Wastewater Treatment Area Source Category Calculation Methodology Sheet

I. Source Category: Wastewater Treatment

II. Pollutants: NH_3

III. SCC:
2630020000 - Waste Disposal, Treatment, and Recovery- Wastewater Treatment- Public Owned

IV. Description:
Wastewater treatment plants collect, transmit, and treat industrial, commercial, and residential wastewater before it is released to a receiving body of water or for further treatment. Wastewater treatment plant processes and operations at wastewater treatment plants cause emissions to the air. Wastewater treatment plants are also known as publicly owned water treatment plants (POTWs). Emissions from this source can be calculated using the Carnegie Mellon University (CMU) emissions model, but the report titled, "Recommended Improvements to the CMU Ammonia Emission Inventory Model for use by LADCO," (STI, 2003), recommends using alternative emission factors, as described below.

V. Current Methodology:
EPA and the CMU Emissions model calculate the ammonia emissions from POTWs using an emission factor of 19 lb $NH_3/10^6$ gallons of waste treated. Using data from alternative sources, it is believed that this emission factor grossly over estimates the emissions from wastewater treatment. Based on a study by the Los Angeles County Sanitation District (LACSD) and the County Sanitation Districts of Orange County (CSDOC), STI recommends an emission factor of 0.12 lb/MMgal of water treated. More information about the justification of this emission factor is available in the LADCO document referenced above.

Currently MANE-VU, under contract with Pechan, is developing an ammonia emissions inventory for 2002 from POTWs in the region. The project will be completed by April 1, 2004. The emission factors used in that project are from draft EIIP guidance (Pechan 2003). The emission factors are not expected to change in the final guidance.

VI. Emission Calculation:

A. Annual Emissions
EPA's NEI emissions for POTWs are grown from National Acid Precipitation Assessment Program (NAPAP) inventories, and no guidance is offered for estimating the throughput of individual POTWs. State water quality divisions may be able to provide additional information about the location and throughput of POTWs in each state.

EIIP cites computer models as the preferred method for estimating emissions from POTWs. Multiple models exist for estimating emissions from POTWs including;

WATER9, BASTE, CORAL+, PAVE, CINCI, NOCEPM, TORONTO, TOXCHEM+. A brief discussion of each of these models is available in EIIP guidance.

Emissions can be calculated in tons/year for wastewater using following equation:

$$EM_{NH3} = (G \times EF_{NH3}) / 2000$$

Where:

- EM_{NH3} = Annual ammonia emissions from wastewater treatment plants (tons).
- G = Annual amount of wastewater processed (MMgal).
- EF_{NH3} = Ammonia emission factor of 0.12 lb/MMgal from the Los Angeles County Sanitation District (LACSD) and the County Sanitation Districts of Orange County (CSDOC)

VII. Point Source Adjustments:

It is possible that states will require POTWs to be inventoried as point sources. Estimated area source activity of emissions should be adjusted by subtracting the activity or emissions attributable to point sources. See EIIP Volume III, Chapter 1, Section 4 for methodology to account for point sources in an area source emissions inventory.

VIII. Adjustments for Controls:

Regulations for ammonia emissions from waste treatment are unlikely to apply to this source.

IX. Spatial Adjustments:

The Federal Emergency Management Association (FEMA) can provide point locations or wastewater treatment plants. This information can be used to apportion the emissions per county.

X. Temporal Adjustments:

Emissions from POTWs may be assumed to be constant through the year.

XI. Assumptions:

Ammonia emissions from POTWs vary depending on the operation type at each POTW, so we assume that the general emission factor is representative of all POTWs.

XII. Rule Effectiveness:

Not applicable.

XIII. Recommendations to Improve Methods/Data

Improvements can be achieved through surveys of state/local sanitation agencies and water quality control boards to identify the location and specific process information of POTWs.

XIV. References:

Emissions Inventory Improvement Program (EIIP), *Preferred and Alternative Methods for Estimating Air Emissions from Wastewater Collection and Treatment Final Report, Volume II: Chapter 5*, March 1997.

Lake Michigan Air Directors Consortium (LADCO), *Recommended Improvements to the CMU Ammonia Emission Inventory Model for Use by LADCO,* prepared by Sonoma Technology, Inc., March, 2003.

Pechan. Estimating Ammonia Emissions from Anthropogenic Sources – Draft Report, prepared for the US EPA, Emissions Inventory Improvement Program, prepared by E.H.Pechan & Associates, Inc. September 2003.

U.S. Environmental Protection Agency, *Current Methods Used to Estimate Emissions, 1985-1999* Procedures Document for National Emission Inventory, Criteria Air Pollutants 1985-1999, March 2001.

U.S. Environmental Protection Agency, *Compilation of Air Pollutant Emission Factors – Volume I: Stationary Point and Area Sources. Fifth Edition, AP-42*, *1998.*

U.S. Environmental Protection Agency, OAQPS, Draft *Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations*, June 2003.