

PTE Evaluation

Equipment:

One waste oil furnace rated at 1.5 gallons/hr with an atomizing burner

One 200 gallon storage tank (5 ft height)

Assumptions:

AP-42 Emission Factors: (Table 1.11-1 through Table 1.11-4)

Source Category	Pollutant	Emission Factor (lb/10 ³ gal)	Emission Factor Rating
Atomizing Burner	NO _x	16	D
Atomizing Burner	CO	2.1	D
Atomizing Burner	TOC	1.0	D
Atomizing Burner	Chromium	1.8x10 ⁻¹	D
Atomizing Burner	Nickel	1.6x10 ⁻¹	D
Atomizing Burner	Arsenic	6.0x10 ⁻²	D
Atomizing Burner	SO ₂	107S	D
Atomizing Burner	PM	66A	D
Atomizing Burner	PM ₁₀	57A	D
Atomizing Burner	Lead	50L	D
Atomizing Burner	Phenol	2.8x10 ⁻⁵	D
Atomizing Burner	Naphtalene	9.2x10 ⁻⁵	D
Atomizing Burner	Antimony	4.5x10 ⁻³	D

Atomizing Burner	Beryllium	1.8×10^{-3}	D
Atomizing Burner	Cadmium	1.2×10^{-2}	D
Atomizing Burner	Cobalt	5.2×10^{-3}	D
Atomizing Burner	Manganese	5.0×10^{-2}	D
Atomizing Burner	Naphthalene	9.2×10^{-5}	D
Atomizing Burner	Phenanthrene/ anthracene	1.0×10^{-4}	D
Atomizing Burner	Dibutylphalate	3.4×10^{-5}	D
Atomizing Burner	Pyrene	8.3×10^{-6}	D

S = weight % sulfur in fuel = 0.46% (v. lube) = 0.46

A = weight % ash in fuel = 0.87% (v. lube) = 0.87

L = weight % lead in fuel = (146 parts/million) = 0.0146% = 0.0146

Waste oil furnace is only permitted to operate September 1st - May 15th.

Operating hours = 6168 hr/yr

TANKs Program for Storage Tanks

The Tanks program accounts for working (loading) and breathing (changes in daytime/nighttime temperature) losses from the storage tanks.

Storage Tank:

200 gal = 26.74 ft

$(1 \text{ tank}/200 \text{ gal})(1.5 \text{ gal/hr})(8760 \text{ hr/yr}) = 65.70 \text{ turnover/yr per tank}$

Assume the contents of the storage tank have properties similar to Diethyl(*n,n*)anilin in the TANKs program since Diethyl(*n,n*)anilin had a high molecular weight of 149.23 and a low vapor pressure of 0.0020 psi. Also, assumed the tanks were white and in good condition.

Calculations:

PTE for NO_x

Waste Oil Furnace (1.5 gal/hr):

$$(1.5 \text{ gal/hr})(16 \text{ lb}/10^3 \text{ gal})(6168 \text{ hr/yr})/(2000 \text{ lb/ton}) = 0.074 \text{ tpy NO}_x$$

Total = 0.074

PTE for CO:

Waste Oil Furnace (1.5 gal/hr):

$$(1.5 \text{ gal/hr})(2.1 \text{ lb}/10^3 \text{ gal})(6168 \text{ hr/yr})/(2000 \text{ lb/ton}) = 0.0097 \text{ tpy CO}$$

Total = 0.0097

PTE for Chromium:

Waste Oil Furnace (1.5 gal/hr):

$$(1.5 \text{ gal/hr})(1.8 \times 10^{-1} \text{ lb}/10^3 \text{ gal})(6168 \text{ hr/yr})/(2000 \text{ lb/ton}) = 0.0008 \text{ tpy Chromium}$$

Total = 0.0008

PTE for Nickel:

Waste Oil Furnace (1.5 gal/hr):

$$(1.5 \text{ gal/hr})(1.6 \times 10^{-1} \text{ lb}/10^3 \text{ gal})(6168 \text{ hr/yr})/(2000 \text{ lb/ton}) = 0.0007 \text{ tpy Nickel}$$

Total = 0.0007

PTE for Arsenic:

Waste Oil Furnace (1.5 gal/hr):

$$(1.5 \text{ gal/hr})(6.0 \times 10^{-2} \text{ lb}/10^3 \text{ gal})(6168 \text{ hr/yr})/(2000 \text{ lb/ton}) = 0.0003 \text{ tpy Arsenic}$$

Total = 0.0003

PTE for SO₂:

Waste Oil Furnace (1.5 gal/hr):

$$S = 0.46$$

$$(1.5 \text{ gal/hr})(107(0.46)/10^3 \text{ gal})(6168 \text{ hr/yr})/(2000 \text{ lb/ton}) = 0.2277 \text{ tpy SO}_2$$

Total = 0.2277

PTE for PM:

Waste Oil Furnace (1.5 gal/hr):

$$A = 0.87$$

$$(1.5 \text{ gal/hr})(66(0.87)/10^3 \text{ gal})(6168 \text{ hr/yr})/(2000 \text{ lb/ton}) = 0.2656 \text{ tpy PM}$$

Total = 0.2656

PTE for PM₁₀:

Waste Oil Furnace (1.5 gal/hr):

$$A = 0.87$$

$$(1.5 \text{ gal/hr})(57(0.87)/10^3 \text{ gal})(6168 \text{ hr/yr})/(2000 \text{ lb/ton}) = 0.2294 \text{ tpy PM}_{10}$$

Total = 0.2294

PTE for Lead:

Waste Oil Furnace (1.5 gal/hr):

L = 0.0146

$(1.5 \text{ gal/hr})(50(0.0146)/10^3 \text{ gal})(6168 \text{ hr/yr})/(2000 \text{ lb/ton}) = 0.0034 \text{ tpy Lead}$

Total = 0.0034 (Highest HAP)

PTE for Phenol:

Waste Oil Furnace (1.5 gal/hr):

$(1.5 \text{ gal/hr})(2.8 \times 10^{-5}/10^3 \text{ gal})(6168 \text{ hr/yr})/(2000 \text{ lb/ton}) = 1.30 \times 10^{-7} \text{ tpy Phenol}$

Total = 1.30×10^{-7}

PTE for Naphthalene:

Waste Oil Furnace (1.5 gal/hr):

$(1.5 \text{ gal/hr})(9.2 \times 10^{-5}/10^3 \text{ gal})(6168 \text{ hr/yr})/(2000 \text{ lb/ton}) = 4.26 \times 10^{-7} \text{ tpy Naphthalene}$

Total = 4.26×10^{-7}

PTE for Antimony:

Waste Oil Furnace (1.5 gal/hr):

$(1.5 \text{ gal/hr})(4.5 \times 10^{-3}/10^3 \text{ gal})(6168 \text{ hr/yr})/(2000 \text{ lb/ton}) = 0.00002 \text{ tpy Antimony}$

Total = 0.00002

PTE for Beryllium:

Waste Oil Furnace (1.5 gal/hr):

$(1.5 \text{ gal/hr})(1.8 \times 10^{-3}/10^3 \text{ gal})(6168 \text{ hr/yr})/(2000 \text{ lb/ton}) = 0.000008 \text{ tpy Beryllium}$

Total = 0.000008

PTE for Cadmium:

Waste Oil Furnace (1.5 gal/hr):

$(1.5 \text{ gal/hr})(1.2 \times 10^{-2}/10^3 \text{ gal})(6168 \text{ hr/yr})/(2000 \text{ lb/ton}) = 0.000056 \text{ tpy Cadmium}$

Total = 0.000056

PTE for Cobalt:

Waste Oil Furnace (1.5 gal/hr):

$(1.5 \text{ gal/hr})(5.2 \times 10^{-3}/10^3 \text{ gal})(6168 \text{ hr/yr})/(2000 \text{ lb/ton}) = 0.000024 \text{ tpy Cobalt}$

Total = 0.000024

PTE for Manganese:

Waste Oil Furnace (1.5 gal/hr):

$(1.5 \text{ gal/hr})(5.0 \times 10^{-2}/10^3 \text{ gal})(6168 \text{ hr/yr})/(2000 \text{ lb/ton}) = 0.000231 \text{ tpy Manganese}$

Total = 0.000231

PTE for Phenanthrene/anthracene:

Waste Oil Furnace (1.5 gal/hr):

$(1.5 \text{ gal/hr})(1.0 \times 10^{-4}/10^3 \text{ gal})(6168 \text{ hr/yr})/(2000 \text{ lb/ton}) = 4.63 \times 10^{-7} \text{ tpy}$

Phenanthrene/anthracene

Total = 4.63×10^{-7}

PTE for Dibutylphthalate:

Waste Oil Furnace (1.5 gal/hr):

$$(1.5 \text{ gal/hr})(3.4 \times 10^{-5} / 10^3 \text{ gal})(6168 \text{ hr/yr}) / (2000 \text{ lb/ton}) = 1.57 \times 10^{-7} \text{ tpy Dibutylphthalate}$$

Total = 1.57×10^{-7}

PTE for Pyrene:

Waste Oil Furnace (1.5 gal/hr):

$$(1.5 \text{ gal/hr})(8.3 \times 10^{-6} / 10^3 \text{ gal})(6168 \text{ hr/yr}) / (2000 \text{ lb/ton}) = 3.84 \times 10^{-8} \text{ tpy Pyrene}$$

Total = 3.84×10^{-8}

PTE for Total HAP:

Waste Oil Furnace (1.5 gal/hr):

$$(1.5 \text{ gal/hr})(1.22 \text{ lb total HAP} / 10^3 \text{ gal})(6168 \text{ hr/yr}) / (2000 \text{ lb/ton}) = 0.0056 \text{ tpy total HAP}$$

Total = 0.0056

PTE for VOC:

Storage Tank: (Working and Breathing Losses)

$$(0.18 \text{ lb})(2000 \text{ lb/ton}) = .00009 \text{ tpy}$$

Waste Oil Furnace (1.5 gal/hr):

$$(1.5 \text{ gal/hr})(1.0 \text{ lb} / 10^3 \text{ gal})(6168 \text{ hr/yr}) / (2000 \text{ lb/ton}) = 0.0046 \text{ tpy}$$

Total = 0.0009 tpy + 0.0046 = 0.0055 tpy VOC

Conclusion: This project is not major for any of the criteria pollutants.