



Mr. Marvin Nichols, Director  
Office of Standards, Variances And Regulations  
MSHA  
1100 Wilson Boulevard, Room 2350  
Arlington, VA 22209

Re: MSHA Diesel Particulate Matter (DPM) Standards For Underground M/NM  
Mines

April 5, 2004

Dear Mr. Nichols:

FMC Corporation appreciates this opportunity to submit comments in response to the re-opening of the rulemaking record on MSHA's diesel particulate matter (DPM) rules, announced in the Federal Register on February 20, 2004 (69 FR, page 7881). FMC is an active member of MARG and has been an active participant in the ongoing NIOSH/NCI study efforts. We urge MSHA to conclude this proceeding as quickly as possible, including adopting the changes endorsed by the MARG Coalition, Nevada Mining Association and the NMA in prior comments. Most importantly, we again urge MSHA to act, now, in this rulemaking, to delete and revoke the January, 2006, permissible exposure limit (PEL) of 160 ug/m<sup>3</sup> total carbon (TC) and adopt the 308 ug/m<sup>3</sup> elemental carbon (EC) "settlement" standard, as the permanent standard for the control of DPM in underground metal and non-metal mines.

This rulemaking results from the interim, partial settlement agreement, dated July 15, 2002 (Interim Settlement), of the legal challenge to the January, 19, 2001 DPM rule; a rule that was rushed to publication on the last day of an outgoing Administration. The Interim Settlement acknowledged the need to address the gross errors in the rule, including the selection of an invalid DPM measurement surrogate and the erroneous feasibility and validity determinations underlying the 2002 and 2006 standards.

Based on this agreement and reserving their positions and litigation rights, the Agency committed to an expedited rulemaking that would adopt needed changes and the industry agreed to a July 2003 implementation of a 308 EC standard, including provisions for renewable, one year feasibility based extensions, and the use of personal protective equipment and administrative controls. Additional compliance assistance, research and technical feasibility efforts were also agreed to in the Interim Settlement.

Almost two years have passed since the Interim Settlement without concluding this critical "expedited," rulemaking, leaving agency personnel, mine operators and employees to struggle with implementation and feasibility issues, without the benefit of

most of the critical changes envisioned by the Interim Settlement. As predicted by industry comments and confirmed by MSHA's compliance assistance sampling, MSHA DPM enforcement sampling now is producing significant compliance issues with the  $400\mu\text{g}/\text{m}^3$  /  $308\mu\text{g}/\text{m}^3$  EC standard from both the Agency and individual operators. MSHA's sampling results posted on the web site (as of September 30, 2003) indicate that 51% of the mines were not in compliance with the  $400\mu\text{g}/\text{m}^3$  TC /  $308\mu\text{g}/\text{m}^3$  EC standard, and virtually all of the mines recorded results above the  $160\mu\text{g}/\text{m}^3$  TC PEL. The January 2006 deadline for the  $160\mu\text{g}/\text{m}^3$  TC standard is rapidly approaching without a regulatory resolution in place.

Unfortunately, the rule rushed to publication on January 19, 2001, did not have a sound scientific, engineering, or economic basis, and work that should have been completed prior to the adoption of the rule is only beginning to be available now, after its adoption, and reflected in the new documents in this rulemaking record. The Mine Act places research responsibility with the National Institute of Occupational Safety and Health (NIOSH) and that agency was in the midst of conducting essential DPM research when the premature rule was adopted on Jan. 19, 2001. In fact, the MSHA adoption ignored the express instruction from the United States Congress that the DPM rulemaking should be informed by NIOSH research.

The new documents in the record again demonstrate that there is neither scientific support nor a feasible means of compliance for the 2006  $160\mu\text{g}/\text{m}^3$  TC standard (and even the settlement standard). These new documents, like the rest of the rulemaking record, provide substantial evidence that will allow MSHA to: (1) delete and revoke the January 2006 160 microgram total carbon PEL; (2) adopt a renewable, one year compliance extension application process for the 308 EC standard based on feasibility issues; and (3) apply existing regulation and policy to the DPM rule to permit the use of personal protective equipment and administrative controls for employee protection.

### **Stillwater Study – Phase 1 Report And Phase 2, Case Study Report Comments**

The first document submitted for the record on which MSHA seeks comments presents the results of in-mine testing of diesel particulate matter (DPM) control technologies at Stillwater Mining Company's Stillwater Mine. Stillwater provided its facilities, personnel, and resources to the NIOSH Metal/Nonmetal Diesel Partnership, which includes MARG, and in which MSHA personnel participated. The Phase 1 report cannot be commented on without inclusion of the Phase 2 report, as the two studies were a combined effort to determine filter feasibility and efficiency as well as attempt to determine effectiveness and functionality in actual mining activities.

“The objective of the first phase was to establish the effectiveness of the selected technologies in reducing diesel emissions by using an isolated zone methodology. The objective of the second phase was to assess the effectiveness of diesel particulate filters in controlling the exposure of underground miners in actual production scenarios.” *Phase 1 report, page 5*

Stillwater's contribution to developing an overall understanding of Diesel Particulate Filter (DPF) technology is invaluable in the partnerships efforts to be proactive in finding

solutions to the control of DPM. Many significant issues surrounding feasibility, program implementation, and secondary health hazards associated with the filter technology were realized from these efforts.

As reflected in the report, the objective of the Phase 1 study, conducted in an isolated zone (“Isozone”) of the Stillwater Mine, was to determine the “viability of DPF systems and establish confidence in their performance.”

“This short-term study addressed some issues related to the selection and installation of filtration systems, but was not able to address other important issues related to the implementation and operation of DPFs, namely regeneration of DPF systems during the production cycle, their reliability and durability. Addressing these issues will require long-term studies with continuous monitoring of performance of the DPF systems and periodic emissions testing.”- *Phase 1 Report, Page 6*

The first specific and detailed comments we submit for the record regarding this Phase 1 Report is the NIOSH March 26, 2004, Phase 2 Report (Case Study) (Attachment 1), which we provide for inclusion in the record.

The isolated-zone created for the Phase 1 test was an underground laboratory not reflective of actual mining conditions. The results obtained in the isolated-zone test are applicable to the limited equipment that could be fitted with DPFs and are not representative of actual mining conditions, or of the current fleet of equipment in use at Stillwater or in the metal/non metal industry. Yet, the Phase 1 study partially fulfilled its objective and demonstrated that, as tested in the isolated-zone setting on the limited equipment capable of using the DPF systems, the systems were capable of performance as designed and advertised. From an operator’s perspective, the Phase 1 study was well suited for its initial objective; however, it provided no reliable data to indicate that the selected filter technologies would in fact provide the necessary control of DPM in an actual mining application. (Note that in the Phase 1 report, testing was mostly performed at ventilation rates above the MSHA nameplate requirements.) Thus, the Phase 2 Case Study was developed in an effort to provide this relevant information.

The isolated zone test demonstrated a possible feasible control system, for a small fraction of the equipment in use, which remained to be tested during actual mining conditions for safety, efficiency, and durability. The results do not demonstrate that feasible controls exist to achieve compliance with the current or pending MSHA PEL, but provided the first steps towards examining actual feasibility of compliance. This study work should have been completed long before the DPM rule was rushed to publication.

As reflected in the introduction of the Phase 1 Final Report, the partnership committed to a second phase of testing to “assess the effectiveness of diesel particulate filters in controlling the exposure of underground miners in actual production scenarios.” The Case Study, Phase 2 report explains and applies the lessons of the Phase 1 Study and provides critical safety and feasibility information regarding the use of DPF systems in actual mining conditions. The Case Study Phase 2 report of the NIOSH Partnership,

conducted with full participation by MSHA representatives, is essential to the completion of this regulatory proceeding and also should have been conducted prior to the adoption of the DPM rules.

The Case Study demonstrates the extreme difficulty of achieving compliance with the  $308\mu\text{g}/\text{m}^3$  EC PEL, the addition of severe hazards to miners created by DPFs (particularly if compliance experiments are mandated through field enforcement), and the lack of a feasible means to comply with the 2006,  $160\text{ ug}/\text{m}^3$  TC PEL.

The Phase 2 Case Study also demonstrates the technological limitations that mines will encounter during attempted DPM reduction efforts in the actual mining cycle. Equipment failures and performance below that obtained during the isolated zone testing, and as advertised by manufacturers, were commonplace and will be repeated as these technologies are deployed elsewhere. Indeed, the report notes that:

“... the efficiencies for the DPF systems achieved in the mining studies did not always agree with the efficiencies reported in the laboratory studies. These studies also demonstrated that considerable effort is needed to select and optimize DPF systems for individual underground mining applications.”

Moreover, the Phase 2 test could only include those pieces of equipment for which a DPF system could be retrofitted as also noted in the Phase 1 testing. Importantly, this category represented only a small fraction of Stillwater’s underground diesel fleet, leaving the vast majority of the fleet to future controls that have yet to be developed or tested, or to premature replacement, secondary health hazards to miners, an economic threat to the mine never intended, envisioned or analyzed by the DPM rulemaking.

The inherent assumption underlying the January 19, 2001, DPM rules, the MSHA feasibility analysis, and the MSHA “Estimator” used to analyze the rules, was that effective and inexpensive DPFs were available and could be readily retrofitted to the mining fleet. That basic assumption, severely criticized by independent engineering experts during the prior phase of this rulemaking, was proven wrong, again, by the Stillwater tests.

Of greater importance, the Phase 1 Report and the Phase 2 Case Study prove the dangers inherent in promulgating rules and mandating technology changes, before feasibility and safety is proven. As reported in the attached NIOSH Case Study Report, the very technology that justified MSHA’s feasibility determination for rule, and appeared promising in the Isozone Phase One study, produced such high levels of  $\text{NO}_2$  in actual mining conditions that the miners were withdrawn and the test stopped to prevent an imminent danger. This hazard was also noted during the Phase 1 study, which led to the premature ending of testing during one test and very close observation of  $\text{NO}_2$  levels during others.

The Phase 1 Report, Page 54, states: “...a significant increase in the number of particles, approximately 80 percent, was evident for both cases when mufflers

*were replaced with DPFs. It was further hypothesized that these particles were primarily other known constituents of DPM although no data was collected to support this hypothesis.”*

While the risks of increasing the quantity of these other particles is unknown, the premature nature of MSHA’s rule is again demonstrated by this result.

The Stillwater Phase 1 Report and the Phase 2 Case Study demonstrate the need for adopting the proposed one-year, renewable extension process for mines that encounter feasibility problems in meeting the 308 EC settlement standard, as well as the proposed rule applying existing PPE standards, administrative controls, and policy to the settlement PEL.

This critical work also reinforces the urgent need to delete the 2006, 160µg/m<sup>3</sup> TC PEL in this rulemaking. Without action now, the 160µg/m<sup>3</sup> PEL will become effective in 18 months and there is no feasible compliance method on the horizon. Under controlled “actual mining” conditions, with NIOSH, Stillwater and MSHA experts overseeing the tests, the Phase 2 Case Study samples downwind from the equipment and personal samples were well in excess of the 160µg/m<sup>3</sup> PEL (Page 18, Phase 2 Report, March 26, 2004). Moreover, recent MSHA DPM sampling reported on the MSHA web site indicates that mine operations continue to struggle with compliance to the Interim Standard even with the utilization of applicable DPF technologies, alternative fuels and ventilation upgrades. This data also reflects the low probability and economic uncertainty of compliance with the Final Standard of 160µg/m<sup>3</sup> prior to the effective date.

The experience gained in the NIOSH Case Study at the Stillwater Mine is extremely relevant to this rulemaking and the Phase One Isozone Study. The March 26, 2004, report provides information and comments on “latest scientific data” discussed in the Stillwater Phase One Report and throughout the rulemaking record. It reflects the experience gained under the MSH Act, led by the federal agency designated to conduct research for MSHA. It provides valuable information; particularly since there is no similar DPM rule or experience at any other federal agency regarding diesel exhaust exposures in underground construction tunneling, trucking, rail, or other diesel exhaust exposure conditions. The Phase 1 and Phase 2 reports in combination, provide the necessary information to allow MSHA to quickly conclude this rulemaking including revoking the 2006, 160µg/m<sup>3</sup> TC PEL.

The breakdown of valuable information gained during the two studies includes several important factors. First, a “one size fits all” filtration system is not currently available for all mining equipment. Utilization of DPF’s is dependent on equipment size constraints, duty cycle and thermal cycles, mine opening constraints and even requirements for permissible equipment utilized in the metal/nonmetal sectors.

Secondly, the Phase 2 study demonstrates that durability and economic feasibility constraints, not previously analyzed by MSHA, exist regarding DPF use. For example, the Phase 2 study indicates a need to replace filters much earlier in the operating cycle than previously believed necessary, (i.e. when a “smoke test” indicates filter efficiencies

are beginning to deteriorate). A mine operator could have expected to change out a filter when the smoke test reads '8' but can not economically replace filters when the smoke test reads '2' or '3'.

Third, the Phase 2 Case Study confirms the failure and lack of feasibility of "off board" regeneration DPF's at Stillwater and their probable failure at many other mines. These systems require additional, new underground excavations to install the regeneration equipment and provide extensive parking areas for the hundreds of units of equipment that would have to travel great distances at the end of shift. Mines with difficult ground conditions or those that design their underground drifts based on a delicate balance of maximizing width and the safety of ground support, can not sustain the increased risks of ground falls that these new excavations would pose.

The premature nature of the rule is again demonstrated by the need to explore the use of these off board regenerations systems in a search for workable technology. MSHA's analysis justifying the rules never anticipated the substantial new safety risks and costs for new excavations, power and a direct exhaust ventilation from the parking area, nor the substantial increase in accident risks, production interference and loss due to increased tramming time at the beginning and end of shift to either plug in the equipment or transfer filters.

Finally, and most importantly, significant secondary health issues arise from the utilization of DPF's. NO<sub>2</sub> generation has been recognized as significant in both the Phase 1 and Phase 2 studies from the use of passive DPF's, to the extent that these units produce enough NO<sub>2</sub> to exceed the MSHA Ceiling limit of 5ppm requiring that the affected miners must be withdrawn from the mine. In the Phase 2 testing, one test was aborted when NO<sub>2</sub> levels exceeded the Ceiling Limit in excess of 80,000 cfm in the main ventilation on the 35W Footwall Lateral as observed by all participants, including MSHA representatives. Two machines operating with fairly new lightly wash-coated filters produced this elevated concentration; this scenario is likely to occur many times with any production fleet. Consequently, one test was completely deleted from the study schedule since the test was not going to change any of the filters and was going to be performed in the same area, unnecessarily exposing miners to elevated NO<sub>2</sub> concentrations for a second day. Testing was also prematurely ended during the Phase 1 study due to NO<sub>2</sub> concentrations above the MSHA Ceiling limit. Other issues involving safety would include runaway regeneration that would affect many more miners in the air split and the unknown effect of the increased particle concentrations in the air demonstrated by the Phase 1 study.

### **The Chase Report**

Akin to the Stillwater Study, the report by Dr. Gerald Chase, "Characterization of Lung Cancer in Cohort Studies and a NIOSH Study on Health Effects of Diesel Exhaust in Miners", also supports the deletion and revocation of the 160 µg/m<sup>3</sup> TC PEL. As comments on the report, and to place it in perspective, we provide for the record the NIOSH data summaries upon which it is based (Attachment 2), of which FMC was a

participant. It is also noteworthy to mention that MSHA representatives were participants in the Federal Register announced public meeting, where the data was presented by NIOSH and NCI, and copies were made available to the public by both the agencies and by Dr. Chase.

FMC, in agreement with the rest of the mining industry, has long maintained that MSHA's actions regulating DPM exposure should be guided by the results of the multi-year, multi-million dollar study being conducted by NCI and NIOSH. Regrettably, despite repeated requests, and Congressional directives that MSHA's rulemaking should be informed by the study, MSHA's previous Assistant Secretary chose not to await the results of this important study, even though it is recognized as the most informative scientific study of the effects of DPM exposure on the very population that the regulations seek to protect.

Since promulgation of the final DPM rule for underground metal/nonmetal mines the first study results were made publicly available. Dr. Gerald Chase, in his analysis of the data, found that:

The "number and pattern of lung cancer deaths reported ... are in agreement with lung cancer deaths from the general population ... and **less than what NIOSH appears to have predicted.**"

The ramifications of Dr. Chase's conclusion cannot, and should not, be ignored. The NIOSH/NCI study data proves the validity of the earlier comments submitted to the record, and that the MSHA PELs are not justified by the agency's faulty risk assessment, nor by any credible scientific evidence. Dr. Chase's conclusion also supports the Agency's duty to delete the 2006,  $160\mu\text{g}/\text{m}^3$  TC PEL.

MSHA's decision to promulgate the DPM standard was premised on two principal health concerns: (1) the transitory, reversible health effects of exposure to DPM and, (2) the long-term impacts that may result in an excess risk of lung cancer for exposed workers. Neither the  $160\mu\text{g}/\text{m}^3$  nor  $400\mu\text{g}/\text{m}^3$  TC standards adopted by MSHA's premature rule were based on scientific evidence supporting health effect risks at these PEL levels. No dose/response relationship related to the PELs could be demonstrated by MSHA, and EPA's review of diesel health effects science concluded that such a relationship is not supported by the scientific evidence. The NIOSH/NCI data and Dr. Chase's analysis and conclusion again supports the validity of the comments submitted by Dr. Jonathan Borak (Yale University Medical School) demonstrating that MSHA's health risk analysis underlying the PELs is void of any credible scientific basis.

Thoroughly reviewing the public record will reveal that the dire predictions of MSHA's flawed risk analysis, supposedly justifying the PELs, are contradicted by the NIOSH/NCI data from the study of 14,000 miners, including the miners at FMC, exposed to diesel exhaust over the last 45 years. The lack of excess risk shown to date by the NIOSH and NCI data is startling evidence rebutting MSHA's PELs and risk analysis. The lack of excess risk in the mining population is even more startling given that the exposures of the miners in the study were orders of magnitude higher than the PELs since they began

working in the mines when the first diesel engines were introduced. The percentage of lung cancer deaths for FMC miners falls within or below the expected range for white males within the general population. This information is great news for our miners and should be evidence enough for the Agency to quickly strike the  $160\mu\text{g}/\text{m}^3$  PEL.

Of course, the Chase report and the NIOSH/NCI data is preliminary in nature and further data will be available over the next two years. But the Chase report and the NIOSH/NCI data support the conclusion of Dr. Borak and EPA, which alone mandate the deletion of the  $160\mu\text{g}/\text{m}^3$  TC PEL as: (1) not addressing a significant or demonstrated risk nor providing any identifiable benefits; (2) inconsistent with sound science, the latest scientific evidence, and actions of other agencies; and (3) inconsistent with sound science and data quality mandates.

### **The NIOSH Respirator Report**

The final item added to the record is a report prepared by Bureau of Labor Statistics and Centers for Disease Control and Prevention/NIOSH providing the results of a voluntary survey of respirator use and practices in private industry during the period August 2001 – January 2002. The report provides general information on respiratory protection use and practices across all industry, including mining. We are pleased that the report documents that many mining companies, like FMC, make respiratory protection available to their employees based upon accepted standards regarding health surveillance, training, fit testing, etc. While the data may be informative, its voluntary basis, limited validation, and lack of detail renders it of little use in any effort to change the existing respirator standards. The report does provide broad support for MSHA's proposal to permit the use of personal protective equipment for DPM exposures, in a manner consistent with existing regulations and policy.

This rulemaking proceeding does not provide any specific, proposed rule changes to the current respirator standards, and it should not be extended to do so now. Such an extension would violate MSHA's rulemaking mandates, including its notice and comment duties, and render impossible the completion of this rulemaking to achieve compliance with the Interim Settlement. The respirator standards are complex and generic to all potentially harmful environments. Proposing changes to the respirator standards create multiple technical, scientific, medical and economic issues that must be closely examined from the perspective of MSHA's statutory mandates. OSHA respirator rulemaking proceedings demonstrate the vast number of issues that must be addressed in proposing to change the respirator standards and the impossibility of addressing such issues in this DPM rulemaking. It is simply inappropriate to consider respirator standard changes in an "expedited" rulemaking limited to the DPM standard.

The Proposed Rule published on August 13, 2003, in accordance with the Interim Settlement, recognized the traditional and established role that personal protective devices can, and must play a part, as operators develop strategies to reduce miner's exposure to DPM. We are pleased that the limited voluntary survey, that predates the settlement and Proposed Rule, documents the role of PPE in protecting miners' health. We oppose, however, any change to the current respirator standards in this rulemaking.



## **Summary**

In conclusion, we again urge expedited action by MSHA in finalizing this rulemaking consistent with the Interim Settlement Agreement, including: (1) the deletion of the January, 2006  $160\mu\text{g}/\text{m}^3$  TC DPM standard; (2) the permanent adoption of the  $308\mu\text{g}/\text{m}^3$  EC settlement standard; (3) adoption of the compliance extension provisions for the  $308\mu\text{g}/\text{m}^3$  EC standard to permit yearly applications and approvals based on feasibility issues; and (4) adoption of personal protective equipment and administrative control options, to supplement engineering controls, pursuant to existing standards and policy.

Thank you for the opportunity to provide these comments on behalf of FMC Corporation.