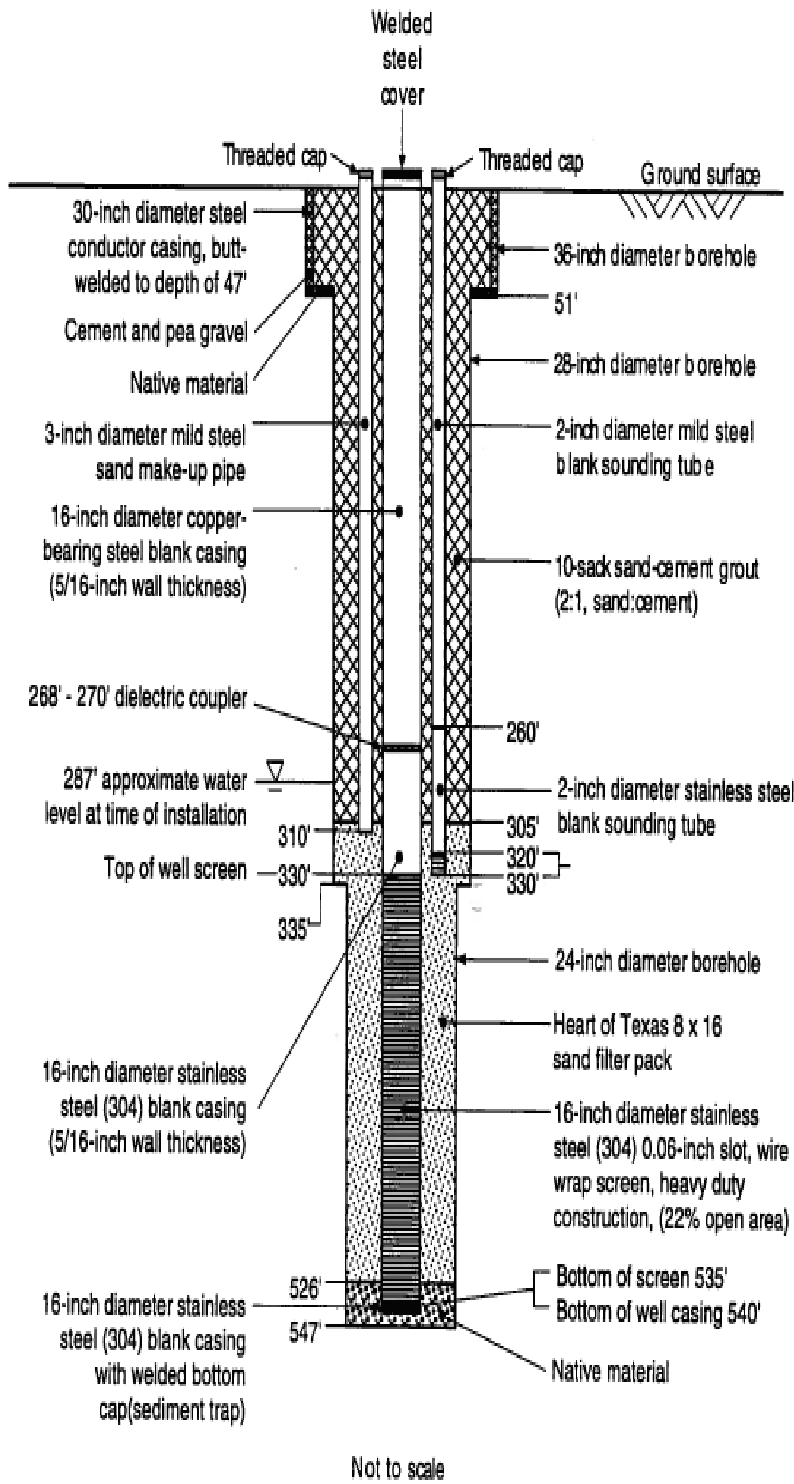
Well Rehabilitation

Minimum Data and Why

HCT, LLC – January 2020

Typical Extraction Well Diagram



Minimum Data

Casing Alloy:

Perforation Type:

Casing Diameter:

GPM pumping rate:

Column Pipe Diameter:

Standing Water Level:

Depth of Bowl Settings:

Total Casing Depth:

Age:

Liner?

Ever jetted (one directional energy)?

1. Casing Alloy (significant differences in what's need to clean stainless steel, mild steel and PVC
2. Age - Steel is always corroding in water and by a variety of conditions including water solvency or under scale deposits, iron reducing aerobic bacteria, sulfate reducing anaerobic bacteria, erosion, dissolved oxygen and even stagnation. Assessing all these variables allow us to use empirical data to determine the processes, procedures, chemical and physical energy that can be used to provide optimum cleaning and service longevity without compromising the operational capacity of the asset and while potentially extending and or restoring its service life.
3. Ground Water Quality – Can define whether a well is capable of scaling or being biologically compromised, or a combination of the two and to which degree – wherein scale is removed by acids, biology removed by biocides, and a combination of the two is removed 1st with biology then with acid.
4. Standing Water Level, Total Depth and Casing diameter allow us to calculate water volumes to calculate treatment volumes needed.
5. Perforations allow us to understand how much energy may be used to help clean the well more efficiently with physical action. It also indicates potential risks like with wire wrap steel screens. Additionally, the amount of debris in the filter pack varies between mill slots, louvers and wire wrap (etc.).
6. Bacteria plays a big role, where iron bacteria are not so aggressive to the deterioration of steel yet sulfate reducing bacteria can degrade steel at the rate of ¼ inch every 10 years – which in turn could cause the loss of the wells filter pack. Ground water food source for bacteria include levels of sulfur, sulfate, iron and manganese. When the levels of these nutrients are in the ground water, it focuses our video images into more specific directions to help define a rehabilitation plan.
7. Gradient Water Flow – without a downhole video, how do we know if we place chemistry in a spot, it will stay there or be washed through the casing from the natural flow of the groundwater. Rarely do we see gradient water flow being a problem.
8. Pump Depth – Knowing where the pump is located provides insight to where the aerobic and anaerobic zones might exist and offer insight to options of bioremediation with the pump/bowls in place. NOTE: Many people think they need to clean around or near where the bowls are set. Usually, that is the cleanest area of the well as due to the flow the bacteria are unable to attach and unable to develop colonies, spores and nodules.
9. Column Pipe Diameter – if we care to move chemistry through the well, the diameter of the column pie will help us make calculations.
10. Pumping Rate – This will allow us to determine the movement and water, and possibly chemistry, so that accuracy in ground water sampling can be achieved, as well as perhaps rawhiding / surging the well while properly moving the chemistry within the well.
11. Tremie Length, Spotting Intervals – The maximum depth you'll get adding chemistry is about 30 ft. so tremie intervals have to be in a minimum of 30 ft. segments. Tremie can be avoided and drawdown using the pump can be utilized, however, dynamics about the well and flow rates need to be known and utilized for calculations, as noted hereto
12. Acid versus Biocide – Usually the most soluble alloy in a water well is 416 stainless steel exposed to acid. This allow is commonly used for bowl shaft material due to its softness. Therein, we do NOT acidize wells with bowls in place without knowing the column shaft alloy is not 416 stainless. HCT's peroxide based bioremediation solution is non-corrosive to all these alloys, and thereby CAN be used to bioremediate a well with the bowls in place.
13. Neutralization – if you acidize, you need to re-passivate steel alloys, mild and stainless.
14. Layup Chemistry – if the well sits stagnant for extended periods of time over 2-3 weeks, it should be flooded with sodium bicarbonate and water to prevent the microbial activity.

Acquiring a Groundwater Sample

If the well has been running continuously for some time, as in days, you more than likely have a true sample of the ground water.

An accurate and representative sample of the groundwater is essential as over time pollutants such as colonies of both aerobic and anaerobic bacteria colonize within wells. Their colonization's are relevant to the actual groundwater quality.

Knowing the differences between water from the well that has sat still for a few days and the actual ground water itself, can exhibit the problems within the well versus as something in the groundwater.

Surprising it can be to see how long it takes in some wells to acquire a true ground water sample. These calculations allow you to make these determinations.

Total Water in the well casing

Gpm pump rate

Amount of time to acquire a representative ground water sample.

Example:

Total Water in the well casing (450 ft.at 16 in. casing (10 gl./ft.) = 4,500

GPM pumping Rate: 34

Minutes to get a representative ground water sample: (4,500 / 34) = 132 minutes (2.2 hours)