Recommended PM Speciation Values – Lime Kiln (Explanation below)

Species	Extinction Coefficient	PM Fraction	
CPM	0.6	0.20	Filterable PM-10 mass larger than 2.5 microns
FPM + Sulfate	1.0 (FPM)	0.70	Filterable PM-10 mass smaller than 2.5 microns plus "inorganic" condensable PM-10 mass
SOA	4.0	0.09	"Organic" condensable PM-10 mass
EC	10.0	0.01	3.5% of filterable PM-10 mass (assumed to be unburned carbon from the fuel)
Sulfate	3 * f(RH)		Calculate separately (part of FPM)

1. For non-combustion units, all PM-10 can be assumed to be inorganic material. Given that most of the emissions are controlled by baghouses, it is also assumed that most of the material is in the fine PM (FPM) category. If the applicant can produce evidence that a significant portion of these emissions are larger than 2.5 microns, the larger size fractions can be modeled as coarse PM (CPM). If all non-combustion sources are modeled as FPM, this would be conservative.

2. For combustion sources, the breakdown can be derived using data for the "filterable" and "condensable" PM-10 fractions. A breakdown of emissions into "filterable" and "condensable" can be found in AP-42, Table 11.17-2. Using data for a "coal-fired rotary kiln with fabric filter", the values are 0.15 lb/ton (filterable) and 0.38 lb/ton (condensable). All condensable PM is assumed to be in the PM-10 fraction. This yields the PM-10 speciation of 28% filterable and 72% condensable. The "filterable" portion is mostly flyash material and can be treated as above, with the exception that a small amount (up to 5%) should be assumed to be unburned carbon from the fuel. The unburned carbon material should be modeled as elemental carbon (EC). The condensable fraction is assumed to include both the sulfate and secondary organic aerosols (SOA) along with inorganic material. Primary sulfate emissions should be estimated separately and this amount can be subtracted from the condensable PM emissions to avoid double counting. The breakdown of the remaining condensable PM emissions is based on the "inorganic" and "organic" AP-42 emission factors, which are listed only for "coal-fired rotary preheater kiln with multiclone, water spray, and fabric filter". This is not the exact configuration of the proposed kiln, but represents the best available data in the absence of other information. The "inorganic" condensable PM is listed at 1.1 lb/ton and the "organic" condensable PM is listed at 0.15 lb/ton. So, about 12% of the total condensable PM mass is "organic". This "organic" fraction should be modeled as SOA. The remainder of the condensable PM-10 can be modeled as sulfate or FPM, since the "condensable" PM fraction should all be PM-2.5 or less.