

**HW # 2: Calculate Air Pollutant Concentrations Downwind
of Air Stripper of Contaminated Groundwater Name: _____**

(Due Oct. 7, 2008 in class)

**Given: Air Toxic Emission Rates for Air Stripper of Groundwater proposed for
construction in Kent-Auburn area (South King County, Washington State).**

| Pollutant | CAS | Q (grams/sec) | Type | ASIL (ug/m ³) Annual Average |
|----------------|---------|---------------|------|---|
| Vinyl Chloride | 75-01-4 | 0.010 | A | 0.012 |

The above ASIL for vinyl chloride was obtained from a Puget Sound Clean Air Agency web site:

<http://www.pscleanair.org/regulated/businesses/regulations.aspx>

<http://www.pscleanair.org/regulated/reg3/asil.pdf>

Washington State type A air toxics are carcinogens. ASIL = "acceptable source impact level" concentration of air pollutant in the atmospheric air. Most other states use "AAL" or "acceptable ambient air". The averaging time for type A ASILs is the annual arithmetic mean (or annual average).

| | | |
|---|-----------|-----------------|
| Stack Height | 36 ft | 10.973 meters |
| Stack Inside Diameter | 2 ft | 0.6096 meters |
| Stack gas exit velocity | 10 ft/sec | 3.08 m/sec |
| Stack gas temperature | 68°F | 20°C = 293.33°K |
| Ambient air temperature | 68°F | 20°C = 293.33°K |
| Receptor Height | 4.92 ft | 1.5 meters |
| Land is flat terrain in Kent-Auburn Area (use Rural option) | | |
| Building Height | 12 ft | 3.658 m |
| Building Width | 8 ft | 2.438 m |
| Building Length | 16 ft | 4.877 m |
| Distance between stack base and fence | 2 m | |

GEP Stack Height = $H_g = H + 1.5L$, where:

H_g = good engineering practice stack height measured from base of the stack.

H = Building height of nearby structure measured from the base of the stack = 12 ft.

L = Building Width = lesser dimension (height or projected width) of nearby structure = 8 ft.

$H_g = 12 \text{ ft} + (1.5)(8 \text{ ft}) = 24 \text{ ft}$ for this Groundwater stripper installation.

Washington State "Washington Administrative Code or WAC) web site for Stack GEP

WAC 173-400-200 "Creditable Stack Height and Dispersion Techniques"

<http://apps.leg.wa.gov/wac/default.aspx?cite=173-400-200>

Find:

Use SCREEN3 or TSCREEN to find the maximum downwind air pollutant concentrations.

Note that the 36 ft (10.973m) high stack is greater than the "Good Engineering Practice"

Stack height of 24 ft so there should not be plume downwash.

a) Distance to maximum downwind Vinyl Chloride concentration: _____ meters

b) Maximum downwind vinyl chloride conc.

a) 1 hr av _____ ug/m³ b) Annual Average _____ ug/m³

c) Is any Vinyl Chloride emission reduction needed to meet ASIL ? _____

Note that Vinyl Chloride is a hazardous air pollutant. However, measurements of the ambient air concentration of vinyl chloride are rarely performed as there are no ambient air quality standards for Vinyl Chloride.