When it comes to the Binary System,
there are:

10

types of people
Those who understand
and
Those who do not.

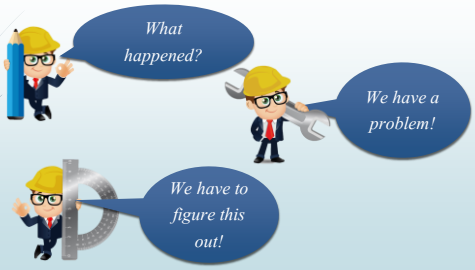
Mr. Wel D. Zine

Mr. Wel D. Zine

Mr. Wel D. Zine

Mr. Wel D. Zine

When there is a problem



Case Study

- **Intent:** Prevent surface contamination
- **Contact Interpretation:** Granulated bentonite around casing while driving
- **Actual Result:** Unable to comply with contract specification to fill with granulated bentonite
- **Improved Result:** Understand intent and methods

Specification Language

1. Contractor shall drill hole which will permit the driving and permanent placement of 30" diameter casing to a depth of 200' (or to refusal) and 24" diameter casing with a drive shoe to a depth of 344'.
2. When driving casings, a cone shaped depression or temporary outer casing filled with bentonite grout must be maintained around the outside of each casing.

Cliff's Notes History of Grouting

- Control of water well construction
- Bentonite grouting provided controlled fill for the annular space around the casing for rotary drilling
- Good for rotary = Good for cable tool
- Mound bentonite around casing while driving
- Casing pulls bentonite to 1st water (max. 30')
- Effective in shallow sand wells – Florida

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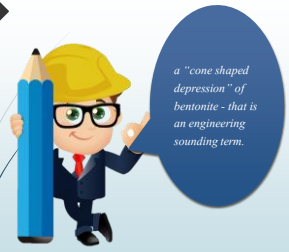
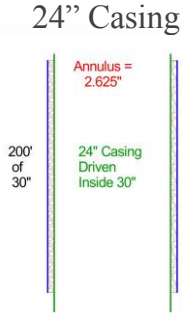
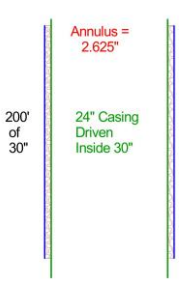
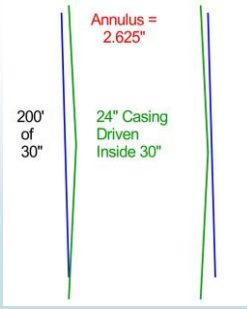




24" Casing



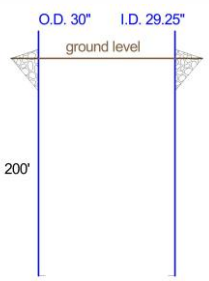
- How to fill 200' of 2.625" Annular Space With Bentonite?
- How to Install Temporary Outer Casing?
- If Annular Space Filled, Difficult to Drive Casing!



Problematic Specification Language

30" Casing

- Mounding granular bentonite around casing does seal the upper outer annulus
- The depth of the "pulled" bentonite 20' - at best = No couplings!



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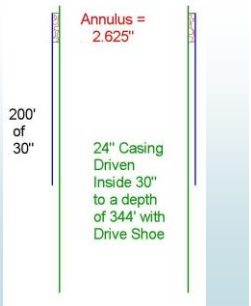

Case Study

- Maximum Demand = 240 gallons in 30 seconds
  = (480 gpm)
- Minimum Demand = 1 gpm
- Minimum Run Time Pump = 4 minutes (VFD)

Water Well Parameters

- Water Well Diameter 8 in
- Well Depth 300 ft
- Casing Depth 80 ft
- Static Water Level 45 ft
- Test Pumping Rate 400 gpm
- Pumping Level 80 ft
- Maximum Well Yield 400 gpm

Operating Parameters

- Maximum Demand 240 gals/30 secs (480 gpm)
- Maximum Well Yield 200 gals/30 secs
- Minimum Make-up Water 40 gals
- Maximum Demand Cycle = 1 every 2 mins
- System Off Pressure 60 psig
- System On Pressure 50 psig

Issues

1) Make-up Water = 40 gals in 30 sec use
2) Pump Runs for a Minimum of 4 mins
3) After Demand Use, Pump Runs for a Minimum of 3.5 mins.

- Fill tank in 3.5 minutes
- Provide a Minimum of 40 gals in Draw Off
- Restrict fill rate to 8 gpm (VFD Pump) =
  28 gals of Draw Down
- Effective Pressure Cycle – High 60 psig and
  Low 30 psig (precharge)
- 120 gal Captive Air Tank = 46 gal Draw Down

2 Minute Cycle

- Restrictive Tank = 18 gals
- Need Additional 22 gals.
- Additional 90 gal Captive Air Tank = 35 gals

Discussion Points

- What difficulties do you experience?
- How can you help contractors perform better?
- Importance of the pre-bid meeting?
- How do you evaluate the contractor qualifications?
- What type of methods/resolutions have worked best for you?

(next slide)