



Needville, TX  
888-331-5871

### Flotation Calculations

**Model:** B-1000 & B-1000NR  
**Description:** NuWater 1000 GPD Aerobic Treatment & Nitrogen Reduction Units

**Given**

Weight of Structure w/ Slab Top: 17,570 lbs.  
Weight of Water: 62.4 pcf  
Weight of Soil: 110 pcf  
Volume of Structure at Flow Line: Pretreatment Compartment = 639 gal.  
Aeration Compartment = 1,121 gal.  
Clarifier Compartment = 326 gal.

A. Weight of unit at operating condition "Down Forces":

- I. Structure Weight w/ Liquid:  $\text{Unit weight} + (\text{total volume} / 7.48 \text{ gals/cu ft}) \times 62.4 \text{ lb/ft}^3$   
 $17,570 \text{ lbs} + (2,086 / 7.48) \times 62.4 = 34,980 \text{ lbs.}$
- II. Weight of soil: (2" overburden)  $(L \times W \times H) \times 110 \text{ pcf}$   
 $(12.167' \times 5.833' \times 2/12) \times 110 \text{ lb/ft}^3 = 1,303 \text{ lbs.}$
- III. Total Weight: Structure weight w/ Liquid + Total Soil Weight  
 $34,980 \text{ lb} + 1,303 \text{ lb} = 35,110 \text{ lbs.}$

B. Weight of water displacement "Up Forces":  $(L \times W \times H) \times 62.4$   
(at 81" depth of bury)  $(12.167' \times 5.833' \times 6.75') \times 62.4 \text{ lb/ft}^3 = 29,893 \text{ lbs.}$

C. Factor of Safety (FS): Required FS:  $\geq 1$

$$\frac{\text{Down Forces}}{\text{Up Forces}} \\ 34,980 / 29,893 = 1.17$$

When the FS = 1 the "down forces" will equal the "up force" and the structure will be in equilibrium.

When the FS is less than 1 the "up force" will be greater than the "down forces" and floating will occur.

X When the FS is greater than 1 the "up force" will be less than the "down forces" and floating will not occur.

**Conclusion:**

Total unit weight at operating condition "down Forces" of **34,980 lbs.** is greater than the weight of water displacement "up forces" **29,893 lbs.** therefore the upward forces causing flotation will not control.

**Minimum burial depth:**

For functional purposes the structure must be buried 2" below grade.

Approved By: \_\_\_\_\_

Date: \_\_\_\_\_

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Seal:

Ronald L Berg  
Engineering Services, LLC.  
Texas Registered Firm No. F-1570