

History of Updates to the Approved Emission Factors for Toxic Air Contaminants:

1. In August 2018, the District published the document *Approved Emission Factors for Toxics Air Contaminants* and the associated spreadsheet with emission factors, *SBCAPCD-Approved TAC Emission Factors.xlsx*.
2. Updates in May 2019:
 - a. Document updates:
 - i. Some minor formatting changes were made, including replacing the District's logo on the cover page.
 - ii. Equations throughout the document were edited so that the order in which the parameters are defined match the order in which they appear in the equation.
 - iii. Section 2.1: A discussion of the emission factors for digester gas fueled internal combustion engines was added. A discussion of the heat content of different fuels was also added.
 - iv. Section 3.1: A discussion of the emission factors for digester gas fueled boilers/heaters was added, and the default heat content of digester gas was added.
 - v. Section 4.0: The last equation (maximum hourly emission for scenario 3: hourly records are kept) incorrectly stated that the units for the maximum hourly usage of solvent were gal/day. The units were corrected to gal/hr.
 - vi. Section 5.0: The District clarified that TOG is equal to TOC.
 - vii. Sections 5.3 through 5.5: These sections were rearranged to match the order in which the emission factors appear in the *O&G Fugitives* tab of the spreadsheet.
 - viii. Section 6.1: A discussion of the emission factors for aggregate materials and haul roads was added.
 - ix. Section 6.2: This section and its subsections 6.2.1 and 6.2.2 were added to discuss emission factors from dryers, load-out, yard, silo filling and asphalt storage tank emissions at hot mix asphalt plants.
 - x. Section 7.0: The references were updated.
 - b. Spreadsheet updates:
 - i. *Engines & Turbines* tab: Emission factors for digester gas fueled internal combustion engines were added.
 - ii. *Boilers & Heaters* tab: Emission factors for digester gas fueled boilers/heaters were added.
 - iii. *Minerals* tab: The crystalline silica emission factor for aggregate transfer to bins and storage in bins/hoppers at CBPs was modified. Emission factors for haul roads at CBPs were added. Furthermore, emission factors for various processes at hot mix asphalt plants and aggregate material handling were added.
3. In April 2020, the spreadsheet was updated with the correct emission factors for hexavalent chromium and fluoranthene from landfill gas-fired flares in the *Flares & Crematories* tab.

4. In May 2020, the spreadsheet was updated with the following:
 - a. *Flares & Crematories* tab: Emission factors for propane-fired flares were added.
 - b. *Boilers & Heaters* tab: Metal emission factors were added for propane-fired boilers. In addition, the propylene emission factor was added.

5. Updates in June 2020:
 - a. Document updates:
 - i. Section 2.4:
 1. Updated to include maximum hourly emissions for diesel PM for AB 2588.
 2. Updated to include annual and maximum hourly emissions for diesel TOG for AB 2588.
 3. Updated to include policy regarding reporting speciated annual emissions for 8-hour chronic risk for diesel engines.
 - ii. Section 2.4.1:
 1. Updated annual average emissions equation to be applicable for both diesel PM and diesel TOG.
 2. Added maximum hourly emissions equation for diesel PM and diesel TOG.
 3. Added speciated annual emission equations for Scenario 1 and Scenario 2.
 4. Updated language to clarify that speciated emissions now include annual emissions, in addition to maximum hourly emissions.
 - iii. Section 2.4.2:
 1. Added annual average emissions equation and maximum hourly emissions equation for diesel PM and diesel TOG.
 2. Added speciated annual emission equations for Scenario 1 and Scenario 2.
 3. Updated language to clarify that speciated emissions now include annual emissions, in addition to maximum hourly emissions.
 - iv. Section 6: Added emission methodologies for miscellaneous fugitive dust.
 - v. Section 6.1: Removed discussion of haul road emissions (moved to Section 6.2).
 - vi. Section 6.2: Moved Section 6.2 (*Hot Mix Asphalt Plants*) to Section 6.3. Used Section 6.2 for new section to discuss emissions from haul roads, roadways and landfill dust.
 - vii. Section 6.2.1: Moved Section 6.2.1 (*Dryers at Batch Mix and Drum Mix Plants*) to Section 6.3.1.
 - viii. Section 6.2.2: Moved Section 6.2.2 (*Load-Out, Yard, Silo Filling and Asphalt Storage Tanks*) to Section 6.3.2. Added clarifying language that phenol is part of organic PM.
 - ix. Section 7.0: The references were updated.
 - b. Spreadsheet updates:
 - i. *Engines & Turbines* tab:
 1. Emission factors for diesel turbines were added.
 2. The PAH (excluding naphthalene) emission factor was added for 4 stroke-rich burn natural gas-fired internal combustion engines.
 3. The PAH (excluding naphthalene) emission factor was added for 4 stroke-rich burn LPG, butane or propane-fired internal combustion engines.

- ii. *Misc. Fugitive Dust* tab: Created new tab with new profiles for unpaved road dust, paved road and landfill dust. In addition, profiles for roadway dust from mineral sources were copied to this tab for ease of use.

6. Updates in August 2021:

a. Document updates:

- i. Some minor formatting changes were made, including updating equations to use FC_{Annual} for annual fuel usage for consistency throughout document.
- ii. Section 2.2:
 - 1. Updated to include the reference for AP-42 Table 3.1-3, the original source of all emission factors except for ammonia.
 - 2. Updated to include policy regarding reporting naphthalene PAHs emission factors for natural gas-fired and LPG turbines.
- iii. Section 2.3:
 - 1. Updated to include the reference for AP-42 Table 3.1-3, original source of all emission factors, except ammonia, for LPG turbines (prior to conversion from natural gas to LPG).
 - 2. Updated to include policy regarding reporting naphthalene and PAH emission factors for natural gas-fired turbine or LPG turbine.
- iv. Section 2.5: New section added to address calculations for diesel-fired turbines.
- v. Section 3.1.2: Updated to include discussion of emission factors for digester gas flares (new source type for this document).
- vi. Section 6.1: Updated with emission factors specific to cement storage silos and fly ash storage silos at concrete batch plants.
- vii. Section 6.2:
 - 1. Removed discussion of landfill dust (moved to Section 6.3 and renumbered following sections as necessary).
 - 2. Added discussion of requirements (i.e., sampling/source testing) to use a control efficiency for sweeping and watering controls for paved roads and for watering unpaved roads.
- viii. Section 6.3:
 - 1. Moved discussion of landfill dust to Section 6.3 (moved old Section 6.3 *Hot Mix Asphalt Plants* to Section 6.4).
 - 2. Added references for calculating PM from landfills for various emission sources.
 - 3. Added discussion of requirements (i.e., sampling/source testing) to use a control efficiency for watering controls at landfills.
- iv. Section 7.0: The references were updated.

b. Spreadsheet updates:

- i. All tabs: Cobalt (CAS# 7440484) is no longer highlighted in orange as OEHHA/ARB adopted health risk data for cobalt in October 2020.
- ii. *Engines & Turbines* tab:
 - 1. Included note regarding reporting naphthalene and PAH emission factors for natural gas-fired and LPG turbines.

2. Updated reference for natural gas-fired and LPG turbines to AP-42 Table 3.1-3, the original source of all emission factors except for ammonia.
3. Revised reference for diesel-fired turbines to include VCAPCD's *AB 2588 Combustion Emission Factors*, the original source, and included pollutants from VCAPCD that were missing from the SCAQMD reference, *Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory*. The added pollutants are total chromium, zinc, chlorobenzene, and propylene.

iii. *Flares & Crematories* tab:

1. The acenaphthene and acenaphthylene emission factors for landfill gas flares were corrected. The source test report for the September 9-11, 2010 testing of the Santa Maria Landfill flare mistakenly switched the factors and this error was propagated into the District's approved emission factors.
2. The digester gas flare source type was added to the tab.

iv. *Minerals* tab:

1. The emission factors, excluding crystalline silica, for cement storage silos at concrete batch plants were revised to emission factors from SDCAPCD, *Cement Storage Silo, Pneumatic Loading, Section 11.12 AP-42 (1/95), w/ Vent Sock Controls*. The crystalline silica emission factor and reference remain unchanged.
2. Emission factors, excluding crystalline silica, for fly ash storage silos at concrete batch plants were added based on emission factors from SDCAPCD, *Fly Ash Storage Silo, Pneumatic Loading, Section 11.12 AP-42 (1/95), w/ Vent Sock Controls*. The same emission factor and reference for crystalline silica emission factor were added as for cement storage silos.
3. Removed an incorrect reference for yard emissions and silo filling from hot mix asphalt plants since the factors were based on only one reference, AP-42 Chapter 11.1. Table 11.1-16: *Speciation Profiles for Load-Out, Silo Filling, and Asphalt Storage Emissions – Organic Volatile-Based Compounds*.
4. For ease of use, converted the load-out emission factors and the silo filling emission factors for speciated PAHs and phenol to units of lb/lb-TOC using the ratio of organic PM to TOC found in AP-42 Chapter 11.1 Table 11.1-14, *Predictive Emission Factor Equations for Load-out and Silo Filling Operations*.

7. Updates in December 2023:

a. Document updates:

- i. Numbers were added to all equations.
- ii. Section 2.1: This section was added to describe how to calculate sulfur dioxide emissions from internal combustion of different fuel types.
- iii. Section 3.1: This section was added to describe how to calculate sulfur dioxide emissions from external combustion of different fuel types.
- iv. Section 3.2.2: The name of the SDCAPCD reference was updated.
- v. Section 3.5: As a separate emission factor profile is now available for animal remains, a reference to that profile was added. As the human remains emission factor profile reference was updated, this section was updated accordingly. Furthermore,

language was added to clarify that the default of 150 pounds per charge is for human remains.

- vi. Section 6.0: A sentence was added at the beginning of this section.
 - vii. Section 6.1: The names of the SDCAPCD references were updated.
 - viii. Section 6.2: The name of the SDCAPCD reference was updated.
 - ix. Section 6.3: The name of the SDCAPCD reference was updated.
 - x. Section 6.4.1: A sentence was added clarifying that sulfur dioxide emissions must be calculated per the new Section 3.1.
 - xi. Section 7.0: This section was added to describe how to calculate emissions from gasoline service stations.
 - xii. Section 8.0: The references were updated.
- b. Spreadsheet updates:
- i. All tabs: sulfur dioxide was added as a pollutant that must be included in the health risk assessment. Additionally, the formatting was updated.
 - ii. *Boilers & Heaters* tab:
 - 1. Added a column for sulfur dioxide and a note about these emission calculations.
 - 2. Added hexavalent chromium to the emission factor profiles for natural gas boiler/heaters and process gas O&G heaters, along with the reference and notes.
 - iii. *Engines & Turbines* tab:
 - 1. Added a column for sulfur dioxide and a note about these emission calculations.
 - 2. Corrected the notes for the Engine – Natural Gas profiles; the numbering was not updated correctly in the August 2021 version.
 - iv. *Flares & Crematories* tab:
 - 1. Added a column for sulfur dioxide and a note about these emission calculations.
 - 2. Added hexavalent chromium to the emission factor profiles for natural gas flares and process gas flares, along with the reference and notes.
 - 3. Reference 5 was updated, as CARB’s website has changed.
 - 4. The mercury emission factor for human remain crematory operations was updated per the most recent version of the reference document.
 - 5. References 6 and 8 were updated, as San Diego County APCD has updated these links.
 - 6. The emission factor profile and associated reference for animal remain crematory operations were added.
 - v. *O&G Fugitives* tab:
 - 1. A column was added for hydrogen sulfide to clearly point out that the emission factors for this pollutant are site-specific.
 - vi. *Misc. Fugitive Dust* tab:
 - 1. Added hexavalent chromium to the emission factor profiles for haul roads at concrete batch plants, hot mix asphalt plants and sand/gravel mining operations, along with the reference and a note.

2. The note for crystalline silica was moved to the pollutant column instead of the reference column for the applicable emission factor profiles.
3. The San Diego County APCD references were updated; crystalline silica emission factors and references 2 and 5 were updated accordingly.

vii. *Minerals* tab:

1. Added a column for sulfur dioxide and a note about these emission calculations.
2. Added hexavalent chromium to the emission factor profiles for haul roads at concrete batch plants, uncontrolled drum mix dryers, aggregate transfer and screening as well as haul roads at hot mix asphalt plants, and all aggregate material mining operations, along with the reference and a note.
3. The note for crystalline silica was moved to the pollutant column instead of the reference column for the applicable emission factor profiles.
4. The San Diego County APCD references were updated; references 2, 4, 6, 7, 14, 15, 16 and 17 and the crystalline silica emission factors for haul roads were updated accordingly (identical to the profiles described in note 7.b.vi.3 above).
5. Notes 1 and 2 were updated to clarify the reference for the zinc emission factor.