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VIA EMAIL AND FEDERAL EXPRESS

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Re: Observations about May 4 Presentation on "Findings of the HEI Diesel Epidemiology Project"

Dear Mr. Greenbaum and Dr. Krewski:

On behalf of Tronox Alkali, thank you very much for the opportunity to offer the comments I made following the May 4 "Findings of the HEI Diesel Epidemiology Project" presented at the Health Effects Institute ("HEI") Annual Conference in Philadelphia, PA. My purpose in making those brief remarks was to give you and the members of the HEI Diesel Epidemiology Panel some real world "in the field" background context for the Panel's consideration with regard to our Westvaco Mine, which was one of the participating mines in the Diesel Exhaust in Miners Study ("DEMS").

The purpose of this letter is to follow up on the oral comments I offered, especially in light of the confusion I have learned about on the part of some Conference attendees that our Westvaco Mine never used diesel engines. Frankly, I found that confusion to be shocking. In order to correct that error, you will find Attachment A, "Comments on Westvaco Trona Mining Operations and Use of Diesel Equipment," containing information on the Westvaco mine and some comparative information on the seven other mines that participated in DEMS. I am also

sending Attachment B, "Comments on Uncertainty in the Estimates of Respirable Elemental Carbon Emissions and Exposures." This attachment addresses important considerations related to the respirable elemental carbon exposures of the workers who were participants in DEMS. Our consultant, Dr. Roger McClellan, assisted in preparation of these attachments, especially Attachment B.

Let me note that part of my motivation for preparing this letter is a desire to see the robust discussion initiated at the May 4th session continued. It would seem reasonable that individuals in attendance, as well as other interested persons not able to attend the session, be given a period of time to offer comments after the visuals for the session were posted on the HEI website. The comments should be useful to the Panel as it completes its assignment. In my view, the determinant of when the assignment is completed should be based on whatever time is required for a scientific based evaluation of all the evidence as contrasted with any process driven deadline HEI might have given to itself. My proposals at the end of this letter, as well as my request for a face-to-face meeting with both of you, are offered in this spirit of dialogue between the HEI and its stakeholders. Such communications are in the best interest of transparent and thorough scientific investigations which I understand is the hallmark of HEI.

By way of brief introduction, I am Vice President, Manufacturing of Tronox Alkali and the Resident Manager of Tronox's Westvaco Trona Mine and soda ash processing facility in Green River, Wyoming, and have been in this latter role since 2010. Trona mining at the Westvaco Mine dates back to the 1940s, with diesel equipment first used in the mine in 1956. Trona is a naturally occurring nonmetallic mineral that is chemically known as sodium sesquicarbonate. It is the raw material that is refined into soda ash, which, in turn, is used to make glass, paper products, laundry detergents, sodium bicarbonate (baking soda), and a variety of other products. The Green River trona deposit (often called the "trona patch") is the largest and purest deposit in the world, supplying nearly all of the nation's soda ash needs. The discovery of this deposit marked the first time that a solid body of trona was discovered and commercially mined, at least in the United States.

Trona mining is the backbone of the local economy. Together, the four trona producers in Green River employ 2,500 workers, a large percentage of the total 12,515 residents in Green River. It is also estimated that trona indirectly creates an equally large number of jobs in the local community. The mean household income in Green River is almost $20,000 higher than the state's median income and the industry is credited with increasing the county population.

Our surface facilities are really chemical plants which refine the trona mined from our extensive ore bodies underground. Under federal mine safety and health law, however, the entire operation (both surface and underground) is regulated as a "mine," and all of our employees (both hourly and salaried) are legally considered to be "miners." Approximately 150-300 employees work underground at any given time, and there are about 200-350 employees working on the surface in the processing plants. Our hourly workers are represented by the United

Steelworkers of America (and have been for many years). We are proud that the relationship between labor and management is generally good.

To make certain that you understand our interest in the HEI Diesel Epidemiology Project (and to eliminate any confusion), we make use of diesel-powered equipment at Westvaco to augment our extensive use of electric-powered machinery. Electrical-powered equipment is used to mine the trona ore at what are called faces, transport it at the mine horizon over miles via conveyors to central shafts, which are up to 1600 feet in depth, and then hoist the ore to the surface for processing. Most importantly, all of our ventilation equipment is electrically powered. Our mine is highly ventilated since it is a "gassy" mine with potential for build-up of methane and, thus, concern for explosions or fires exist. Our ventilation dilutes any methane that may be liberated during the mining process and sweeps it away, rendering it harmless. Because of these methane hazards, federal mine safety law requires that all of our electrical powered equipment used in the mining faces also must be approved by the federal Mine Safety and Health Administration ("MSHA") as "permissible" for use in a "gassy" environment. This means that the equipment is designed, constructed, and installed so as not to cause a mine explosion or mine fire.

When and where we use diesel-powered equipment depends on several factors, including the tasks at hand, engine efficiency, and horsepower needs. Diesel-powered equipment is used primarily to transport personnel and material from the bottom of the shafts to the mine's working faces and in support operations. In light of our use of diesels, when we learned in the late 1980s about the interest of NIOSH and the NCI in conducting a study of the health effects of diesel exhaust on underground nonmetal miners, we volunteered to participate in what became DEMS. We are "Mine I" in DEMS. The history of DEMS is a long one. Without getting into the weeds on that history, simply put, the DEMS mines became concerned about the scientific integrity of DEMS and the relationship between the DEMS mines and NIOSH/NCI became adversarial. About three years ago, we at Westvaco decided to "push the reset button" with the two agencies and to step aside from the then still ongoing battle being waged by the other DEMS mines with NIOSH and NCI. The basis for our decision was straightforward and specific: that being the health and safety of all our employees is a primary concern of our entire management team. Not only are we obligated by law to provide a safe and healthful workplace for our employees, but also it's important for you to know that the Green River area comprises several small, close-knit communities where we're all neighbors, friends, and family. In that regard, we worked hand in glove with NIOSH to prepare worker notification information, which was sent to our workers and their families by NIOSH in January 2014. The bottom line (and the reason we pushed the reset button with NIOSH/NCI) is if occupational exposure to diesel exhaust poses health problems, we wanted to know about it—and we wanted our employees to know about it.

This is a good place to tell you that during the time noted above, the Westvaco Mine was owned and operated by FMC Corporation. The Mine was sold to Tronox Limited and became Tronox Alkali, effective on April 1, 2015. I'm happy to say that the shift in ownership has been

seamless. That is especially the case in Tronox Alkali's commitment to the well-being of our workforce.

In light of the foregoing, we want you both to know how pleased we were when we learned that HEI planned, at the request of the EPA and its industry sponsors, to conduct an evaluation of current epidemiological literature as to its use for quantitative risk assessment. Our advisors, Dr. McClellan and Ed Green, had positive things to say when they briefed us on HEI. When I went to the HEI website, I was personally happy to read about HEI's origins and mission "to provide high quality, **impartial**, and relevant science" on the work it carries out. My good feeling carried over to the May 4 meeting when I picked up my program and saw on the cover the slogan "**Trusted Science** ▪ Cleaner Air ▪ Better Health."

At this juncture, I want to say categorically that Tronox Alkali has no vested interest in any specific outcome of the HEI Panel's work. We applaud the efforts of the HEI. It was terribly disappointing, therefore, to see the PowerPoint presentation of the HEI Diesel Epidemiology Panel and to listen to those Panel members who spoke during the session. As I listened, I was upset that the Panel had never taken the time to visit any mines—not to mention any of the DEMS mines. As best I could tell, the Panel did not have the slightest understanding of how any diesel fleet functions underground, not to mention any dieselized pumps, fans, etc. I was puzzled that the Panel seemed to make scant acknowledgment of the significant differences among the DEMS mines with regard to how diesel engines are utilized in each of the mines, the engine types and horsepower, and, most significantly, the differences in ventilation rates.

I was also disturbed that the Panel sounded as if it were giving short-shrift to the work of the independent researchers who had re-analyzed the DEMS data for the Engine Manufacturers' Association ("EMA"). I found it surprising that the Panel had not made any effort to examine some of the key DEMS data, especially related to the specific diesel equipment used in the various mines. And, finally, I was angry to hear Professor Kaufman speak in such a disparaging way about industry funding of these independent researchers. I scribbled down what he said. It was along the lines of "having a strong interest in what the results show is a poor approach to addressing model selection bias." Mr. Greenbaum and Professor Krewski, that sort of comment has no place in an "impartial" organization which strives to produce "trusted science"—and, frankly, it indirectly attacks my own personal integrity.

It's not my intent to disparage Professor Kaufman, the HEI Panel, or HEI itself. For that matter I was pleased with the discussion of radon as a potential carcinogenic hazard. You should know that at our mine large amounts of ventilation are used to effectively control radon levels. It was also important to point out, as the PowerPoints did, the major differences in the estimated comparisons of diesel exhaust hazards among the different DEMS mines and between ever-underground and always underground miners. These kinds of presentations are of great interest to me and to our employees, because we want to understand the relevance of the results of the several analyses of the DEMS data to past and current employees in the Westvaco operations.

Thus, our interest in the contents of HEI's final report is two-fold. First, we want the final report to be as comprehensive as possible in presenting the strengths and weaknesses of all the DEMS data and the various reports that have used it. This includes the original exposure assessments and the latter assessments conducted with industry support, as well as the epidemiological analyses conducted by the original investigators and the subsequent studies carried out with industry support. Second, we are very interested in the evaluations being presented in a manner such that readers can clearly understand the association between cigarette smoking, radon exposure, and diesel exhaust exposure and lung cancer in surface workers, always underground workers and individuals who worked in both locations. On that point, you should know that smoking is prohibited in the underground areas of the Westvaco Mine because of the potential presence of methane. Obviously, our workers are most interested in the findings for the Westvaco trona mine and the other two trona mines, and similarities and differences in findings among the operations mining and processing the four different types of ore (trona, potash, salt and limestone).

On the whole, I have grave doubts as to whether, in its form as presented at the Conference, the draft HEI Panel's report meets the high standards of your organization. I personally, and on behalf of Tronox Alkali, would like to see a report that does what it set out to do—a report that will fairly (in an unbiased way) evaluate the evidence before it and provide a useful analysis of the strengths and limitations of the multiple studies that have used the DEMS data for use in quantitative assessment of the lung cancer risks associated with exposure to diesel exhaust.

With that objective in mind, before the final report is published, I propose to you and the HEI Panel of Experts the following approach:

- Please visit our Westvaco Mine, per my invitation at your Conference, to see how our diesel-powered equipment is used and to talk to our employees. I'm convinced that seeing first hand our underground and surface operations, you and your colleagues will gain an appreciation for how diesel-powered equipment is and has been used at our facility, as well as the high degree of attention management and, indeed, all workers give to health, safety, and protection of the environment. In connection with that invitation, and to give you some flavor of the use of diesel equipment and the ventilation in our mine in 1982, I have attached summary information taken from the DEMS data files obtained by the EMA in Response to a Freedom of Information Act ("FOIA") request.

- Please ask the Panel to spend sufficient time reviewing the DEMS data so you can have a better sense of the exposure assessments and epidemiological analyses conducted by the independent investigators funded by the EMA coalition and be able to weigh and balance them more effectively. At the May 4 meeting, as an aside, Professor Krewski asked if I would share with him detailed data on our mine. The aforementioned tables will aid his understanding; but the mine-specific data obtained

by the EMA from the NCI is worth examining. I had understood that EMA had provided this data to the HEI, so I was surprised when Professor Krewski seemed to be unfamiliar with it. Out of an abundance of caution, I'm going to have that data sent to both of you on CDs with the hard copy of this letter.

- Please hold another public workshop like that held in Boston in March 2014. I received very positive comments that the March Workshop stimulated the exchange of information and robust discussion. I think that if the Panel undertakes my proposals above, enough new knowledge will then have been learned to warrant another workshop for further transparent public discussion.

Gentlemen, to discuss our concerns further, and the proposals above, I would very much appreciate having a face-to-face meeting with both of you and with our advisors Dr. McClellan and Mr. Green. I think a frank discussion among us will be very useful in ensuring we understand one another. We will be happy to meet in Boston, Ottawa, or any other place you both find convenient.

When all is said and done, Tronox Alkali is hopeful that HEI's final report will be impartial and trustworthy so that it will provide value to NIOSH, MSHA, OSHA, and the EPA, as well as to our Green River community, our governor, and the Wyoming Congressional delegation. I have heard that you both have decided to close the door to further input from interested stakeholders. For the reasons I've addressed above, I think it would be a terrible mistake for HEI to do that. Our elected representatives understand the substantial economic benefits to Wyoming and the Nation of the trona industry. You should know we are very proactive in engaging our elected officials. In that regard, our Congressional delegation, in particular, has a special interest in issues related to access to data and how it is used to impact federal policy and regulations.

We'd much rather be able to tell them about a positive experience with HEI, as opposed to our present very serious concerns about an unbalanced, if not downright biased report. We know they will be interested in ensuring that, as a public-private partnership, HEI does, indeed, carry out high quality, impartial, and relevant science that all stakeholders and the American public can trust. I fear the draft report simply does not meet these high standards.

Again, thank you for the opportunity to speak at the May 4 Conference. I do hope you find this letter and its attachments to be constructive. That is certainly the spirit in which we provide this information to you. In that light, I urge you to share this letter and its attachments with all the members of the HEI Panel since the scientific issues raised are so central to the Panel's deliberations. Indeed, the technical content and discussion in the attachments are so critical to the Panel's scientific review that I cannot fathom why you would not want to share it with your colleagues. In particular, the attachments raise serious scientific concerns that need to be examined and addressed by Panel members such as Professor David Foster. He fully

understands how diesel technology has developed and changed since 1947, when the first DEMS mine was dieselized.

Please let me know if you have any questions. I will look forward to hearing favorably from you both about meeting and our proposals.

Sincerely,

Fred von Ahrens
Vice President, Manufacturing
TronoxAlkali
Resident Manager, Westvaco Mine

Attachments