Texas Commission on Environmental Quality
Air Permits Division

New Source Review (NSR) Emission Calculations

This information is maintained by the Chemical NSR Section and is subject to change. Last update was made **August 2007**. These emission calculations represent current NSR guidelines and are provided for informational purposes only. The emission calculations are subject to change based on TCEQ case by case evaluation. Please contact the appropriate Chemical NSR Section management if there are questions related to the emission calculations.

Sample Drum Filling Calculations

The AP-42 loading equation listed in Chapter 5.2 is typically used to calculate emissions from loading operations. Emissions are broken down into short-term emissions (lb/hr) and annual emissions (tons/year). Short-term emissions should be estimated by using the maximum expected vapor pressure and the maximum expected temperature of the compound being loaded and the maximum expected pumping rate being used to fill the drum. Annual emissions should be estimated by using the average annual temperature and corresponding vapor pressure of the compound and the expected annual throughput of the compound.

Emissions from all loading shall be estimated using the following expression which can be found in AP-42, Fifth Edition, Section 5.2, dated January 1995.

$$L_L = \frac{12.46SPM}{T}$$

where: L_L = Loading Loss (lb/10^3 gal of liquid loaded)
S = Saturation factor from AP-42, Table 5.2-1
P = True vapor pressure of liquid loaded (psia)
M = Molecular weight of vapors (lb/lb-mol)
T = Temperature of bulk liquid loaded (^oR)

Example 1

The following example is based on drum loading of 50,000 barrels per year of an organic liquid. The process is submerged loading with dedicated normal service. The true average vapor pressure of the liquid loaded is 0.30 psia; the vapor molecular weight is 150 lb/lbmol; and the annual temperature of the bulk liquid loaded is 70^{o}F.

Annual Loading Losses

$$L_L = \frac{12.46SPM}{T}$$

Where: S = 0.6 for submerged loading, dedicated normal service
P = 0.30 psia
M = 150 lb/lb-mol
T = 530^{o}R (70^{o}F)

$$L_L = \frac{12.46(0.6)(0.30)(150)}{530} = 0.63 \ lb/10^3 \ gallons \, liquid \, loaded$$

Total Uncontrolled Emissions =

$$\left(\frac{0.63 lb}{1000 \, gal}\right)\left(\frac{50{,}000 \, bbl}{yr}\right)\left(\frac{42 \, gal}{bbl}\right)\left(\frac{ton}{2000 \, lb}\right) = 0.66 \ tons/yr$$

Short-Term Uncontrolled Loading Losses

Use the maximum filling rate and maximum true vapor pressure to calculate the maximum short-term emissions. At 100°F, the maximum vapor pressure is 0.45 psia. At this facility, 5,000 gallons of liquid can be loaded in one hour.

$$L_L = \frac{12.46(0.6)(0.45)(150)}{560} = 0.90 \ lb/10^3 \ gallons \, liquid \, loaded$$

Uncontrolled Emissions =

$$\left(\frac{0.90 lb}{1000 \, gal}\right)\left(\frac{5{,}000 \, gal}{hr}\right) = 4.5 \ lb/hr$$