



North Carolina Department of Environment and Natural Resources
DIVISION OF AIR QUALITY

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August 18, 2003

Mr. John W. Kirk, III.
President
Associated Asphalt, Inc.
P.O. Box 12626
Roanoke, VA 24027

Subject: Response to Comment on the Draft Salisbury Air Quality Monitoring Study Report

Dear Mr. Kirk:

Thank you for your September 30, 2002 letter in which Associated Asphalt (Associated) provided comment on the Division of Air Quality (DAQ) subject draft report dated April 30, 2002. Your letter contained several statements disagreeing with DAQ's interpretation of the reported data and information. In particular, it was indicated that Associated "believe[s] that the ambient air in the Milford Hills area did not impose a health concern or nuisance odor during the study period" and that "there was not substantial evidence of a nuisance odor at the cul-de-sac location during the study period." Associated also disagreed with the reported statement that "the liquid asphalt terminal is the primary contributor to the odor problem in the Milford Hills community." Finally, Associated commented "the DAQ study did not discuss the impact of mobile sources on ambient concentrations of hydrogen sulfide." Below is DAQ's response to these comments; first on odor and hydrogen sulfide (H₂S) related issues, and then on health concerns.

I. Odor and H₂S issues. Over time, Associated Asphalt (Associated) appears to have modified its position with respect to the release of odorous emissions from its asphalt terminal. Initially, Associated took the position that its asphalt did not emit much/any H₂S, was not odorous and, therefore, emission control equipment on its processes was not required. In 2001, Associated conducted formal H₂S emission tests and found much higher H₂S emission levels than expected. This finding led DAQ to require Associated to reinstall activated carbon beds on its storage tank vents while keeping carbon beds on its truck loadouts. Below is a summary of what else has transpired concerning Associated's odorous H₂S emissions and emission control activities. Also included is DAQ's interpretation of several independent sets of evidence that lead to our conclusion that Associated was the primary contributor to the odor problem in Milford Hills:

1. Associated's 1999 Emission Inventory Form showed an estimated annual H₂S emission level of only 4 lb/year using 4 activated carbon beds on the storage tanks and truck

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loadouts. The 4 lb/year estimate assumed H₂S emissions would be 0.1% of volatile organic compound emissions without any supporting basis for the assumption. Recent engineering estimates made by DAQ based on the September 2001 emission test data using 4 carbon beds on the tanks and truck loadouts reflect an annual H₂S emission level of 132 lbs/year or 30 times Associated's original estimate.

2. Associated petitioned DAQ in 2000 and argued that the Ecosorb® scrubber would perform at an equivalent level to carbon beds in reducing odorous H₂S emissions from the liquid asphalt storage tanks but with significantly lower cost than activated carbon. Associated assured DAQ of Associated's capability to comply with state regulations even though the Ecosorb® manual stated "Ecosorb® is not designed to control emissions in compliance with federal and state regulations." (see Ecosorb® "Odor Control Engineering Guide," October 1998, Version 2.1, page V.41). However, emission testing documented the ineffectiveness of the previously untested Ecosorb® scrubber and it validated the ability of activated carbon beds in reducing odorous H₂S emissions. Instead of being equivalent to carbon beds, H₂S emission levels from the Ecosorb® scrubber were over 11,000 times greater than from the activated carbon beds (2370 parts per million [ppm] H₂S from the Ecosorb® scrubber vs 0.20 ppm H₂S from activated carbon).
3. Due to over 400 odor complaints and H₂S emission testing indicating the ineffectiveness of the Ecosorb™ system in reducing odorous emissions, DAQ sent Associated a certified letter in January 2002 withdrawing the temporary permit which allowed the use of the Ecosorb® scrubber. Associated conceded the temporary permit withdrawal and complied with the reinstated, more expensive requirement to use activated carbon on the storage tank vents. In fact, in a February 2002 meeting with DAQ officials it was indicated that Associated finally recognized its Salisbury plant could be causing an odor problem and that it was time to properly address the matter. It was also indicated that Associated were even talking with a Canadian expert on H₂S control getting his ideas on other effective control technologies. Associated asked for and received a time extension to comply with the terms of its permit renewal, then discontinued use of the Ecosorb® scrubber and completed the reinstallation of the carbon beds by the end of March 2002, meeting the extended deadline.
4. A large body of *other* data collected during the study and analyzed in the draft report strongly indicates the Associated asphalt terminal was the primary contributor to detectable H₂S levels beyond its property line and the ensuing odor problem in the local area. It is DAQ's opinion that the modeling results, the H₂S ambient monitoring data, the process data, the wind directional data, and citizen complaints individually and collectively make a solid case that Associated was the primary contributor to the odor problem in the local area, as presented below:
 - Dispersion modeling results. Modeling results showed that the maximum predicted 1-hour concentration produced by the Associated Asphalt terminal occurred on its north property line at a level of 290 parts per billion (ppb). The same type of results for the APAC-Carolina hot mix asphalt plant showed a maxima of 3.5 ppb H₂S on its east property line. Since there are no other H₂S emission sources nearby, the modeling results indicate a much higher

concentration (290 vs 3.5 ppb) of H₂S stemming from the Associated facility than from the APAC facility and levels well above the H₂S odor threshold of 8 ppb.

- H₂S ambient monitoring data. As presented in Table 14 of the draft report, the monitoring data for the Access Road site (located 50 feet north of Associated's modeled maxima location) observed the most frequent and intense H₂S peaks relative to the other two monitoring sites. Again, given there are no other H₂S sources nearby, this distribution of the 1-hour data strongly suggests that one or both of the asphalt facilities is (are) the source causing the elevated H₂S levels.
- Process data. The monitoring data were evaluated to determine whether a relationship could be established with the time periods when the asphalt facilities were operating. During the DAQ study period over 70% of the concentrations above 10 ppb occurred after 17:00 hours, the time when APAC was not operating and when Associated was operating. The number of hours each facility was operating and the corresponding H₂S ambient concentrations for those time periods are presented in Table 17 of the draft report. The analysis of the process data with the 1-hour H₂S monitoring data clearly show that the majority of the detected H₂S levels were during unique time periods when only Associated was conducting H₂S emissive operations. H₂S ambient levels at the Access Road site were highest and occurred most frequently in the late evening hours when only Associated was unloading railcars, its most H₂S emissive operation. Evaluation of the process data with the elevated H₂S ambient levels strongly suggest that Associated was the source of these elevated H₂S levels.
- Wind directional data. For the last analysis, the data were collectively organized and sorted in two ways: by production scenarios and then by wind direction. To separate the effect of common operating times, four specific scenarios were identified. The scenario-numbering scheme starts with least frequent script and progresses up to the most frequent. In scenario one, which occurred only 8% of the time, APAC was producing HMA and Associated was filling tanks. This scenario represents worst-case emissions or the greatest potential amount of H₂S entering the area. Scenario two, APAC producing HMA and Associated not filling tanks. This specific scenario occurred 14% of the study period. Scenario three is just the opposite, Associated filling tanks and APAC not producing HMA; it occurred 17% of the time. The fourth and final scenario is when neither facility was operating, which was 53% of the time.

Figure 1 presents the average H₂S ambient 1-hour concentrations for the above four scenarios as a function of wind direction. As seen in the figure, most of the plotted points are less than the detection level of 2 ppb. Process scenario 4 (neither asphalt facility operational) is the study baseline. Note that Scenario 2 (APAC only operational) is virtually indistinguishable from the baseline data across all wind directional sectors. However, the combination of Scenario 3 (only Associated operational) and wind sector 8 (southerly wind directly from Associated) results in a H₂S average concentration significantly (more than 4 times) above the baseline. Once again, the study data strongly suggests that Associated is largely responsible for the elevated H₂S levels based on the combination of ambient H₂S data, process data, and wind directional data.

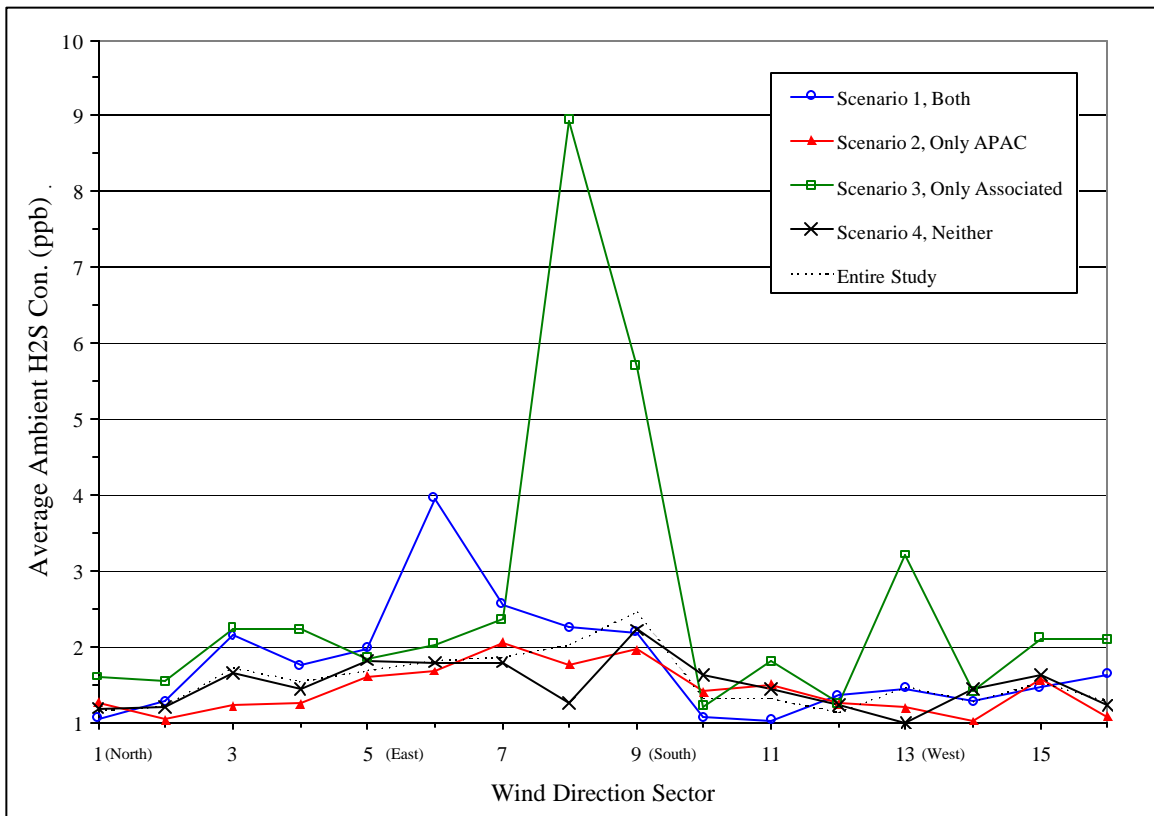


Figure 1. Access Road 1-hour H₂S Concentration vs. Wind Sector and Process Scenario

- Citizen complaints. During the study there were 24 unique odorous events reported by 39 citizens. Of these events 88% coincided with or occurred less than 4 hours after either APAC HMA production or Associated storage tank filling. In the opinion of the city risk manager the intensity of the odor on four occasions warranted citation. All four citations that occurred during the study period were issued to Associated because it was the only facility operational at the time of the odor complaint. And, since the re-installation of carbon beds in April 2002, there has been a marked drop in odor complaints. Again, such data strongly suggests that Associated was the primary source of the odor problem in Milford Hills.

Finally, the DAQ study did not discuss the impact of mobile sources on ambient H₂S concentrations because automobiles typically do not produce H₂S. Our understanding is that H₂S emissions from vehicles would only occur in situations of poor quality gasoline, deficient gas additives, or poisoned catalysts in the catalytic converter. Given that such conditions are unusual and isolated and DAQ is not aware of any EPA data showing H₂S emissions from vehicles, there was no hard data to include in the DAQ study. The sulfur in gasoline burned in vehicle engines is normally converted (oxidized) to sulfur dioxide; because of the oxidizing conditions, the sulfur is generally not reduced to H₂S.

- Associated commented “[d]espite the fact that levels of hydrogen sulfide measured at the cul-de-sac location were below the nuisance level, DAQ claims that hydrogen sulfide levels ‘very likely reached or exceeded nuisance levels on a periodic basis.’” ... Associated “believes that it is inappropriate for DAQ to speculate about ambient air conditions that were not quantified during the monitoring study.”

The rationale for DAQ’s statement was that because of the inherent variability in levels producing a 15-minute average, there is high probability that there were near-instantaneous levels much higher and much lower than reflected in the average concentration. For example, the nature of varying ambient levels suggests that a 15-minute average reading of 30 ppb was not likely produced by a constant 30 ppb value maintained over the 15-minute period. Rather, it is much more reasonable and probable that there would be variability in the ambient concentrations, say with a 40 ppb average concentration for the first 5 minute period, a 30 ppb average for the next 5 minutes, and a 20 ppb average for the last 5 minutes. Likewise, a 40 ppb 5-minute average likely consisted of 60 ppb average for 2 ½ minutes and 20 ppb average for the remaining time; and so on. It is this understanding of the inherent variability in levels producing a 15-minute average that led DAQ to recognize the likelihood that 15-minute H₂S readings consisted of short-term peaks well above the measured average. Given this information and the fact that there were at least four 15-minute readings between 10.25 and 30 ppb H₂S at the cul-de-sac location, DAQ believes that stated levels “very likely reached or exceeded nuisance levels on a periodic basis.”

- Associated also commented “the dispersion modeling conducted by DAQ appears to have overestimated the ambient air impacts” since the *modeled* maximum 1-hour average H₂S was over 2.5 times the *measured* maximum 1-hour average.

The direct comparison between 5 *years* (60 months) of meteorology used in a modeled data set to only 4 *months* of meteorology used in measured data is flawed by two interconnected respects:

1. The time period for the modeling was not the same as the study period; modeling covered 15 times more observations than the study.
2. The study was conducted from May to September 2001; however, worst-case dispersion conditions occur in the winter months, December to March. This fact means that the modeling results were based on 5 annual sets of worst-case winter conditions as compared to no winter/worst case condition measurements during the study period. Since the study period did not include any worst-case dispersion conditions, it is reasonable that modeling would predict somewhat higher maximum 1-hour average H₂S levels than *measured* maximum 1-hour levels.

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DAQ has a long history, as does EPA and many other states, in determining favorable, direct comparisons between modeled and measured ambient concentrations. Accordingly, comparisons between modeled and measured concentrations normally agree within a factor of 2. This level of agreement is common when there is an equal time period with equal opportunity of modeling and measuring the same meteorological conditions. It is DAQ's experience that modeling and ambient monitoring produce nearly equivalent ambient concentrations when the coincidence of multiple factors (emissions, dispersion, and wind direction) occurs.

In summary, given that six sets of information independently support the same argument, the collective weight of evidence supports the reported statement that "the liquid asphalt terminal is [was] the primary contributor to the odor problem in the Milford Hills community."

II. Health issues. Associated also "believe[s] that the ambient air in the Milford Hills area did not impose a health concern ... during the study period." DAQ performs modeling and/or ambient monitoring of the emissions from facilities. However, a final determination of whether toxic air emissions from a facility impose a health concern is not a DAQ responsibility, and therefore DAQ made no statements in the subject report on this point. Such a determination is the sole responsibility of the NC Department of Health and Human Services.

I hope this response letter serves as adequate clarification on Associated's comments. DAQ agrees with you that this study reflected a significant degree of cooperation between Associated and DAQ. We thank Associated Asphalt for your cooperative participation in this study and exchange of emissions and operational data. If you have any further questions or comments, please contact me at (919) 715-2694.

Sincerely,

Steve Schliesser
Environmental Engineer II, Toxics Protection Branch

cc:

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