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ESTABLISHING CAUSATION IN AN AMBIENT AIR QUALITY NUISANCE ACTION

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Establishing Causation in an Ambient Air Quality Nuisance Action

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Introduction

When twenty thousand people living in two Detroit communities complained about air emission fallout from a nearby steel mill, proving causation in a nuisance class action seemed simple. The metallic dust, or "kish," blanketing the residents was a well-known by-product of integrated steel mill operations. Many residents regularly witnessed releases of particulate matter over the years and the more dramatic releases had even been photographed.

The Michigan Department of Environmental Quality–Air Quality Division (MDEQ-AQD) had already cited the steel mill for air emission equipment failures and the United States Environmental Protection Agency (EPA) had listed the steel mill on its "Highest Priority Offender List." The particulate matter (PM) emitted from the steel mill had to be the source of the fallout that coated the residents' property and made a mess of their daily lives.

However, every "slam-dunk" case has its problems and this case would prove to be no exception. The integrated steel mill was only one of many industrial plants in the highly industrialized community and the affected neighborhoods were consistently showered with PM emissions. Furthermore, there was another steel mill located about two to four miles in an apparent upwind direction from the affected communities. Therefore, detailed investigation, testing and sound expert analysis were needed to scientifically verify the obvious, establish causation, and satisfy the Daubert criteria.

Strategy and Scientific Investigation

Although the observational evidence and the administrative record suggested a direct causal relationship between the integrated steel mill's emissions and the fallout, it was necessary to identify all of the potential material sources of local PM fallout and, if possible, identify a specific marker for the source(s). Working with an expert, the following plan was designed to collect air quality test data in sufficient quantity and quality to provide a valid scientific basis for our expert's opinion:

(1) Characterize and quantify what was being emitted from the steel mill;
(2) Characterize and quantify the ambient air quality and fallout within the communities;
(3) Identify other potential industrial and non-industrial sources of the PM;
(4) Characterize and quantify what was being emitted from the other identified sources;
(5) Develop an Air Quality Profile (AQP) for the communities and an Air Emission Profile (AEP) for the identified sources; and
(6) Compare the profiles and determine what sources, if any, matched the AQP for the communities.

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Field reconnaissance, examination of aerial photographs, and review of MDEQ and EPA records regarding the industrial PM air emission sources in the affected area established a long list of potential industrial sources of PM air emissions, including the suspect integrated steel mill facility. Concurrently, an ambient air quality sampling station was installed within one of the affected communities near the local steel mill. This initial sampling and testing was designed to analyze a wide spectrum of air pollutants, including PM, as a means to survey the ambient air quality for potential source markers and to develop the AQP.

The results formed a baseline for the ambient air quality monitoring (Baseline) which was pivotal in defining the overall ambient air quality. The Baseline measurements also helped with source identification and the analysis of likely causes of the fallout. The degree of confidence in the Baseline data was high because of its representativeness and reproducibility, which were validated by comparing the results to those obtained by the MDEQ-AQD at an ambient air quality monitoring station located within the same community.

Tracking the Fallout

The Baseline data indicated the presence of metals in the PM, including Manganese. Based on this information, it was reasonable to assume that the Manganese present in the PM was likely also present in the fallout. The concentration of Manganese in soils within the affected communities was

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investigated by collecting soil samples for testing. Samples were also collected and analyzed from neighboring communities, including communities near the other steel mill, and cities remote from the affected communities.

The sampling and testing indicated substantial levels of Manganese in the ambient air and soil. Manganese is a known Hazardous Air Pollutant (HAP) emitted by integrated steel facilities as well as other industrial sources. Manganese was in the ore and scrap metal being used by the mill as raw material and its content in PM air emissions was a product of specific steel making processes. In other words, where you find substantial quantities of Manganese, you expect to find a steel mill.

After establishing that Manganese was a significant PM contaminant in the air emissions from the steel mill and also present in the ambient air and soil within the community, fallout monitoring stations (i.e., dustfall collectors) were designed and constructed within one of the communities to measure accumulation rates. These fallout monitoring stations were previously employed by the local county air pollution authority as a measure of air quality in heavily industrialized areas. The fallout collection stations demonstrated that Manganese was present in the fallout and indicated a rapid rate of accumulation in the communities.

Fallout and ambient air samples were collected for analysis at the sampling stations over multiple years to account for variables such as fluctuations in steel production levels and air emission controls, weather, and contributions from other sources. Our expert also obtained surface wipe samples from several sites, including citizen homes, often in response to acute fallout events. Only state-of-the-art testing devices and standard sampling and analytical protocols were used to collect the data. Our expert analyzed the data and determined what compounds were present in ambient air, fallout, and soil within the communities, both in absolute and relative quantities, with special attention paid to Manganese.

Air dispersion modeling was considered to further augment the test data, but it was cost prohibitive and, moreover, unlikely to produce any useful data (i.e., there is too much inherent uncertainty in

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predicting the precise location of PM at a given point in time, particularly, for unplanned releases). PM speciation testing was also considered (i.e., actually examining the PM emitted from the steel mill and other sources microscopically and using electron spectroscopy or other methods to physically characterize the material). Having a source "finger-print" in hand, the PM fallout could be examined and compared to the steel mill's emissions. The goal would be to find unique physical characteristics that identified the steel mill as the source of the PM found in the fallout. In the end, the approach required more time and money than it was worth in this case.

Having identified a known local major industrial source of PM and Manganese, and having tracked the Manganese through the ambient air, fallout, and soil data, we next turned to the task of quantifying the risk of experiencing fallout from the steel mill.

Quantification of the Fallout

Our expert began this step in the process by examining the EPA Toxic Release Inventory Reporting System and the Michigan Air Emission Reporting System databases to identify local area sources of PM and Manganese. Using these data, PM AEPs were developed for comparison to the community AQP using the fallout data collected from the dustfall samplers. Concurrently, the expert studied the integrated steel making process and listed the pollutants they emitted, including information specific to the air emissions from the subject local steel mill, so that an AEP could be developed for the steel mill. The expert confirmed that Manganese was the most prominent HAP present among an array of PM compounds emitted from a steel mill. It could be used as a source marker in terms of absolute quantity and as a percentage of the total emitted PM.

Comparison of the AEPs developed for the area industrial sources with that of the AQP for the affected communities indicated that the two area steel mills had effectively identical AEPs which differed from the other industrial sources. Furthermore, the steel mill AEPs compared well with the affected community AQP.

But Manganese also occurs naturally in ores and soil. As part of the analysis, the expert needed to account for the PM that occurred naturally and from "non-industrial" activities, as opposed to originating from an industrial process. The naturally occurring PM or Manganese that was unaccounted for in the data analysis would weaken any conclusion as to the steel mill being the source of the fallout.

Our expert located a published study of a similar midwest city in which a steel mill operated. The study had calculated naturally occurring PM from sources such as lawn mowing, cars, construction sites, and wood burning. Our expert determined that the study was conducted in a reasonable manner and so similar in context to our case that it was representative of our situation. The naturally occurring PM levels as identified in the study were then deducted from the levels calculated from using our test data. The final levels represented the PM and, therefore, the Manganese that most likely came from nearby industrial sites.

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Lastly, the other steel mill emissions had to be accounted for. Using the frequency of reported citizen fallout complaints for both nearby steel mills, the spatial proximity to the community, the soil sampling data set, and the regulatory administrative records, the expert was able to determine that the steel mill located about two to four miles from the communities was not responsible in any meaningful way for the fallout within the affected communities.

Developing the Storyline: An Opinion Is Reached

Only after examining the facts and data as outlined above could we transform what was common sense into sound scientific opinion. Namely, common sense dictated that the local steel mill, located on 1,100 acres within the affected communities, with at least 32 significant individual process sources of PM and/or Manganese and spanning about 3.3 miles along the communities, was the predominant source of the fallout affecting the two Detroit communities. But science, and the rules of evidence, required test data, a three day site visit, the public record, including citizen complaints, review of testimony by steel mill personnel and experts, and application of a scientific method of analysis.

The expert report filled three large three-ring binders. To support each piece of the puzzle, the binders contained graphic summaries of the various testing and analysis performed by the expert; presentation of all of the ambient air, fallout and soil sample analytical data; citizen complaints; the regulatory agency record of air permit violations for the local steel mill; and deposition testimony indicating a failure to control PM and Manganese air emissions from the mill. Everything was assembled and organized on a time line.

By examining which PM compounds were being emitted from the steel mill, which were present in the ambient air, the fallout in the communities, and all other likely sources of the PM, both natural and industrial, a scientifically valid and common sense method of proving proximate cause was developed. Taken together, it was a formidable piece of work that withstood the *Daubert* test despite having no prior roadmap or forensic application.

What at first looked like a simple task had quickly proven to be very cumbersome. But in the end, our expert concluded that the steel mill was the “predominant” source of the PM and Manganese fallout that was negatively affecting the communities, thus establishing causation in this air emissions nuisance action.

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