subject matter here and it's difficult to deal with it in a general context.</p> <p>So I guess the final point I would leave you with is that we could take any of the subjects that were brought here today and I think that we should dive into them in more detail in separate sessions. And what I would suggest would be a good one to work with would be to take a look at what Link Bowers and Monique Spruill brought to the table today. I think it lends itself to looking and best practices, what worked for people in the past, what could work for people in the future. And I think if we could just get that far with the next meeting that would be a significant achievement.</p>
F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Larry Patts (NIOSH):</i>	<p>I really believe that what Mark said and what the doctor said hold a lot of value. I think we need to see success stories and transfer those to people. But I think we also need to find out what doesn't work for the industry. I think we can learn sometimes just as much from what doesn't work to move in a direction to find things that will work.</p>
F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Joe Betar (Classic Motors, Chrysler):</i>	<p>I represent Chrysler Corporation in addition to my own enterprise as far as the mantrips that are produced by Chrysler under the Ram and Jeep brand. And I guess you asked what's keeping me up at night, and it relates to what the gentleman said about moving towards regulatory solutions here. From a manufacturer standpoint, the uncertainty as to the direction of where we're going to go with future engines and requirements is creating an enormous burden for us because we don't know what engines to approve or to seek approval for.</p> <p>And since the time frames are so long for vehicles in terms of from, you know, beginning conceptualization to actual production, we could run into a situation where we actually approve engines that either go out of production shortly thereafter or do not meet what could be potential regulations. And so the costs and the keeping awake at night factor are enormous when talk of, you know, reconsidering DPM regulations begin to float around because I'm at that point right now where we're getting ready to, you know, redesign engines, and there's a huge amount of uncertainty as to what we should be doing. And that's again staying away from a regulatory solution would be immensely helpful, because, ultimately, it reduces miners' choices for what types of vehicles they will have available to them to use.</p>
F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Evelyn Stirling (Cummins Engine Co.):</i>	<p>I just want to echo what Joe is saying because we're getting into some next generation work which ultimately will reduce emissions. It may not meet the Tier 4 requirements. So do we go ahead and invest in getting certification, vent certification through MSHA on these engines or not? You know, so if we have a regulatory body that says you have to meet Tier 4 emissions on any future engines, then that really will put a heavy burden on us as engine manufacturers as well.</p>
F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Dr. Bugarski (NIOSH):</i>	<p>... what I'm hearing here, we have number of the problems. ... I think that the most effective way would be not to work as a whole group. We'll have to find some kind of subcommittees which are going to address these issues and work on it, because in smaller groups with pre-defined tasks, I think we have chance of success.</p> <p>... So, basically, if you don't specify very well problems and maybe vote on the priority of those and start addressing the most precious one, then we are not going to make enough progress.</p>

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F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Dr. RJ Matetic (MSHA):</i>	... at the first partnership meeting in December of last year, I believe it was Mark Ellis that mentioned about working groups in the partnership, for example, looking at health effects, looking at new and existing technologies, looking at improved technologies, looking manufacturers providing input to the group as well. So that's definitely something that I think maybe we can consider moving forward as well. Looking at working groups, it truly makes sense based upon what we're actually trying to do relative to this partnership.
F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Ed Green (mining industry counsel):</i>	<p>I think this was an extraordinarily useful and important day ... Perhaps a next step along the way can be to put together a document, maybe a memorandum for the partnership that describes what happened today and sets out some next steps in terms of what else can be done in terms of research goals along the lines of Alex's presentation and the kinds of best practices that were described by our MSHA colleagues.</p> <p>One thing that troubled me a lot was that, in spite of the fact that Monique's presentation shows that exposures have gone down in terms of what comes out of the tailpipes; there are still a fair amount of excursions above the PEL. What's that all about? I think that's worthwhile exploring. ...</p> <p>I'm pleased with this ... second meeting, and I think we need to really focus now on what the third meeting should be and use this meeting as sort of a way to describe what has happened here. And my view is that a memorandum from NIOSH and MSHA to the other partners would be a very, very useful milestone along the way.</p>
F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Sheila McConnell (MSHA):</i>	<p>Ed, I thank you for your comments and I agree that it would helpful if we ... did, break this down into finer points. So the question is, and this is a struggle I've been having, is what would those finer points be? I think we have this general conception that we need to do that, but what does that mean? Does that mean do we take a look at particular best practices in general? Biofuel, ventilation.</p> <p>Do we look at types of engines that are within different sectors of the ... mining industry? Coal versus metal? So it would good to hear some more specifics on what -- and hearing from not only our operators but even the engine manufacturers that are listening in today. What are some specifics in terms of helping NIOSH and MSHA make those next steps?</p> <p>... the next question I have is, Ed, ... I'm not quite sure what would be the differentiation between a memorandum with the partnership and a charter. ... So, in general, I agree ... that it would be good to have separate, more precise tracks on different topics, but I would appreciate a little bit more guidance on what they would be.</p>
F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Ed Green (mining industry counsel):</i>	<p>The document I'm talking about would be different than the charter. I think the charter is fine as far as the goals. It's a good post along the way too. But I think today, unless we get down on paper what ... happened today, we'll lose it.</p> <p>And I think a task that MSHA and NIOSH can do is that, once you've got the transcript along with the PowerPoints that, ... presenters used today, I think putting all that stuff together into a memorandum that they're not minutes, but it's basically a description of the things that were talked about today. And I think that will focus as sort of a good reminder to everybody about what we're talking about and can serve as a document from which we can then develop working groups and that sort of stuff, because we do need working groups. You know, the differences between the coal legal regime and the metal/non-metal legal regime is absolutely critical.</p> <p>And I hear loud and clear the comments from the Chrysler person and the, I think it was a Cummins person, about their frustration dealing with what MSHA requires and what EPA requires. You know, we can't fix that, but we need to at least identify it and see if there's anything that we can do to assist that. So I'm not talking about a modification, Sheila, to the charter. I'm talking about basically a memorandum that sets out what we discussed today and then maybe sets out some next steps, if you will.</p>
F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Mark Ellis (IMA-NA):</i>	I think that Ed's suggestion is a good one because I think you need a vehicle now to get feedback from other people and there needs to be a way to summarize what happened today and then say, either recommend as sort of a stalking horse, you know, what MSHA and NIOSH feel would be working groups that might be established, but ask the stakeholders for their input on that as well. You know, what should be the topics that the different working groups might address at the outset that would potentially serve as an agenda for each of those working groups to focus on those ideas.

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F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Ed Green (mining industry counsel):</i>	<p>Let me be very frank. I believe the objective of this partnership should be to see how we can proceed without developing regulations. We have a regulatory regime, and maybe it needs some tweaking, and I think what we ought to be doing in this partnership is to try to accomplish everything possible short of regulations, and that means that we have to also be responsive to MSHA's RFI.</p> <p>I'm mindful of Roz's recitation of the comments received in response to the questions that MSHA raised and her comments about the two executive orders. We need to have something that MSHA as the regulatory agency can point to that says, well, here's the answer to our Request for Information. I think the deadline is, what? January 28 or something like that? And also something that NIOSH can point to as sort of a document that NIOSH can use to help it carry out its research chores.</p>
F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Sheila McConnell (MSHA):</i>	<p>Ed, this is Sheila again. And I hear you and I want to, ... make sure that everyone understands that today's presentations were geared to looking at best practices within the current regulatory framework and, within that current regulatory framework, how can we improve miners' health. And I just want to enunciate that because there seems to be a lot of concerns vocalized by -- I mean, and true, a Request for Information is like a preliminary step at what agencies typically take in going down that path. But does that necessarily mean that's the case all the time? And so we should look at the RFI as a vehicle by which the stakeholders can submit information, data, cross-data, best practices that would allow us to help miners' health. Does that make sense?</p>
F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Sheila McConnell (MSHA):</i>	<p>Okay. But there seems to be a general concern and uncertainty, and I was thinking that today's presentation was geared to such that it looks like we are looking within the framework that we currently have and how can we protect miners' health, and there's room for improvement even within this current regulatory framework.</p>
F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Ed Green (mining industry counsel):</i>	<p>I'll be happy to help this out, by the way, but I think it would be very useful for NIOSH and MSHA to put your collective heads together and, again, put pen to paper and come up with a roadmap, if you will, for going forward. That's what I mean by a memorandum.</p>
F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Ed Green (mining industry counsel):</i>	<p>I'll be happy to help this out, by the way, but I think it would be very useful for NIOSH and MSHA to put your collective heads together and, again, put pen to paper and come up with a roadmap, if you will, for going forward. That's what I mean by a memorandum.</p> <p>MS. McCONNELL: Okay. And I don't disagree with you and I can't speak for NIOSH, but MSHA's willing to do that.</p>
F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Dr. Bugarski (NIOSH):</i>	<p>... in the past, we had diesel, ... partnerships with both, with coal side and with metal/non-metal. And I'm finding that, basically, we have hard time to reach part of the industry which has, actually, problems because there's small operations, stone mines, underground sand and gravel operations... I'm trying to understand are they represented in this partnership at all. Who is reaching them and how we are going to hear from them? How we are going to learn about their problems? Because I have very good experience working with Newmont, Stillwater, and, you know, big companies... But what might help, you know, with the DPM regulations with overexposures which are currently occurring is that we are not actually reaching all parts of the underground mining industry.</p> <p>And, you know, I'm so desperate to find access to that part and how to help them because, ... deeper analysis of exposure data will show you basically that most of the larger companies have their ducks in a row. But a lot of overexposure is actually occurring in small operations, ... with no structure to the, you know, new industrial hygienists, mechanics and this kind of stuff. So we need also to focus on that part of industry because, if we want to eliminate overexposures, I think we should focus on that part of the industry.</p>
F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Ed Green (mining industry counsel):</i>	<p>Alex, Ed Green here. I couldn't agree more with you and I think it seems to me that part of the document that I'm talking about should be to identify that problem and try to sort out how NIOSH, MSHA, and the private sector partners can help figure that out. We're not going to get an answer today, but I understand what your problem is.</p>
F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Dr. Matetic &amp; Sheila McConnell (MSHA):</i>	<p>DR. MATETIC: I think what everyone is saying here is once we're identifying the tracks that we all believe we need to move towards, then we need to get the right people in the partnership if they don't exist currently to make that happen. Is that what I'm hearing?</p> <p>MS. McCONNELL: And that's a challenge in itself, getting the right people in the room.</p>

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Comment Code	Comment Code Description	DCN	Commenter Name	Comment
F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Dr. Kogel (NIOSH):</i>	<p>... it's pretty clear what the next steps need to be. I think Sheila did a good job of articulating our challenges, NIOSH and MSHA, as far as taking that first stab at developing kind of what are the topic areas for these working groups. And I think I hear that we're all in agreement that that's how we need to go.</p> <p>We need to develop this document that is going to come out of this meeting. And so I think the next steps need to be NIOSH and MSHA to get together, go through that process. But I think we are going to -- because Sheila spent a lot of time already struggling with this question, and so I think what we can commit to do is to come back to this group, and not just those here in the room but everybody who's collectively involved in this, and we might come up with a list that we'll throw out there of areas where we'll ask you to please come back to us and give us your comments on that or, in the meantime, because it's going to take us some time to get to that point, if you have any thoughts about logical ways that we can organize this to advance this partnership and what we're trying to do here, we would really, really appreciate it because I think we're going to end up spending, you know, a lot this time and thought about what that should be and we may not come up with the best answer.</p>
F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Sheila McConnell (MSHA):</i>	<p>... what we can do is ... we'll just put a comment link to where they could send specific things on our website, a specific link to a mailbox. But in the meanwhile, they have access to my email address, and Roslyn Fontaine has also been emailing the community. So either way would be right now as an intermediate step to email either one of us. But then I think for moving forward, just of having a link to send comments, information out, you know, outside of this. So it's ongoing because the RFI will close and we'll need to move forward just to have a separate one. And that's what we'll do when we get back.</p>
F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Joe Sbaffoni (mining industry consultant):</i>	<p>Just an observation. It sure seems like a lot of the improvements that have taken place have been a result of cleaner engines. And I think it's imperative that you have the equipment manufacturers asking for direction. They need to get that direction because that's one of the biggest issues that we've faced throughout our history. We don't explain to people where we want them to get to.</p> <p>And I think we have the expertise in MSHA and NIOSH, but they need to get out of that mode of not knowing where they want to go. You know, it sure seemed to me like they were asking for some direction on where to go with the next design of cleaner engines. I think that's very important because it sure seems like all the improvement we've seen to this point is a result of cleaner engines.</p>
F2	Diesel emissions partnership	MSHA-2014-0031-0079	<i>Evelyn Stirling (Cummins Engine Co.):</i>	<p>Again, this is Evelyn Stirling from Cummins, Inc. We know where we're going in terms of cleaner engines. We're always working to do that. We have the Tier 4 final. We're going into stage five in Europe, which will also be Tier 4, which is hopefully making a more simpler engine. It allows us to take some of the after-treatment off. It allows us to take the EGR system off and still meet Tier 4. So, you know, from a manufacturing standpoint, we're always working to improve the emissions of the engine.</p> <p>But the frustration is understanding if, you know, MSHA are going to regulate to do that or not, because, currently, I'm also working to get a lot of the older product over Tier 3, not anything less than that, but Tier 3 and some Tier 4i and some engines which are basically Tier 4 but without the after-treatment approved in the system so they can be used to clean up older engines in there. So, yes, some of the improvements over time has made because of our emissions engines but also because miners have taken out some of the Tier 0, Tier 1 and maybe Tier 2 and put in Tier 3, which are repairable.</p> <p>I mean, I heard a lot in the discussion about people saying, you know, with the integrated engines, it is very difficult to repair current equipment. But some of the Tier 3s, et cetera, can be used to repair Tier 0, Tier 1, Tier 2 engines. So I think some of the benefits out there and some of the reductions we see aren't necessarily being from using Tier 4 interim and Tier 4. It's just been using later emissions and more electronic emissions. ... we're improving emissions all the time and we know the direction we're going to, but when it comes to working to see what we need get certified for the underground mining market, you know, just tell me.</p> <p>... I'm being asked all the time from OEMs or mines saying we would really like this Tier 3 product certified because now we want to use it. You know, so I'm investing in doing that work through MSHA, and, I mean, if that's not where people are going, then I don't want to do that investment. That's where my frustration is. I mean, it's not that I don't know where to develop the engines. We're doing that, and we're trying better and better to improve the emissions even beyond what EPA regulates.</p>