EPA's PM Augmentation Procedure

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ABSTRACT

The development of State Implementation Plans (SIPs) to demonstrate compliance with the 8-hour ozone National Ambient Air Quality Standard (NAAQS), the particulate matter $(PM)_{2.5}$ NAAQS , and the Regional Haze Rule, requires that state, local, and tribal agencies (SLT) have access to accurate emissions inventories. The $PM_{2.5}$ NAAQS and the Regional Haze Rule emphasize emission inventory development for the PM species required in regional air quality modeling. Submission of PM emissions to EPA's National Emissions Inventory (NEI) by SLT agencies should include filterable and primary PM (PM10-PRI, PM10-FIL, PM25-PRI, and PM25-FIL) along with condensible PM (PM-CON). Augmentation of the PM species in the 2008 NEI point source inventory is necessary to ensure completeness of the PM inventories and to ensure that SLT inventories do not contain erroneous pollutant reporting. This paper explains the procedures developed to correct reporting inconsistencies and to populate missing PM species in the NEI.

In general, emissions for PM species missing from SLT inventories were estimated using PM emissions data supplied by SLT agencies, conversion factors described in Strait et al. (1999), and factors derived from Microsoft Access® databases that serve as a replacement for the PM Calculator historically used by EPA. One limitation is that the Access® databases do not contain information on condensible emissions; however, in cases where condensible emissions are not reported, conversion factors developed by Strait et al. (1999) are applied to SLT reported PM species or species derived from the PM Calculator databases.

Pre-screening Steps and Self-Consistency Checks

Steps are taken to review SLT submitted PM data and remove inconsistencies where applicable. There are five PM pollutants that can potentially exist and be submitted for every process in the point source inventory; although for some processes, PM-CON will equal zero, in which case, PMxx-PRI will equal PMxx-FIL (xx= 10 or 2.5). The five PM pollutants and their definitions are as follows:

PM10-FIL – filterable particulate matter less than or equal to 10 microns in aerodynamic diameter.

PM25-FIL – filterable particulate matter less than or equal to 2.5 microns in aerodynamic diameter.

PM10-PRI – primary particulate matter less than or equal to 10 microns in aerodynamic diameter (includes condensible emissions).

PM25-PRI – primary particulate matter less than or equal to 2.5 microns in aerodynamic diameter (includes condensible emissions).

PM-CON – condensable particulate matter, that matter which exists as a vapor at stack conditions but exists as a liquid or a solid after exiting the stack and being cooled by ambient conditions.

There are physical and mathematical relationships that exists between these five PM pollutant species. For example, PM10-PRI is the sum of PM10-FIL and PM-CON. Also, PM25-PRI is the sum of PM25-FIL and PM-CON. Other relationships are that PM10-FIL should be greater or equal to PM25-FIL and PM10-PRI should be greater or equal to PM25-PRI. When PM data submitted to EPA by SLT agencies do not conform to these relationships, then the data need to be corrected before PM augmentation is performed to prevent error propagation.

The PM calculator was a stand alone computer program developed by EPA (but no longer supported) that would calculate PM10-FIL and/or PM25-FIL data from PM-FIL, and vice versa. Necessary inputs to the programs were process descriptions, fuel information, and control devices, indicated by EPA's source classification code (SCC) and control device codes. The PM Calculator used size fractionation data from Appendices B.1 and B.2 of AP-42 to calculate the various PM sizes from PM total data for a large number of processes. Since the PM Calculator computer program is no longer supported by EPA, we converted the size fractionation data to a set of MS Access® tables, and these tables are used in the methodology described in this paper. Due to concerns regarding file size, the Access® tables were split into three databases. The database names are as follows;

1. pm_calculator_for_all_sccs_except_if_start_with_3.accdb
2. pm_calculator_for_sccs_starting_with_3_to_30399999.accdb
3. pm_calculator_point_sccs_start_with_3_and_greater_than_30399999.accdb

These PM Calculator replacement tables were used to calculate controlled PM10-FIL and controlled or uncontrolled PM2.5-FIL using uncontrolled PM10-FIL. In addition, condensible emissions were estimated by applying conversion factors developed by Strait et al. (1999) to SLT reported PM species or PM species derived from the replacement tables or by applying emission factor ratios.

Before performing any calculations to create new PM data, we reviewed the PM data submitted to EPA by SLT agencies and corrected all the mathematical inconsistencies, as noted above. We performed the following set of checks and fixes on all SLT submitted PM data to ensure self-consistency. These checks are repeated after the augmentation process to ensure that no inconsistencies were introduced by the augmentation process:

1. If PM10-FIL>PM10-PRI when both were reported by SLT, PM10-PRI was replaced with Null and the remaining augmentation steps were performed as if it had not been reported. For the PM10-PRI record, the EmissionsComments field was populated with this comment. "___-reported emissions for PM10-PRI were recalculated using PM-Calculator data because ___ reported PM10-FIL>PM10-PRI." (Note: In the EmissionsComments field examples , ___ is the program system code for the SLT data, which identifies the reporting agency.)

2. If PM25-FIL>PM25-PRI when both were reported by SLT, PM25-PRI was replaced with Null and the remaining augmentation steps were performed as if it had not been reported. For the PM25-PRI record, the EmissionsComments field was populated with this comment. "___-reported emissions for PM25-PRI were recalculated using PM-Calculator data because ___ reported PM25-FIL>PM25-PRI."

3. If PM10-FIL+PM-CON>PM10-PRI, PM10-PRI was replaced with PM10-FIL+PM-CON to eliminate inconsistencies. For the PM10-PRI record, the EmissionsComments field was populated with this comment. "___-reported emissions for PM10-PRI were replaced with ___-reported PM10-FIL+PM-CON because ___ reported PM10-FIL+PM-CON>PM10-PRI."

4. If PM25-FIL+PM-CON>PM25-PRI, PM25-PRI was replaced with PM25-FIL+PM-CON to eliminate inconsistencies and a check was performed to ensure that the new PM25-PRI value was less than PM10-PRI. For the PM25-PRI record, the EmissionsComments field was populated with this comment. "___-reported emissions for PM25-PRI were replaced with ___-reported PM25-FIL+PM-CON because ___ reported PM25-FIL+PM-CON>PM25-PRI."

5. If PM25-PRI>PM10-PRI when both were reported by SLT, PM10-PRI was replaced with PM25-PRI. For the PM10-PRI record, the EmissionsComments field was populated with this comment. "___-reported emissions for PM10-PRI were replaced with ___-reported PM25-PRI because ___ reported PM25-PRI>PM10-PRI."

6. If PM25-FIL>PM10-FIL when both were reported by SLT, PM10-FIL was replaced with PM25-FIL. For the PM10-PRI record the EmissionsComments field was populated with "__-reported emissions for PM10-FIL were replaced with ___-reported PM25-FIL because ___ reported PM25-FIL>PM10-FIL."

7. If PM-CON>PM25-PRI or PM-CON>PM10-PRI when both are reported, two cases were considered:

   A. The SLT was reporting PM-CON that was much higher than PM10-PRI, which is inconsistent with the definition. For this case, (PM-CON>110% PM10-PRI) PM-CON was replaced with Null and the remaining augmentation steps were performed as if PM-CON had not been reported. For the PM-CON record, the EmissionsComments field was populated with this comment. "___-reported PM-CON emissions were recalculated using PM Calculator data because ___ reported PM-CON>PM10-PRI/PM25-PRI."

   B. The SLT was trying to say that all the PMxx-PRI is PM-CON but PM-CON is rounded to a different accuracy and ends up slightly higher than PMxx-PRI. For this case, (110% PMxx-PRI>PM-CON>PMxx-PRI) PM-CON was replaced with PMxx-PRI, effectively setting PMxx-FIL to zero. For the PM-CON record, the EmissionsComments field was populated with "___-reported PM-CON emissions were replaced with PM10-PRI/PM25-PRI because ___ reported PM-CON>PM10-PRI/PM25-PRI."

Trivial Updates

After the pre-screening checks and fixes, trivial (addition and subtraction based on the definition of condensible and filterable) updates were made. The trivial updates included:

1. If both PMxx-FIL and PM-CON were available, but not PMxx-PRI, then PMxx-PRI = PMxx-FIL + PM-CON.

2. If both PMxx-PRI and PM-CON were available, but not PMxx-FIL, then PMxx-FIL = PMxx-PRI - PM-CON if the difference is positive, or zero if the difference is negative.

3. If both PMxx-PRI and PMxx-FIL of either diameter were available, but not PM-CON, then PM-CON = PMxx-PRI - PMxx-FIL, with preference to PM10-PRI - PM10-FIL if all four non-condensible pollutants were reported.

In addition, where SLT agencies reported a pollutant as zero that by definition must have higher emissions than another pollutant, that other pollutant was set to zero:

1. If PM10-PRI was reported as zero, all other pollutants were changed to zero.

2. If PM25-PRI was reported as zero, PM25-FIL and PM-CON were changed to zero.

3. If PM10-FIL was reported as zero, PM25-FIL was changed to zero.

After performing the trivial updates, we repeated the pre-screening steps to ensure that no inconsistencies had been introduced.

Non-Trivial Updates

A mapping of all possible reported pollutant combinations to non-trivial cases is provided in Table 1. A set of pollutants is considered equivalent to a non-trivial case if after applying the trivial updates, the same set of pollutants have populated values. A set of pollutants is considered trivial if after applying the trivial updates, all five pollutants have populated values.

Table 1. Reported Pollutants to Non-Trivial Case Lookup

SLT Reported Pollutants	Non-Trivial Case	Equivalent Non-Trivial Case
PM10-PRI	1	
PM10-FIL	2	
PM2.5-PRI	3	
PM2.5-FIL	4	
PM-CON	5	
PM10-PRI and PM2.5-PRI	6	
PM10-FIL and PM2.5-FIL	7	
PM10-PRI and PM2.5-FIL	8	
PM10-FIL and PM2.5-PRI	9	
PM10-PRI, PM10-FIL, and PM-CON	10	
PM2.5-PRI, PM2.5-FIL, and PM-CON	11	
PM10-FIL and PM-CON		10
PM10-PRI and PM10-FIL		10
PM10-PRI and PM-CON		10
PM2.5-FIL and PM-CON		11
PM2.5-PRI and PM2.5-FIL		11
PM2.5-PRI and PM-CON		11
PM10-FIL, PM2.5-FIL, and PM-CON		Trivial
PM10-PRI, PM10-FIL, and PM2.5-FIL		Trivial
PM10-PRI, PM10-FIL, PM2.5-PRI, and PM2.5-FIL		Trivial
PM10-PRI, PM10-FIL, PM2.5-PRI, and PM-CON		Trivial
PM10-PRI, PM2.5-PRI, and PM10-FIL		Trivial
PM10-PRI, PM2.5-PRI, PM2.5-FIL, and PM-CON		Trivial
PM10-PRI, PM2.5-PRI, and PM-CON		Trivial
PM10-PRI, PM10-FIL, PM2.5-FIL, and PM-CON		Trivial
PM10-PRI, PM2.5-FIL, and PM-CON		Trivial
PM10-PRI, PM2.5-PRI, and PM2.5-FIL		Trivial
PM10-FIL, PM2.5-PRI, PM2.5-FIL, and PM-CON		Trivial
PM10-FIL, PM2.5-PRI, and PM2.5-FIL		Trivial
PM10-FIL, PM2.5-PRI, and PM-CON		Trivial

For the processes in which missing pollutants were not able to be gap-filled by applying trivial updates, the processes were divided into uncontrolled and controlled processes. Both controlled and uncontrolled processes were further split into three SCC groups corresponding to the three Access® databases derived from the PM Calculator. Cases were then assigned the SLT agency reported pollutants as shown in Table 3 below.

The PM Calculator databases have certain variables that depend on EPA's Source Classification Code (SCC), primary control measure, and secondary control measure. For the dataset containing the SLT process level PM data, primary and secondary control measure codes were assigned to every process. Beginning with the control information from the facility inventory in the EIS, obsolete control measure codes were replaced with the map-to equivalents from the EIS control measure code table. Duplicates created from the mapping were eliminated. In addition, controls were evaluated to determine if the controls would have an impact on PM emissions. If a control was determined to not impact PM emissions, the control measure code was reassigned to 999 (see PM Control Mapping column in Table 2). If only one control existed, it was considered primary, and the secondary code was set to 999. If only two existed, the first code was assigned as primary and the last code as secondary. For more than two controls, the control code 99 for "miscellaneous other" controls was eliminated. Then if there were two or more controls remaining, the first was assigned as primary and the last as secondary. A small number of processes had more than two controls excluding the "miscellaneous other" category. The assignments for these processes were arbitrary, as only two controls could be matched to the PM Calculator databases.

Table 2. PM Control Measure Code Mapping

Control Measure Code	Description	PM Control Mapping
1	Wet Scrubber - High Efficiency	141
2	Wet Scrubber - Medium Efficiency	141
3	Wet Scrubber - Low Efficiency	141
4	Gravity Collector - High Efficiency	209
5	Gravity Collector - Medium Efficiency	209
6	Gravity Collector - Low Efficiency	209
7	Centrifugal Collector (Cyclone) - High Efficiency	210
8	Centrifugal Collector (Cyclone) - Medium Efficiency	210
9	Centrifugal Collector (Cyclone) - Low Efficiency	210
10	Electrostatic Precipitator - High Efficiency	128
11	Electrostatic Precipitator - Medium Efficiency	128
12	Electrostatic Precipitator - Low Efficiency	128
13	Gas Scrubber (General, Not Classified)	999
14	Mist Eliminator - High Velocity, I.E. V>250 Ft/Min.	211
15	Mist Eliminator - Low Velocity, I.E. V<250 Ft/Min.	211
16	Fabric Filter - High Temperature, I.E. T>250F	127
17	Fabric Filter - Medium Temperature, I.E. 180F<T<250F	127
18	Fabric Filter - Low Temperature , I.E. T<180F	127
19	Catalytic Afterburner	999
20	Catalytic Afterburner with Heat Exchanger	999
21	Direct Flame Afterburner	
22	Direct Flame Afterburner with Heat Exchanger	999
23	Flaring	999
24	Modified Burner or Furnace Design	999
25	Staged combustion	999
26	Flue Gas Recirculation	999
27	Reduced Combustion - Air Preheating	999
28	Steam or Water Injection	
29	Low Excess Air Firing	999
30	Use of Fuel with Low Nitrogen Content	999
31	Air Injection	999
32	Ammonia Injection	999
33	Control of % O2 in Combustion Air (Off Stoichiometric Firing)	999
34	Wellman-Lord/Sodium Sulfite Scrubbing	999
35	Magnesium Oxide Scrubbing	141
36	Dual Alkali Scrubbing	141
37	Citrate Process Scrubbing	999
38	Ammonia Scrubbing	141
39	Catalytic Oxidation - Flue Gas Desulfurization	999
40	Alkalized Alumina	999
41	Dry Limestone Injection	999
42	Wet Limestone Injection	999

Control Measure Code	Description	PM Control Mapping
43	Sulfuric Acid Plant - Contact Process	999
44	Sulfuric Acid Plant - Double Contact Process	999
45	Sulfur Plant	999
46	Process Change	
47	Vapor Recovery System (Including Condensers, Hooding, Other Enclosures)	999
48	Activated Carbon Adsorption	999
49	Liquid Filtration System	
50	Packed-Gas Absorption Column	
51	Tray-Type Gas Absorption Column	
52	Spray Tower	
53	Venturi Scrubber	129
54	Process Enclosed	
55	Impingement Plate Scrubber	129
56	Dynamic Separator (Dry)	
57	Dynamic Separator (wet)	
58	Mat or Panel Filter	
59	Metal Fabric Filter Screen (Cotton Gins)	
60	Process Gas Recovery	999
61	Dust Suppression by Water Sprays	217
62	Dust Suppression by Chemical Stabilizers or Wetting Agents	217
63	Gravel Bed Filter	
64	Annular Ring Filter	
65	Catalytic Reduction	999
66	Molecular Sieve	999
67	Wet Lime Slurry Scrubbing	141
68	Alkaline Fly Ash Scrubbing	141
69	Sodium Carbonate Scrubbing	141
70	Sodium-Alkali Scrubbing	141
71	Fluid Bed Dry Scrubber	119
72	Tube and Shell Condenser	999
73	Refrigerated Condenser	999
74	Barometric Condenser	999
75	Single Cyclone	
76	Multiple Cyclone w/o Fly Ash Reinjection	121
77	Multiple Cyclone w/ Fly Ash Reinjection	121
78	Baffle	999
79	Dry Electrostatic Granular Filter (DEGF)	
80	Chemical Oxidation	999
81	Chemical Reduction	999
82	Ozonation	999
83	Chemical Neutralization	999
84	Activated Clay Adsorption	999
85	Wet Cyclonic Separator	
86	Water Curtain	
87	Nitrogen Blanket	999
88	Conservation Vent	999
89	Bottom Filling	999
90	Conversion to Variable Vapor Space Tank	999
91	Conversion to Floating Roof Tank	999
92	Conversion to Pressurized Tank	999
93	Submerged Filling	999
94	Underground Tank	999
95	White Paint	999
96	Vapor Lock Balance Recovery System	999
97	Installation of Secondary Seal for External Floating Roof Tank	999
98	Moving Bed Dry Scrubber	999
99	Miscellaneous Control Devices	
100	Baghouse	
101	High-Efficiency Particulate Air Filter (HEPA)	
102	Low Solvent Coatings	999
103	Powder Coatings	999
104	Waterborne Coatings	999
105	Process Modification - Electrostatic Spraying	999

Control Measure Code	Description	PM Control Mapping
106	Dust Suppression by Physical Stabilization	999
107	Selective Noncatalytic Reduction for Nox	999
108	Dust Suppression - Traffic Control	999
109	Catalytic Oxidizer	999
110	Vapor Recovery Unit	999
112	Afterburner	999
113	Rotoclone	
115	Impingement Type Wet Scrubber	999
116	Catalytic Incinerator	999
117	Packed Scrubber	129
118	Crossflow Packed Bed	999
119	Dry Scrubber	
120	Floating Bed Scrubber	999
121	Multiple Cyclones	
122	Quench Tower	999
123	Spray Scrubber	999
124	High Pressure Scrubber	999
125	Low Pressure Scrubber	999
127	Fabric Filter	
128	Electrostatic Precipitator	
129	Scrubber	
130	Caustic Scrubber	999
131	Thermal Oxidizer	
132	Condenser	999
133	Incinerator	
134	Demister	211
137	HVAF	999
138	Boiler at Landfill	999
139	SCR	999
140	SNCR	999
141	Wet Scrubber	
143	Wet Suppression	
144	Spray Screen	999
145	Single Wet Cap	999
146	Wet Electrostatic Precipitator	
147	Increased Air/Fuel Ratio with Intercooling	
148	Clean Burn	999
149	Pre-Combustion Chamber	999
150	Mechanical Collector	121
151	Fiber Mist Eliminator	211
152	Mist Eliminator - High Efficiency	999
153	Water Sprays	999
154	Screened Drums or Cages	999
155	Packed Bed Scrubber - High Efficiency	999
157	Screen	
158	Ionizing Wet Scrubber	999
159	Electrified Filter Bed	129
201	Knock Out Box	121
202	Spray Dryer	999
203	Catalytic Converter	999
204	Overfire Air	999
205	Low NOx Burners	999
206	Dry Sorbent Injection	999
207	Carbon Injection	999
208	Freeboard Refrigeration Device	999
209	Gravity Collector	999
210	Centrifugal Collector	999
211	Mist Eliminator	999
212	Steam Injection	999
213	Water Injection	999
214	Low Nitrogen Content Fuel	999
215	Flue Gas Desulfurization	999
216	Sulfuric Acid Plant	999

Control Measure Code	Description	PM Control Mapping
217	Dust Suppression	61
218	Electrostatic Spraying	999
219	Increased Monitoring Frequency (IMF) of PM Controls	999
220	CEM Upgrade and Increased Monitoring Frequency of PM Controls	999
999	Uncontrolled	

Emissions for the missing pollutants were calculated using the formulas in Table 3. Gap-filling all missing pollutants for some processes using the Access® databases from the PM Calculator was not possible since the databases do not contain all SLT reported SCCs. The term "pmcalc_" in Table 3 refers to factors derived from dividing emissions output data from the PM Calculator databases. Where the table refers to (un)controlled factors, there are two separate fields in the PM Calculator databases for controlled and uncontrolled which were used depending on the status of the unit associated with the SLT reported emissions. The controlled factors refer to the matching of the primary and secondary controls as described above. The following terms identify the conversion factors discussed in the Strait et al. paper (1999): pm10pri_to_pm10fil and pm10fil_to_pmcon. Factors to convert PM25-PRI to PM25-FIL were not developed; therefore, SLT supplied PM25-PRI emissions were converted to PM25-FIL emissions using the conversion factors for pm10pri_to_pm10fil.

Table 3. Calculation of PM species not reported by SLT

SLT reported Pollutants	Non-Trivial Case	Final Augmented Pollutants
PM10-PRI	1	PM10-PRI=Original PM2.5-PRI=PM10-PRI×(pm10pri_to_pm10fil)×(pmcalc_pm25fil(un)controlled/ pmcalc_pm10fil(un)controlled)+PM10-PRI-PM10-PRI×(pm10pri_to_pm10fil) PM10-FIL=PM10-PRI×(pm10pri_to_pm10fil) PM2.5-FIL=PM10-PRI×(pm10pri_to_pm10fil)×(pmcalc_pm25fil(un)controlled/ pmcalc_pm10fil(un)controlled) PM-CON=PM10-PRI-PM10-PRI×(pm10pri_to_pm10fil)
PM10-FIL	2	PM10-PRI=PM10-FIL×pm10fil_to_pmcon+PM10FIL PM2.5-PRI=PM10-FIL×(pmcalc_pm25fil(un)controlled/ pmcalc_pm10fil(un)controlled)+PM10-FIL×pm10fil_to_pmcon PM10-FIL=Original PM2.5-FIL=PM10-FIL×(pmcalc_pm25fil(un)controlled/pmcalc_pm10fil(un)controlled) PM-CON=PM10-FIL×pm10fil_to_pmcon
PM2.5-PRI	3	PM10-PRI=(PM2.5-PRI×pm10pri_to_pm10fil×pmcalc_pm10fil_(un)controlled/pmcalc_pm25fil_(un)controlled)+PM2.5-PRI×(1-pm10pri_to_pm10fil) PM2.5-PRI=Original PM10-FIL=PM2.5-PRI×pm10pri_to_pm10fil×pmcalc_pm10fil_(un)controlled/pmcalc_pm25fil_(un)controlled PM2.5-FIL=PM2.5-PRI×pm10pri_to_pm10fil PM-CON=PM2.5-PRI×(1-pm10pri_to_pm10fil)
PM2.5-FIL	4	PM10-PRI=PM2.5-FIL×(pmcalc_pm10fil_(un)controlled/pmcalc_pm25fil_(un)controlled)+PM2.5-FIL×(pmcalc_pm10fil_(un)controlled/pmcalc_pm25fil_(un)controlled)×pm10fil_to_pmcon PM2.5-PRI=PM2.5-FIL+PM2.5-FIL×(pmcalc_pm10fil_(un)controlled/pmcalc_pm25fil_(un)controlled)×pm10fil_to_pmcon PM10-FIL=PM2.5-FIL×(pmcalc_pm10fil_(un)controlled/pmcalc_pm25fil_(un)controlled) PM2.5-FIL=Original PM-CON=PM2.5-FIL×(pmcalc_pm10fil_(un)controlled/pmcalc_pm25fil_(un)controlled)×pm10fil_to_pmcon
PM-CON	5	PM10-PRI=PM-CON+PM-CON/(pm10fil_to_pmcon) PM2.5-PRI=(PM-CON/(pm10fil_to_pmcon))×(pmcalc_pm25_fil_(un)controlled/ pmcalc_pm10_fil_(un)controlled)+PM-CON PM10-FIL=PM-CON/(pm10fil_to_pmcon) PM2.5-FIL=(PM-CON/(pm10fil_to_pmcon))×(pmcalc_pm25_fil_(un)controlled/pmcalc_pm10_fil_(un)controlled) PM-CON=Original
SLT reported Pollutants	**Non-Trivial Case**	**Final Augmented Pollutants**

PM10-PRI and PM2.5-PRI	6	PM10-PRI=Original PM2.5-PRI=Original PM10-FIL=PM10-PRI×(pm10pri_to_pm10fil) PM2.5-FIL=PM2.5-PRI-(PM10-PRI-PM10-PRI×(pm10pri_to_pm10fil)) PM-CON=PM10-PRI-PM10-PRI×(pm10pri_to_pm10fil)
PM10-FIL and PM2.5-FIL	7	PM10-PRI=PM10-FIL+PM10-FIL×pm10fil_to_pmcon PM2.5-PRI=PM25-FIL+PM10-FIL×pm10fil_to_pmcon PM10-FIL=Original PM2.5-FIL=Original PM-CON=PM10-FIL×pm10fil_to_pmcon
PM10-PRI and PM2.5-FIL	8	PM10-PRI=Original PM2.5-PRI=PM25-FIL+PM10-PRI×(1-pm10pri_to_pm10fil) PM10-FIL=PM10-PRI×pm10pri_to_pm10fil PM2.5-FIL=Original PM-CON=PM10-PRI×(1-pm10pri_to_pm10fil)
PM10-FIL and PM2.5-PRI	9	PM10-PRI=PM25-PRI×pmcalc_pm10fil(un)controlled/pmcalc_pm25fil(un)controlled PM2.5-PRI=Original PM10-FIL=Original PM2.5-FIL=PM25-PRI-(PM25-PRI×pmcalc_pm10fil(un)controlled/pmcalc_pm25fil(un)controlled-PM10-FIL) PM-CON=PM25-PRI×pmcalc_pm10fil(un)controlled/pmcalc_pm25fil(un)controlled-PM10-FIL
PM10-PRI, PM10-FIL, and PM-CON	10	PM10-PRI=Original or Trivial Update PM2.5-PRI=PM10-FIL×(pmcalc_pm25fil(un)controlled/pmcalc_pm10fil(un)controlled)+PM-CON PM10-FIL=Original or Trivial Update PM2.5-FIL=PM10-FIL×(pmcalc_pm25fil(un)controlled/pmcalc_pm10fil(un)controlled) PM-CON=Original or Trivial Update
PM2.5-PRI, PM2.5-FIL, and PM-CON	11	PM10-PRI=PM2.5-FIL×(pmcalc_pm10fil_(un)controlled / pmcalc_pm25fil_(un)controlled)+PM-CON PM2.5-PRI=Original or Trivial Update PM10-FIL=PM2.5-FIL×(pmcalc_pm10fil_(un)controlled / pmcalc_pm25fil_(un)controlled) PM2.5-FIL=Original or Trivial Update PM-CON=Original or Trivial Update

All three groups of uncontrolled processes and all three groups of controlled processes were consolidated into a single table, and the pre-screening steps repeated to ensure consistency. In addition, the trivial updates were redone with checks to ensure that the updates did not introduce any inconsistencies that would violate the pre-screening criteria.

To ensure that all PM10-PRI and PM25-PRI records contained values, any remaining null records for these PM species were populated according to the schema presented in Table 4. All null PM25-PRI records were populated prior to gap-filling null PM10-PRI records. For example, if PM25-PRI is null, PM25-FIL is null and PM10-PRI is not null, then PM25-PRI would be set equal to PM10-PRI.

Table 4. Gap-filling Schema for Null PM10-PRI and PM25-PRI Records

Pollutant with Null Record	Gap-filling Priority List (Null Record Set Equal to First Non-null Value in List)
PM25-PRI	1. PM25-FIL 2. PM10-PRI 3. PM10-FIL 4. PM-CON
PM10-PRI	1. PM10-FIL 2. PM25-PRI

Non-trivial and trivial emissions for all pollutants not reported by an SLT agency were consolidated into the EIS format. Results were split into two separate files, one containing overwrites and one containing additions. Overwrites were cases where the SLT reported emissions for a process/pollutant that were overwritten or deleted in the pre-screening because of inconsistencies. The overwrites file contains some null values where the SLT provided inconsistent information that was made null in the pre-screening and there was no replacement value since the SCC/control combination was not in the PM Calculator. Additions are the remaining process/pollutant level records which were added in the trivial or non-trivial updates sections.

REFERENCES:

Strait, et al, 1999: "PM Augmentation Procedures for the 1999 Point and Area Source NEI", Randy Strait and Donna McKenzie, E.H. Pechan & Associates, Roy Huntley, EIAG, EPA

AP 42, Fifth Edition, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, Appendices B.1 and B.2, http://www.epa.gov/ttn/chief/ap42/index.html

KEY WORDS
Condensible particulate matter
Filterable particulate matter
National emission inventory
Particulate matter
Point sources
Primary particulate matter