

HW Problem 14:

2005

solution

Determine the area required for the proposed Sukumaran Composting Facility.

It should handle Dusseau's Folley's Yardwaste 20 years from now (Scenarios B and C).

Assume that the per capita yardwaste collection in Scenarios B and C, as previously determined, applies.

The population 20 114770.4

Yardwaste is collected at the same rate throughout the year.

During October through March (6 months) yardwaste is stored, and no volume reduction occurs.

During April through Sept., each month's waste is added to 1/6 of the waste collected during the winter and composted. Composting results in 50 % volume reduction after one month.

Assume that compost is removed from the site once per year, at the end of September.

a) How much yard waste (mass) is collected during 1/12 of the year (i.e., one month), 20 yrs from now?

$$\begin{aligned}
 &= \text{population} \times \text{MSW gen per capita} \times 365/12 \times \text{lb yardwaste collected per 100 lb MSW gen} \\
 &= 114770.4 \times 5.8 \times 365/12 \times 0.099 \\
 &= 2018101 \text{ lb/month}
 \end{aligned}$$

b) How much yard waste (volume) is collected during 1/12 of the year (i.e., one month)

From Table 4-1, the specific weight of yardwaste (loose) is 170 lb/cu-yd

$$= 11871.18 \text{ cu-yd/month}$$

c) What is the maximum volume of yardwaste at the site during the year?

	1	2	3	4	5
October	11871	11871	0	0	11871
November	11871	23742	0	0	23742
December	11871	35614	0	0	35614
January	11871	47485	0	0	47485
February	11871	59356	0	0	59356
March	11871	71227	0	0	71227
April	11871	59356	23742	0	83098
May	11871	47485	23742	11871	83098
June	11871	35614	23742	23742	83098
July	11871	23742	23742	35614	83098
August	11871	11871	23742	47485	83098
September	11871	0	23742	59356	83098

Column (All volumes in cu-yd)

- 1 volume collected each month
- 2 volume stored (increases in winter, decreases when stored material is composted)
- 3 Volume of material added to compost piles each month
- 4 Volume remaining of previous months' compost
- 5 Volume of material on site, each month (columns 2+3+4)

d) Assuming that 1 acre is required / 4000 cu-yd of yardwaste, how many acres are required?

$$= 83098 / 4000 = 20.77$$