Calculate the Volume of a Well

Example: An abandoned well is 6 inches in diameter and 100 feet deep and a water level of 40 feet.

The volume of the well is calculated by the formula.

$$V = ((J * D^2)/ 4)* d$$

Where:

      J = 3.1416
      D = diameter of well (feet)   = 6 inches = 0.5 feet
      d = depth of well (feet)   = 100 feet

$$V = ((3.1416 * 0.5^2)/ 4) * 100$$

$$V = 19.62 \text{ ft}^3$$

By using Table 1 diameter, and depth of the well the number of sacks of 94 lb sacks Cement or 50 lb sacks Bentonite chips can be calculated.

For the above example:

Cement	100 ft / 7.2 ft = 13.8 sacks
Bentonite	100 ft/ 3.5 ft = 28.5 sacks

Large diameter wells can be plugged using compacted clay or caliche to surface. Leave mounded on the surface to promote drainage from the entering the plugged well and to allow for settling. An alternate cement cap of two to three feet can be used.

Table 1: Plugging Materials Calculation Guild

Well or Hole Diameter[1]	Cement[2]	Bentonite Chips[3]
Inches	Linear Feet	Linear Feet
2	50.3	31.3
3	28.8	13.9
4	16.2	1.9
5	10.4	5
6	7.2	3.5
7	5.3	2.6
8	4	2
9	3.2	1.5
10	2.6	1.3
12	1.8	0.86
14	1.3	0.63
16	1	0.48
18	0.8	0.38
20	0.6	0.31
24	0.4	0.21
36	0.2	0.097
40	0.16	0.078
44	0.13	0.065
48	0.11	0.054

Notes:
[1] If measured well diameter falls in-between listed diameters, use the larger diameter to ensure adequate material purchase. Diameter for cylindrical wells only.
[2] Linear feet filled by cement slurry consisting of on 94-pound sack of Portland cement and 7 gallons of water.
[3] Linear feet filled by 50-pound sack of 3/8 to 3/4- inch bentonite chips.

Calculating the Disinfection Volume

Example: An abandoned well is 6 inches in diameter and 100 feet deep and a water level of 40 feet.

The volume of the well is calculated by the formula.

V = ((J * D²)/ 4)* d

Where:
  J = 3.1416
  D = diameter of well (feet)   = 6 inches= 0.5 feet
  d_{total} = depth of well (feet)   = 100 feet
  $d_{water\ level}$ = level of water in well   =   40 feet

Volume of water:

The volume of water in the well is calculated by subtracting the total depth of the well from the water level

V = ((π * D²)/4) * (d $_{total}$ – d $_{water\ level)}$
V = ((3.1416 *0.5²)/4) * (100 –40)
V = 3.927 ft³
1 ft³= 7.48 gallons
V = 88.0 gallons

Volume of bleach needed

The volume of bleach needed to disinfect the well is calculated by dividing the volume of water by 500 gallons per gallon of bleach. This gives you the number of gallons of water needed to disinfect the well.
V = 88.0gal/ 500 gal/ gal of bleach

V = 0.17 gallons of bleach
V = 0.17 gallons * 128 oz in a gallon
V = 22.5 oz of bleach

By using Table 2, diameter, and depth of well the number of ounces of bleach per linear foot of well is given. Once the volume of bleach is calculated:

  1.   Add the calculated volume of bleach to the well.
  2.   Mix the water column (well water) by surging.

Table 2: Disinfection Calculation Table

Well or Hole Diameter[1]	Volume of Water (Per Linear Foot)	Added Chlorine[2,3] (Per Linear Foot)
Inches	Gallons/Foot	Fluid Ounces/Foot
2	0.16	0.04
3	0.37	0.09
4	0.65	0.17
5	1.02	0.26
6	1.50	0.38
7	2.00	0.51
8	2.61	0.66
9	3.30	0.84
10	4.08	1.04
12	5.88	1.49
14	8.00	2.03
16	10.44	2.65
18	13.22	3.35
20	16.32	4.15
24	23.50	5.97
36	52.88	13.43
40	65.28	16.58
44	78.99	20.06
48	94.00	23.87

Notes:

[1] Diameters are for cylindrical wells only.

[2] Typical 5.25% to 6.0% chlorine product. Common brand names include: Clorox, Purex, Snowhite, Kandu, Topco,etc

[3] Added volume produces an equivalent concentration of 100 parts per million of chlorine per linear foot of water.