Source Category Description

Publicly Owned Treatment Works (POTW) means a treatment works that is owned by a state, municipality, city, town, special sewer district, or other publicly owned and financed entity as opposed to a privately (industrial) owned treatment facility. The definition includes intercepting sewers, outfall sewers, sewage collection systems, pumping, power, and other equipment. The wastewater treated by these POTWs is generated by industrial, commercial, and domestic sources.1

The general approach to calculating emissions for POTWs is to estimate the 2008 national POTW flow rate using methods described below and then multiply the estimated flow rate by the emission factors for VOCs, ammonia, and 53 HAPs. The emissions are allocated to the county level using methods described below.

Activity Data

A nationwide projected flow rate in 2010 of 39,780 million gallons per day (MMGD) was available from an EPA report.2 Of this, POTWs account for 98.5 percent of the flow rate or 39,180 MMGD, with privately owned treatment works accounting for the rest. The EPA Clean Watersheds Needs Survey reports the existing flow rate in 2004 for POTWs as 34,370 MMGD.3 The interpolated 2008 nationwide flow rate (using a linear regression) was calculated at 37,580 MMGD, or 13,754,280 million gallons annually. The nationwide flow rate includes Puerto Rico and the U.S. Virgin Islands.

Emission Factors

The ammonia emission factor was obtained from a report to EPA4, while the VOC emission factor was based on a TriTAC study.5 Emission factors for the 53 HAPs were derived using 1996 area source emissions estimates that were provided by ESD6 and the 1996 nationwide flow rate.7 These HAP emission factors were then multiplied by the 2008 to 2002 VOC emission factor ratio (0.85/9.9) to obtain the final HAP emission factors applied in the 2008 inventory. The emission factors, pollutant codes, and pollutant descriptions are reported in Table 1.

Emissions

Emissions were allocated to the county-level by the county proportion of the U.S. population.8

It is important to note that the emission estimates for this category represent total emissions. It may be necessary to determine whether there are point source emissions in SCCs 50100701 through 50100781 and 50100791 through 50182599 that need to be subtracted to yield the nonpoint source emission estimates for this category.

Sample Calculations:

The 1996 flow rate per day was 32,175 MMGD. (1996 was a leap year.) Annually, this computes to:

32,175 MMGD treated \* 366 days = 11,776,050 million gallons treated

Benzene emissions in 1996 for area source POTWs were estimated to be 461.44 tons per year. The derived benzene emission factor is calculated as follows:

Benzene emission factor = ((461.44 tons \* 2000 lb/ton) / (11,776,050 million gallons treated)) \* (0.85/9.9)

Benzene emission factor = 0.0067287 lb/million gallons treated

Benzene emissions for 2008 for area source POTWs are calculated as follows:

2008 Benzene emissions = (37,580 MMGD \* 366 days) \* (0.0067287 lb/million gallons treated)

2008 Benzene emissions = 92,548 pounds / 2,000 pounds = 46.27 tons/year

Total national 2008 benzene emissions from area source POTWs are allocated to county-level by the county proportion of the U.S. population. The total U.S. population in 2008 is 308,123,578. Benzene emissions for Autauga County, Alabama (2008 population of 50,364) are calculated as follows:

2008 emissions = 46.27 tons/year \* 50,364/308,123,578 = 0.0076 tons/year

**References**

1. U.S. Environmental Protection Agency, 64FR57572, National Emission Standards for Publicly Owned Treatment Works, Final Rule, 40 CFR Part 63, 26 October 1999.
2. U.S. Environmental Protection Agency, “Wastewater Flow Projections for POTWs and Privately and Federally Owned Treatment Works in 2000, 2005, and 2010,” Table A-8 in *Biosolids Generation, Use, and Disposal in the United States*, EPA530-R-99-009, September 1999.
3. U.S. Environmental Protection Agency, [Clean Watersheds Needs Survey, Ask WATERS Online Database Query Tool,](https://www.epa.gov/cwns) accessed May 2019.
4. Stephen M. Roe, Melissa D. Spivey, Holly C. Lindquist, Kirstin B. Thesing, and Randy P. Strait, E.H. Pechan & Associates, Inc., *Estimating Ammonia Emissions from Anthropogenic Nonagricultural Sources – Draft Final Report*, prepared for U.S. Environmental Protection Agency, Emission Inventory Improvement Program, April 2004.
5. Prakasam Tata, Jay Witherspoon, Cecil Lue-Hing (eds.), VOC Emissions from Wastewater Treatment Plants: Characterization, Control, and Compliance, Lewis Publishers, 2003, p. 261.
6. Memorandum from Bob Lucas, U.S Environmental Protection Agency to Greg Nizich, U.S. Environmental Protection Agency, “Review of Baseline Emissions Inventory,” 16 October 1998.
7. U.S. Environmental Protection Agency, “Facilities Database (Needs Survey) - Frequently Asked Questions,”.
8. U.S. Census Bureau, “[Population Estimates](https://www.census.gov/topics/population.html),”released 14 May 2009 with population estimates as of 1 July 2008. Note: The U.S. Census Bureau estimate does not include the U.S. Virgin Islands, so the Census Bureau estimate was supplemented with Virgin Island population data from U.S. Department of Commerce, National Oceanic and Atmospheric Administration, [*Demographic Baseline Report of U.S. Territories and Counties Adjacent to Coral Reef Habitats*](https://www.coris.noaa.gov/activities/coral_demographics/), June 2008, accessed June 2019.

**Table 1. Criteria and HAP Emission Factors for Publicly Owned Treatment Works (SCC 2630020000): Not Adjusted for Point Source Emissions**

|  |  |  |  |
| --- | --- | --- | --- |
| **Pollutant Description** | **NIF 3.0 Pollutant Codes** | **Emission Factor (lb/MMGAL)** | **Emission Factor Reference(s)** |
| 1,1,2,2-TETRACHLOROETHANE | 79345 | 1.75E-06 | 6, 7 |
| 1,1,2-TRICHLOROETHANE | 79005 | 1.17E-06 | 6, 7 |
| 1,2,4-TRICHLOROBENZENE | 120821 | 8.67E-05 | 6, 7 |
| 1,3-BUTADIENE | 106990 | 2.51E-05 | 6, 7 |
| 1,4-DICHLOROBENZENE | 106467 | 2.16E-04 | 6, 7 |
| 1-CHLORO-2,3-EPOXYPROPANE | 106898 | 4.52E-06 | 6, 7 |
| 2,4-DINITROTOLUENE | 121142 | 4.81E-05 | 6, 7 |
| 2-NITROPROPANE | 79469 | 2.92E-07 | 6, 7 |
| ACETALDEHYDE | 75070 | 3.10E-04 | 6, 7 |
| ACETONITRILE | 75058 | 3.45E-04 | 6, 7 |
| ACROLEIN | 107028 | 3.84E-04 | 6, 7 |
| ACRYLONITRILE | 107131 | 3.86E-04 | 6, 7 |
| ALLYL CHLORIDE | 107051 | 1.94E-05 | 6, 7 |
| AMMONIA | NH3 | 1.69E-01 | 4 |
| BENZENE | 71432 | 6.73E-03 | 6, 7 |
| BENZYL CHLORIDE | 100447 | 8.17E-06 | 6, 7 |
| BIPHENYL | 92524 | 7.52E-05 | 6, 7 |
| CARBON DISULFIDE | 75150 | 4.32E-03 | 6, 7 |
| CARBON TETRACHLORIDE | 56235 | 1.12E-03 | 6, 7 |
| CHLOROBENZENE | 108907 | 4.83E-04 | 6, 7 |
| CHLOROFORM | 67663 | 6.44E-03 | 6, 7 |
| CHLOROPRENE | 126998 | 2.38E-05 | 6, 7 |
| CRESOLS (INCLUDES O, M, & P)/CRESYLIC ACIDS | 331 | 1.61E-06 | 6, 7 |
| DIMETHYL SULFATE | 77781 | 1.31E-06 | 6, 7 |
| ETHYL ACRYLATE | 140885 | 1.75E-06 | 6, 7 |
| ETHYL BENZENE | 100414 | 7.66E-03 | 6, 7 |
| ETHYLENE OXIDE | 75218 | 2.22E-04 | 6, 7 |
| FORMALDEHYDE | 50000 | 1.97E-05 | 6, 7 |
| GLYCOL ETHERS | 171 | 1.15E-02 | 6, 7 |
| HEXACHLOROBUTADIENE | 87683 | 7.29E-07 | 6, 7 |
| HEXACHLOROCYCLOPENTADIENE | 77474 | 5.83E-07 | 6, 7 |
| METHANOL | 67561 | 1.14E-02 | 6, 7 |
| METHYL CHLOROFORM | 71556 | 5.63E-04 | 6, 7 |
| METHYL ETHYL KETONE | 78933 | 2.84E-03 | 6, 7 |
| METHYL ISOBUTYL KETONE | 108101 | 2.69E-03 | 6, 7 |
| METHYL METHACRYLATE | 80626 | 3.11E-04 | 6, 7 |
| METHYL TERT-BUTYL ETHER | 1634044 | 6.37E-05 | 6, 7 |
| METHYLENE CHLORIDE | 75092 | 9.10E-03 | 6, 7 |
| N,N-DIMETHYLANILINE | 121697 | 3.22E-04 | 6, 7 |
| NAPHTHALENE | 91203 | 1.31E-03 | 6, 7 |
| NITROBENZENE | 98953 | 6.56E-06 | 6, 7 |
| O-TOLUIDINE | 95534 | 1.75E-06 | 6, 7 |
| P-DIOXANE | 123911 | 1.79E-05 | 6, 7 |
| PROPIONALDEHYDE | 123386 | 3.50E-06 | 6, 7 |
| PROPYLENE DICHLORIDE | 78875 | 1.15E-05 | 6, 7 |
| PROPYLENE OXIDE | 75569 | 7.32E-04 | 6, 7 |
| STYRENE | 100425 | 2.73E-03 | 6, 7 |
| TETRACHLOROETHYLENE | 127184 | 4.27E-03 | 6, 7 |
| TOLUENE | 108883 | 1.23E-02 | 6, 7 |
| TRICHLOROETHYLENE | 79016 | 3.06E-04 | 6, 7 |
| VINYL ACETATE | 108054 | 7.66E-05 | 6, 7 |
| VINYL CHLORIDE | 75014 | 6.71E-06 | 6, 7 |
| VINYLIDENE CHLORIDE | 75354 | 4.23E-04 | 6, 7 |
| VOLATILE ORGANIC COMPOUNDS | VOC | 8.50E-01 | 5 |
| XYLENES (MIXTURE OF O, M, AND P ISOMERS) | 1330207 | 5.98E-02 | 6, 7 |
|  |  |  |  |
| lb/MMGAL = pounds per million gallons |  |  |  |