Appendix C

GAS SYSTEM CALCULATIONS

RUSS FETROW ENGINEERING INC.

P.O. Box 501
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Phone: (503) 363-8760
FAX: (503) 588-7716

P.O. Box 47
Eugene, Oregon 97401
Phone: (503) 689-8110
FAX: (503) 689-1524

3000 Stewart Parkway, Suite 108
Roseburg, Oregon 97470
Phone: (503) 672-4754
FAX: (503) 672-5310

PROJECT Circle C Landfill
TITLE Gas Generation Data
CALCULATED BY Maxwell Mrock DATE 3-7-90
CHECKED BY _____ DATE _____
SCALE _____ SHEET NO. ____ OF ____

Existing Landfill Waste Material

Type	
Stumps / Brush	44%
Demolition and Roofing	10%
Asbestos	6%
Inert Industrial	28%
Sheetrock - New Construction	12%

The organic content is mostly composed of wood fiber, which tends to decay slowly especially when the water content is low.

Estimated Density of material $\cong$ 1500 lb/yd^3

Estimated gas generation $\cong$ .041 $\frac{\text{standard cubic feet}}{\text{lb.}}$ / yr

These are conservative estimates actual production will probably be lower, especially after closure and the reduction of water infiltration.

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PROJECT: Circle C Landfill
TITLE: Gas generation Data
CALCULATED BY: M Mick DATE: 3-7-90
CHECKED BY: DATE:
SCALE: SHEET NO. OF

Existing fill = 400,000 yds — per Topo.

$$400{,}000 \text{ yds} \times 1500 \frac{\text{lbs}}{\text{yd}} \times 0.041 \frac{\text{scf}}{\text{lb yr}} =$$

$$= 24{,}600{,}000 \frac{\text{scf}}{\text{yr}} \text{ Total landfill gas}$$

Estimated composition 55% CH_4
45% CO_2

$$24{,}600{,}000 \frac{\text{scf}}{\text{yr}} \times .55 = 13{,}530{,}000 \frac{\text{scf}}{\text{yr}} \text{ of } CH_4$$

$$\frac{24{,}600{,}000 \frac{\text{scf}}{\text{yr}}}{365 \frac{\text{day}}{\text{yr}}} = 67{,}397 \frac{\text{scf}}{\text{day}}$$

$$67{,}397 \Big/ 1440 \frac{\text{min}}{\text{day}} = 46.8 \frac{\text{scf}}{\text{min}}$$

New fill is estimated at 100,000 yd^3

that will add 25% more gas to the existing system

or $\frac{46.8}{4} = 11.7 \frac{\text{scf}}{\text{min}}$ Total estimated gas generation

$$= 46.8 + 11.7 = 58.50 \frac{\text{scf}}{\text{min}}$$

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PROJECT Circle C Landfill
TITLE Gas generation Data Pipe sizing
CALCULATED BY M Mick DATE 2-7-90
CHECKED BY _____ DATE _____
SCALE _____ SHEET NO. ____ OF ____

Pipe Sizing

4" pipe Area $= \pi r^2$ $r = .17$ ft

$\pi \times .17^2 = .09$ ft

1 ft^3 of pipe volume = 11.1 ft. of pipe

6" pipe Area $= \pi r^2$ - $r = .25$ ft

$\pi \times .25^2 = .2$

1 ft^3 of 6" pipe volume = 5 ft.

60 scf = 300 ft/min

30 scf = 150 ft/min (reasonable)

8" pipe Area $= \pi r^2$ $r = .37$

$\pi \times .37^2 = .35$

$= 2.86$ ft

60 scf $= 60 \times 2.86 = 171.43$ ft/min (reasonable)