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 2014 emissions for POTWs is to multiply the 2012 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

The EPA Clean Watersheds Needs Survey reports the existing flow rate in 2012 for POTWs as 28,296 million gallons per day (MMGD).2 The nationwide flow rate includes Puerto Rico and the U.S. Virgin Islands. Flow rates were allocated to each county by the county proportion of the U.S. population.3

It should be noted that the derivation of the nationwide flow rate for the 2014 nonpoint POTW emissions inventory differs from the derivation of the nationwide flow rate used to estimate year 2011 nonpoint POTW emissions. The methodology for the 2011 nonpoint POTW emissions inventory used a projected 2010 nationwide flow rate of 39,780 MMGD that was available from an EPA report.4 The projection was based on Needs Surveys from 1984 to 1996. The 2012 nationwide flow rate used for the 2014 inventory is not a projection, but a value directly reported by the 2012 Needs Survey.

Emission Factors

The ammonia emission factor was obtained from a report to EPA5, while the VOC emission factor was based on a TriTAC study.6 Emission factors for the 52 HAPs were derived using 1996 area source emissions estimates that were provided by ESD7 and the 1996 nationwide flow rate.8 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 2014 inventory. The emission factors, pollutant codes, and pollutant descriptions are reported in Table 1.

Emissions

Emissions per county for a given pollutant were computed by multiplying the pollutant emission factor (lb/million gallon) by the county flow rate (million gallons). This process was repeated for all counties in the U.S., Puerto Rico, and the U.S. Virgin Islands, and the result was pollutant specific nonpoint POTW county-level emissions.

The next step was to determine whether there are POTW point source emissions and to subtract those point source emissions from the total nonpoint emissions. The EIS was queried for POTW point sources, and the resulting output contained facility-level HAP and CAP emissions in fifteen states. The fifteen states were: CA, CO, FL, IA, IL, MA, MD, MI, MN, NC, NJ, NY, PA, TN, and TX. The facility-level point source emissions were summed to county and pollutant, and then were subtracted from the nonpoint POTW emissions by county and pollutant. For counties where the point source emissions were larger than the corresponding nonpoint emissions, the nonpoint emissions were set to zero.

Sample Calculations

Year 2014 benzene emissions for Pinellas County, Florida for nonpoint source POTWs are calculated as follows:

* First, the flow rate for Pinellas County is computed from the 2012 national flow rate based on the proportion of the county population to the U.S. population.

2012 national flow rate = 28,296 MMGD

2014 U.S. population = 322,511,858

2014 Pinellas County population = 938,098

Pinellas County flow rate = (28,296 MMGD \*365 days) \* 938,098/322,511,858

= 30,041.42 MMGY

* The benzene emission factor is 0.00673 lb/MMG
* Compute total nonpoint POTW benzene emissions in Pinellas County

Total nonpoint benzene emissions = 30,041.42 MMGY \* 0.00673 lb/MMG / 2000 lb/ton

= 0.101089 tons/year

* Point source benzene emissions in Pinellas County from the 2014 NEI = 0.000217 tons
* Subtract benzene point source emissions

Pinellas County nonpoint POTW benzene emissions = 0.101089 tons – 0.000217 tons

= 0.100872 tons

**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. Year 2014 county population for fifty states acquired from U.S. Census Bureau, “Annual Estimates of the Resident Population for Counties: April 1, 2010 to July 1, 20,” Year 2014 municipio population for Puerto Rico acquired from U.S. Census Bureau, "[Puerto Rico Municipios Totals: Vintage 2014](https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml),”. Note: because of the unavailability of 2014 county population estimates for the U.S. Virgin Islands, 2010 county population was used from the U.S. Census Bureau, “[2010 Census Island Areas](https://www.census.gov/newsroom/releases/archives/2010_census/press-kits/island-areas.html),”, accessed May 2019.
3. U.S. Environmental Protection Agency, Clean Watersheds Needs Survey 2012 Data and Reports, Detail Report, at http://ofmpub.epa.gov/apex/cwns2012/f?p=121:4::::RP::, accessed 25 February 2016.
4. 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.
5. 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.
6. Prakasam Tata, Jay Witherspoon, Cecil Lue-Hing (eds.), VOC Emissions from Wastewater Treatment Plants: Characterization, Control, and Compliance, Lewis Publishers, 2003, p. 261.
7. 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.
8. U.S. Environmental Protection Agency, “[Facilities Database (Needs Survey) - Frequently Asked Questions](https://www.epa.gov/cwns/clean-watersheds-needs-survey-cwns-2008-report-and-data),” May 2019.

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

| **Pollutant Description** | **NEI 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/CRESYLIC ACID (ISOMERS AND MIXTURE) | 1319773 | 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 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 |  |  |  |