MACTEC

engineering and constructing a better tomorrow

DATE: October 7, 2009

TO: John Mousa, ACEPD

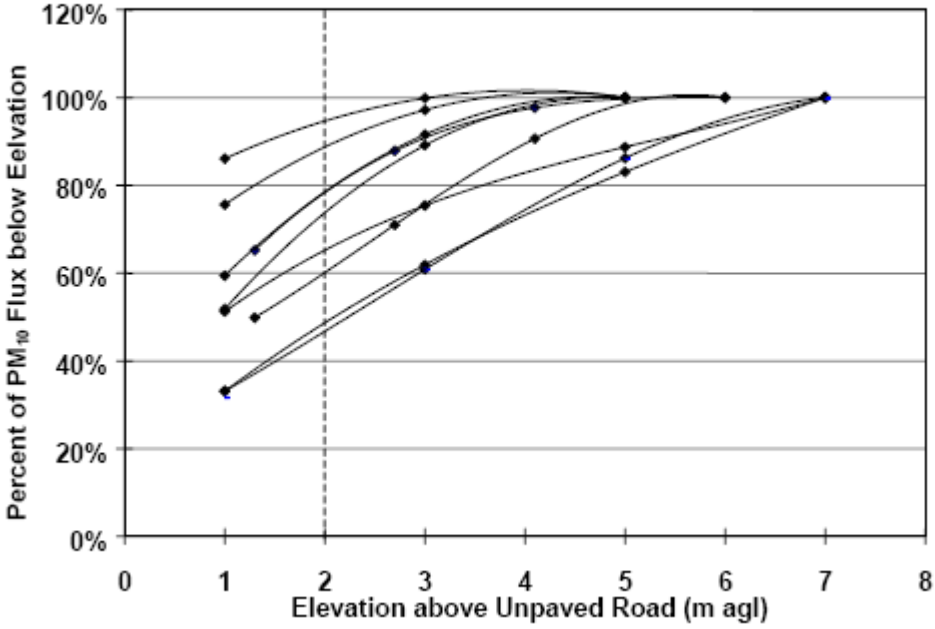
FROM: William Barnard, MACTEC
Brad Uhlmann, MACTEC

SUBJECT: Preliminary review comments on AMEC report entitled "Potential Fugitive Dust Impacts Predicted from Air Dispersion Modeling Koppers, Inc. Wood-Treating Facility Gainesville, Florida"

The comments below represent MACTEC's initial findings following review of the above referenced document.

1. In the introduction, the last paragraph it indicates that "All of the comparisons are based upon current surface soil concentrations and do not reflect reduced fugitive dust emissions or reduced constituent surface soil concentrations that would likely result if portions of the facility were covered." MACTEC feels that the document reflects only potential reductions based upon where the current roads are located and not future roadway locations. Thus any claim of this type is contingent upon a) maintenance of the current location of roads within the facility and b) development of a plan in the future that would increase the coverage on existing roads or open areas. We did not see any evidence of such a plan in the document, thus we feel this claim is invalid. In addition, if the roadways change in the future to areas not currently utilized, there is an equal potential for INCREASED emissions from those roadways due to higher silt value, higher soil concentrations of COPCs or both.
2. Information provided by Desert Research Institute in the document "Reconciling Urban Fugitive Dust Emissions Inventory and Ambient Source Contribution Estimates: Summary of Current Knowledge and Needed Research" (Desert Research Institute Document No. 6110.4F, May, 2000) shows that between 60 to 90 percent of the horizontal emission flux of PM_{10} occurs at elevations above ground level (agl) of 2 meters or less for unpaved roads. This trend in low release heights of the horizontal emission flux from unpaved roads is shown in Figure 4.2 from the DRI report (which is provided below).

Figure 4-2. Cumulative horizontal PM_{10} flux at different downwind elevations above different unpaved roads (data from Cowherd, 1999).



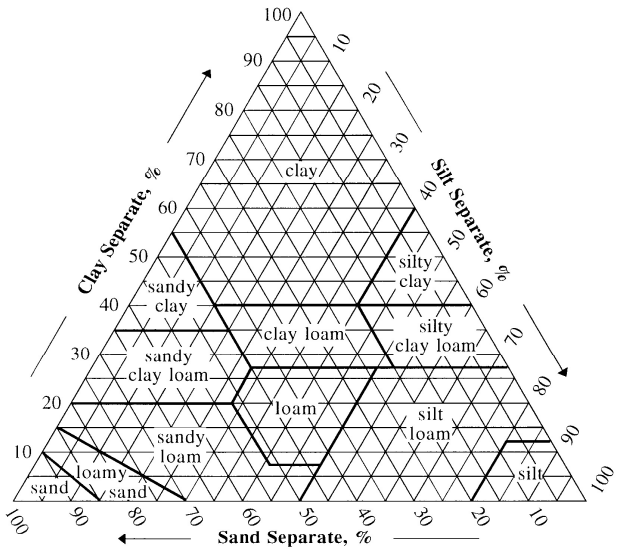
A 10 µm aerodynamic diameter particle has a settling velocity of ~0.3 cm/s, and would therefore deposit to the surface within ~5 minutes after achieving an elevation of 1 m above ground level. This corresponds to a travel distance of no more than 1 km in a 3 m/s wind. Travel distances would be 0.25 km for a 20 µm particle and 4 km for a 5 µm particle under similar wind conditions. Thus for the larger particles (10 microns or larger) deposition is likely to occur within 0.25 to 1 km downwind from the source. Thus a continuously active source would be a constant source of deposition downwind if not controlled. If there is continuous activity within the Western Active Area, eastern winds (which is one of the predominant wind directions shown in Figure 4 of the AMEC report) would result in a deposition area located in the neighborhoods immediately to the west of the site.

3. On page 7 AMEC cites the removal of PM via impaction due to trees, shrubs, etc., citing the "Methodology to Estimate the Transportable Fraction (TF) of Fugitive Dust Emissions for Regional and Urban Scale Air Quality Analyses", authored by Tom Pace. MACTEC has two issues with the use of this document. First, the factors specified in that document are intended to be primarily applied to ground level emissions of dust when used to support on a scale larger than the 10s or 100s of meters. That is clearly NOT the case here.

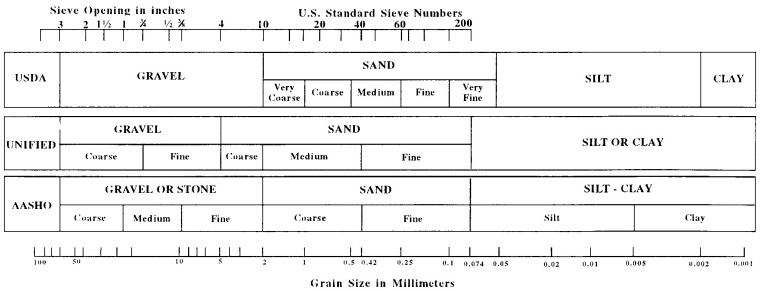
   Second, the removal of particles by impaction via these mechanisms, while reducing the potential for inhalation exposure does NOT result in decreases in deposition of particles to soils or to future re-entrainment via disturbance of the plants/vegetation serving as the impaction surface. Wash-off of impacted materials from leaves and other plant surfaces could result in substantial build-up of concentrations in the underlying soils, when

precipitation washes the impacted materials off of the surface, especially when there is no reduction in source strength (e.g., constant replenishment of materials). Thus continued build-up of toxic materials could occur at the air/plant boundary and into the soils when removal via precipitation wash-off occurs. In addition, re-entrainment of particles can occur between wash-off periods should the plant surfaces be further disturbed by animals, high wind events, or other types of disturbances (e.g., land development activities).

4. It was unclear from the document if the driveway is paved, unpaved or partially both in different areas. Segment R38 to R39 to R35 are all shown in red in Figure 2 indicating unpaved. However future indications in the document are that the driveway was paved (paved road emission factor equation used) but treated as "unpaved" in the way emissions were calculated. The document was confusing on this point.
5. Page 13.2.2-5 of AP-42 section 13.2.2 indicates that the quality ratings of the emission factor equations are for values near the mid-range of measured source conditions and suggests that for a "worst-case" analysis, higher mean vehicle weight and higher than normal traffic rates may be justified. The values used in this study are at or very near to the lower end of all ranges for vehicle weight, vehicle speed, silt content, etc. Thus the quality of the estimates would be reduced from values closer to the mid-range. In addition, this would suggest that higher values should have been chosen for a true "worst-case" scenario.
6. The AMEC assumption on page 3 that indicates that they assumed that soil silt is equivalent to the combined silt and clay fractions would lead to an ***underestimate*** of the silt content (as defined by EPA). The soil triangle below and the underlying sieve scale below clearly show this. Silt content on unpaved roads is measured by the fraction that passes a #200 mesh (standard size number) sieve, which is equivalent to 75 microns. The fraction that passes a #200 sieve for NRCS actually contains the clay, silt and a portion of the very fine sand fraction. Thus including only the silt and clay fraction would lead to an underestimate of the silt fraction as determined by EPA methods.
   In addition, care must be used in comparing measurements of silt between EPA methods and NRCS (USDA) methods, as the methods used for determining the silt and clay fractions are different. For the NRCS method silt and clay are both determined by using wet sieving methods while the EPA silt value is determined by dry sieving. Wet and dry sieving can lead to substantially different results depending upon the type of soil being evaluated.



COMPARISON OF PARTICLE SIZE SCALES



7. With respect to the silt samples taken, it is unclear why the samples were not taken from active portions of the active roadways? Silt sampling on unpaved roads to estimate emissions should performed on a) active roadways and b) from the travelled portion of the roadway. Indeed Appendix C.1 of AP-42 indicates that the first objective of the sampling program is "collecting 'representative' samples of the loose surface material ***from the road***;" [Emphasis added]. In this sampling program, only two samples were taken from roadways (of four total) and only one of those samples could be considered to be from a currently active area. Sample SS104 was taken from an active area of the site, but not on a roadway. Sample SS102 was from a work area, but not a roadway. Sample SS103 was considered to be representative of "active" haul roads but was not actually located on an active haul road. It is located to the east of the easternmost segment of unpaved haul roads (segments R22/R34 in Figure 2). Silt sample SS101 is the closest sample to a haul road, but is located in a high traffic area (e.g., everything coming off the end of the driveway traverses that area). Thus you could expect it to potentially be the most depleted area on the site if silt depletion is truly a mechanism that is active within the site as suggested by AMEC.
8. Because only a few silt samples were taken and only one was from an active haul road area, it may not be representative of the mean silt concentration. Studies have shown that

silt content along a one mile stretch of unpaved roads can vary by a factor of 3. MACTEC suggests that multiple samples along a stretch of active unpaved haul road should have been taken.

9. AMEC indicates that the maximum permitted speed is 5 mph for front end loaders. Maximum permitted speed typically does not equal maximum speed. 5 mph is very slow and the data provided does not truly support this assumption. A more characteristic speed while underway could have been obtained/supported by on-site measurements of loading and unloading times, looking at actual throughput data at the plant on numbers of timbers handled per loader and throughout the year, values of the tons of wood/year handled, the average pile weight, etc. These would all have helped justify or better estimate the actual vehicle speed used for the analyses. None of this information was presented. This type of data is easily obtainable.
10. On Page 6 of the AMEC report, AMEC indicates that they reduced emissions by evaluating the number of days with precipitation exceeding 0.01 inch. They also claim a 75% reduction in emissions due to a watering control program when looking at the realistic case evaluation. It is not clear if they accounted for any double counting in emission reductions resulting from the use of both of these factors. The 0.01 inch factor basically eliminates (on an annual basis) emissions from the roadways on any day having more than 0.01 inch of recorded rainfall. The document indicates that AMEC used that annual value in the dispersion modeling to develop the reported concentrations. If they then applied a 75% reduction to that level they would be double counting controls. In addition, they provide NO information to support the 75% control program. In order to fully claim a 75% control program, they would need to provide initial soil moisture levels. To achieve the 75% controls claimed, the watering program would have to provide soil moisture levels that were a factor of 2 or higher than typical levels.
11. On page 5 in the second paragraph AMEC indicates that "The northern end of the paved main driveway was conservatively assumed to be an unpaved roadway and was defined as a series of volume sources as described above. This portion is traveled by the front end loaders that can access it from a number of connecting unpaved haul roads. This section is subject to loading of silt that has been carried onto this paved section from unpaved areas by the heavy equipment tires." Does this imply that segments R39/R35 and R35/R13 were calculated using the UNPAVED road equation or were they treated as PAVED roads using the paved road equation?
12. Page 5 of the AMEC report also indicates that emissions from Tables 5 through 8 (inclusive) were "added to those for the front-end loaders for the volume sources…" It appears from those tables that emissions on unpaved roads for employees, deliveries, visitors, biomass trucks, etc. were all calculated separately. This is an INCORRECT application of the AP-42 equation for unpaved road emissions. AP-42, section 13.2.2 clearly indicates that a fleet average weight and speed should be applied to utilize the equation. Note particularly the following paragraph from page 13.2.2-6 below Table 13.2.2-4: "It is important to note that the vehicle-related source conditions refer to the

average weight, speed, and number of wheels for all vehicles traveling the road. For example, if 98 percent of traffic on the road are 2-ton cars and trucks while the remaining 2 percent consists of 20-ton trucks, then the mean weight is 2.4 tons. ***More specifically, Equations 1a and 1b are not intended to be used to calculate a separate emission factor for each vehicle class within a mix of traffic on a given unpaved road.*** That is, in the example, one should not determine one factor for the 2-ton vehicles and a second factor for the 20-ton trucks. Instead, only one emission factor should be calculated that represents the "fleet" average of 2.4 tons for all vehicles traveling the road." [Emphasis added] The information presented in Tables 5 through 8 of the AMEC report appear to do exactly this, determine a factor for each vehicle type. This is clearly an incorrect application of the equations.

13. In general the overall modeling approach with AERMOD seems reasonable. MACTEC would note the following: a) there is functionality in AERMOD to model deposition; however, it appears that it was not utilized b) the receptor grid could have been extended to beyond the fenceline to account for predicted emissions within residential areas (it appears AMEC only specified receptors at the fenceline and a few on-site, and c) why was upper air data taken from Apalachicola? - was it not available at a closer location (e.g., Jacksonville)?