A flowing well seems to amaze everyone. People can sit and watch the water flow for hours. It creates a calming effect, truly a gift of nature.

Attention: Sanitarians and Drillers

The last statement could turn into the worst experience of your career with nothing calming about it. Some may go so far as to say they are the product of the devil and the flow comes directly from hell.


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CAUTION

As with any problem, if you do not understand the mechanics of a flowing well then solving the problems become very difficult. The following is an attempt to supply some of the information needed to help make the best decisions you can, if you find yourself staring the devil in the eye.

4 Major Factors in Working with A Flowing Well

1: Elevation of true water level

2. Depth of aquifer

3. GPM of flow

4: Volume of hole

Elevation of True Water Level

1: If a pipe is extended above the ground the water will raise in the pipe and stop at it's true water level
2: The installation of a shut off valve should be immediate upon entering the building.
3: When drilling you have no way of knowing the true water level so in your fluid weight calculation you have no choice but to guess (good luck on that one).
4: Elevation may change seasonally.

Depth to Aquifer

1: Is it sand and gravel or rock?
2: To accurately calculate the fluid weight needed you need to know your depth.
3: When drilling you don't know for sure where you will encounter the water, so for calculating purposed you guess (good luck on that one).
4: Pressures in gravely clay?

GPM of The Flow

1: If grouting while flowing it will dilute your grout until the flow is stopped

2: When drilling you don't know what the flow will be just because the neighbors flow 5 GPM it is probably not the true potential of the aquifer (so you guess).

3: But the law says you have to determine that before you start (good luck on that one).

Volume Of The Hole

1: Grouting with elevated casing is easiest
2: Grouting while flowing you must have your total volume of grout pre-mixed to continuously pump or you will wash out.
3: When drilling you have more over wash erosion of the bore hole. When drilling sensitive formations you need to guess your over wash (good luck with that one).

*Bottom line fluid weight is what controls the hole.
*To stop a flow you have to exert equal or more weight pushing down then is trying to push it out of the ground.
* Figuring the necessary fluid weight is easy in an existing well. But only an educated guess in drilling a new well.

How to Calculate Needed Weight

Figure what percentage of the total column on water is above the ground.

Example: Well is 80’ deep that will flow 10’ above land surface.

90’ of standing water ÷ 80’ of depth = 1.125 or 112.5%

weight of water (8.34 x 1.125= 9.38lb/gal) this is to reach equilibrium only.

Examples

Ft. above land	Depth to Aquifer	Formula	Min. needed weight
10’	25’	35÷25=1.4 x 8.34	11.68
10’	50’	60÷50=1.2	10.01
10’	75’	85÷75=1.13	9.43
10’	100’	110÷100=1.1	9.17
10’	150’	160÷150=1.07	8.90
10’	200’	210÷200-1.05	8.76
20’	75’	95÷75=1.27	10.56
20’	100’	120÷100=1.2	10.01
20’	150’	170÷150=1.13	9.45
30’	75’	105÷75=1.4	11.68
30’	100’	130÷100=1.3	10.84
30’	150’	180÷150=1.2	10.01

*New clean mix 50 seconds thick drilling mud is approximately 1-50 lb bags to 100 gal of water, ½ lb per gallon. (8.34+.5=8.84) *see above chart, oops!
*Your bag of high solids Bentonite grout 1-50lb bag to 25gal. 10.34lb at best on paper this could work in ½ of the cases if placed properly. To place it properly you must rinse the drilling fluid out first. Oops!
*Thickness (Viscosity) is not weight!
*Some experienced drillers could work with out a mud scales but most can't.

Bentonite Slurry

Negatives:

- Relatively light weight per gallon
- The need to rinse the hole with fresh water prior to pumping in place
- You can not pre-mix large volumes due to swelling
- No structural strength once set
- If it leaks how do you re-grout?

Positives:

- Easy to mix
- If you know for sure that you have very little feet of head to over come and you can stop the flow prior to pumping, it will work.
- Inexpensive

Neat Cement

Negatives:

- Clean up is a mess
- Dangerous cement, burns to skin
- Heat of setting with PVC casing
- Possible loss of circulation due to high lb/gal weight
- Expensive

Positives:

- 15-16 lb per gal is enough weight to take a big flow head on
- It has the structural strength to stay in place

Our Opinion

- Bentonite is a good product when used properly, however it has no place when high head pressures are encountered.

Now take your knowledge and tools and put them to use!

Abandonment of existing wells with Neat Cement

1: If you can raise the casing to stop the flow

A: Place 2- 1" Tremie pipes one at the bottom and one ½ way down.

B: Pump at your leisure through bottom of tremie till full.

C: Allow till the next day to cut down the casing.

2:If you have to take it head on while flowing

A: 2- 1" Tremie pipes, one low and one ½ way.

B: Mix what you think is 2-3 times the volume of the hole.

C:Have a pump for each tremie and pump both at the same time.

D: Once full, if it drinks down only aid in the top tremie pipe.

E: Never pull a tremie pipe.

Mechanics of Drilling a Flowing Well

I am avoiding the rules to be discussed at the end!

1: Research and predict your depth and flow elevation above land surface.

2: Now predict your shallowest depth and highest elevation and calculate the minimum lb/gal weight needed.

3: Use a few terrible drilling techniques and gently drill the hole.

4: Monitor mud weight and keep it 1 lb. above your minuim calculated weight. Mix barite if needed.

5: Set your screen and casing.

6: Slowly pour your LARGE gravel pack through the drilling fluid.

Mechanics of Drilling a Flowing Well Cont.

7: Do not remove drilling fluid when you pump the heavy neat cement. It will chase the drilling fluid out without thinning.

8: Allow cement time to set.

9: Develop the well.

10: Shut the rig off, go get the customer. Watch the well flow for a minimum of 10 minutes till the calming effect kicks in enjoying the gift of nature, singing kum-by-ah is optional.

11: Tear the rig down and get the hell out of there!

A flowing well seems to amaze everyone. People can sit and watch the water flow for hours. It creates a calming effect, truly a gift of nature.

The phone rings at the Health Department, “come out to the drill site, there’s a problem”. You arrive to find approximately 1,000 GPM flowing out of the bore hole filling up several neighbor’s yards and flooding the farmers field. The driller is trying his best to get it under control. The water is dirty with the silt being eroded from the hole. You looked up a couple well logs, the wells gave 20 GPM and flowed 5-10 GPM. No one wanted to spend the money to double case, so the permit was issued with no restrictions. If it were double cased the driller simply would have raised the casing to stop the flow. Now there is no simple way to stop it. The driller tries for several days, he’s in over his head. The neighbor’s are screaming and the home owner wants to sue the driller for damages and has no money or ability of his own to get a loan for $20,000 to $50,000 to stop it. The driller says “take my bond, I’m done”. Who’s going to walk in and solve this mess for nothing? What are you going to do? Hurry up, the mess is getting worse by the minute.

Why does it turn into such a disaster?

1: What a residental well in the top of a formation with a short screen produces many times misrepresents the aquifer true potential.

2: Over wash volumes are the major problems.


WATSON


GASOLINE


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