Appendix I

Sample Calculations for Nonpoint Sources

APPENDIX I- Sample calculations for several NonPoint Sources are below:

2007 Prescribed Burning
AMS: 2810014000
Suffolk County, NY (FIPS: 36103)

PM2.5 Flaming Fuel Emission Calculations:

((Acres burned)^{1} × (Fuel Loading Factor (tons/acre burned))^{2} × (PM2.5 Flaming Fuel Emission Factor (lb/ton)))^{2} × 0.75 = PM2.5 Flaming Fuel Emissions (lbs/yr)

((77.5 acres burned) × (8.2 tons/acre burned) × (24.1 lb/ton)) × 0.75 = 11,490 lbs/yr

PM2.5 Smoldering Fuel Emission Calculations:

((Acres burned)^{1} × (Fuel Loading Factor (tons/acre burned))^{2} × (PM2.5 Emission Factor (lb/ton)))^{3} × 0.25 = PM2.5 Smoldering Fuel Emissions (lbs/yr)

((77.5 acres burned) × (8.2 tons/acre burned) × (24.1 lb/ton)) × 0.25 = 3,830 lbs/yr

PM2.5 Annual Emissions = PM2.5 Flaming Fuel Emissions + PM2.5 Smoldering Fuel Emissions
= 11,490 lbs/yr + 3,830 lbs/yr
= 15,320 lbs/yr
= 7.66 tons/yr

Notes:
1. 2007 data was compiled by the New York State Department of Environmental Conservation's Division of Lands And Forests.

2. Fuel Loading factor and Emission Factors: EPA's Documentation For The 1996 Base Year National Toxics Inventory for Area Sources dated May 31, 2001 (Appendix A; Pages A-31 and A-32).

3. PM2.5 Emission Factor: The PM2.5 emission factor (24.1 lbs/ton) was forwarded to the Department's Division of Air Resources in an email from Randy Strait of E. H. Pechan & Associates, Inc. on 08/02/2004.

2007 Residential Heating (Oil)
AMS: 2104004000 & 2104011000
Nassau, NY (FIPS: 36059)

1. County: Nassau

2. Allocation of Fuel to County Level

   a. Raw Data
      i number of households heated w/oil: 247,586 (2000 Census)
      ii heating degree days (2007 calendar year): 5,252 days (NOAA)
      iii statewide fuel usage for sector:

      distillate oil: $1{,}338{,}120 \times 10^3$ gallons
      kerosene: $52{,}164 \times 10^3$ gallons

   b. Weighted Average Allocation

   For each county, the product of census data times heating degree days was determined. For Nassau County:

   = (247,586 homes)(5,252 heating degree days)
   = 1,300,321,672 homes-heating degree days

   The statewide sum: 12,925,564,782 homes-heating degree days

   The Nassau County allocation factor (AF) for residential fuel oil then is calculated by dividing the county-specific value by the statewide value:

   AF = (1,209,210,024)/(11,988,704,610)
   AF = <u>0.1006</u>

   The residential fuel oil allocation for Nassau County is then determined by multiplying the statewide fuel usage for the sector by AF:

   distillate oil: $(0.1006)(1{,}338{,}120 \times 10^3$ gallons)

   $= \underline{134{,}615 \times 10^3 \text{ gallons}}$

   kerosene: $(0.1006)(52{,}164 \times 10^3$ gallons)

   $= \underline{5{,}248 \times 10^3 \text{ gallons}}$

3. Emission Factors

   a. sulfur content of fuel oil:

distillate oil: 0.21 percent
kerosene: 0.053 percent

NOTE: Sulfur content in fuel oil as reported on 2007 Emission Statements submitted by facilities in Rockland and Nassau Counties.

b. Area Source Classifications:

distillate oil: 2104004000
kerosene: 2104011000

c. Emission Factors (EF)

Sources: AP-42, FIRE for commercial/institutional facilities using distillate or kerosene.

Pollutant	EF (lb/10^3 gallons)	
NO_x	24	
CO	5	
PM_{10}	2.38	
SO_2	142[S]	where [S] is sulfur content (%)

4. Emissions Calculations – Residential Heating Oil – Nassau County

a. Annual

Emissions calculated by multiplying fuel allocation by emission factors. Sample calculations presented below:

1. Distillate Oil

NO_x ($134{,}615 \times 10^3$ gallons)(24 lb/10^3 gallons) = 3,230,800 lb = 1615.4 tons

CO ($134{,}615 \times 10^3$ gallons)(5 lb/10^3 gallons) = 673,100 lb = 336.6 tons

PM_{10} ($134{,}615 \times 10^3$ gallons)(2.38 lb/10^3 gallons) = 320,400 lb = 160.2 tons

SO_2 ($134{,}615 \times 10^3$ gallons)(142 lb/10^3 gallons)(0.21) = 4,014,200 lb = 2007.1 tons

2. Kerosene

NO_x	(5,248 x 10^3 gallons)(24 lb/10^3 gallons) = 126,000 lb = 63.0 tons
CO	(5,248 x 10^3 gallons)(5 lb/10^3 gallons) = 26,240 lb = 13.1 tons
PM_{10}	(5,248 x 10^3 gallons)(2.38 lb/10^3 gallons) = 12,490 lb = 6.2 tons
SO_2	(5,248 x 10^3 gallons)(142 lb/10^3 gallons)(0.053) = 39,500 lb = 19.8 tons