WATER TREATMENT AND BOREHOLE DRILLING

TYPES OF TREATMENT

Flocculation/Sedimentation/Coagulation: This practice is an essential pretreatments system especially for filtration treatments. The processes combine suspended solids together into larger particles so that physical filtration process can be done easily by removing them. This method makes filtering far more effective. The next process is gravity separation (sedimentation or flotation) and is always followed by filtration.

Process:

A chemical coagulant such as iron salts, aluminum salts or synthetic organic polymers is added to source water (reservoir) to facilitate bonding among particles. Coagulants work by creating a chemical reaction and eliminating the negative charges that cause particles to repel each other.

After adding the coagulant, then the source water (reservoir) will be stirred slowly in a process called flocculation, this makes the particles come together to form a bigger easily removable particles also known as “flocs” or clots.

This process requires chemical knowledge of source water (reservoir) characteristics to ensure that an effective coagulant mix is used. Improper coagulants makes these treatments method ineffective.

The effectiveness of this method is also determined by the efficiency of the filtering process which is been used.

Dissolved Air Flotation

Dissolved air flotation is a form of coagulation/flocculation/sedimentation technology that is used as pretreatment

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Flocculated water is collected in a tank and is subjected to a large infusion of tiny, pressurized air bubbles. The action of these bubbles forces clots or flocs of particles to the water surface where they can be skimmed off.

Dissolved air flotation is an alternative to sedimentation. It performs a similar task by a diametrically opposed method—forcing contaminant clumps to the surface rather than allowing them to settle out on the bottom.

Flocculation-Chlorination

A system that incorporates coagulation-flocculation followed by chlorination has been developed as a point of use technology, which is widely used in Nigeria.

It uses a small packet of powdered ferrous sulfate (a common flocculent) and calcium hypochlorite (a common disinfectant). A user opens the packet, adds the contents to an open bucket containing about ten liters of water, stirs for five minutes, lets the solids settle to the bottom, strains the water through cotton cloth into another container, and waits 20 minutes for the chlorine to disinfect the water.

The combination of particle removal and disinfection appears to produce high removal rates of bacteria, viruses, and protozoa, even in highly turbid waters. There is considerable evidence that the system has reduced diarrheal disease significantly in various locations. There is also evidence that the flocculation process helps remove arsenic; however, these systems are not an adequate substitute for high-quality centralized treatment when it can be made available.

Disinfection (chlorination/ozonation): Water is often disinfected before it enters the distribution system to ensure that potentially dangerous microbes are killed. Chlorine, chloramines, or chlorine dioxide are most often used because they are very effective disinfectants, not only at the treatment plant but also in the pipes that distribute water to our people. Ozone is a powerful disinfectant, and ultraviolet radiation is an effective disinfectant and

treatment for relatively clean source waters, but neither of these are effective in controlling biological contaminants in the distribution pipes.

BOREHOLE DRILLING

When considering drilling borehole, assessing the land with the use of a dowser should be done but many people make use of geological maps of the area plus an onsite visit to ascertain where they might find water (which is an educated guess). Rocks and soil contain hidden clues that can be deciphered by a professional geologist to determine where the borehole is most likely located on the land. The presence or absence of gravels can be indicators that the water table can be reached in a certain area. Stress fractures on rocks can also indicate the presence of water below them. A geological survey is a quick and it is a sure way to test the proposed location and discover where the water table is hidden.

A dowser is an individual who uses the vibrations of a wishbone-shaped willow branch to find water on a piece of property. The dowser claims that the willow branch will be drawn to the ground when it is placed over water that is underground.

We will observe the topography of the landscape. Water tends to collect more in valleys, gaps and depressions where the water table is easier to reach. Drilling in a lower spot on a location can save money because we won't have to drill as deeply. Some drillers charge by the foot, so we need to go as low as we can go because every foot counts.

DIFFERENT TYPES OF BOREHOLE

These are the common Borehole dug in Nigeria.

- Hand Pump Borehole
- Solar Powered Borehole
- Electricity/Generating set Powered Borehole

One of the reasons why NGO construct Hand Pump Borehole for communities is because most villages do not maintain the Solar Powered Borehole or the Electricity/Generator Powered Borehole and most of the equipment are even stolen by some hoodlums.

During my NYSC days, I constructed the Hand pump Borehole for the reason above.

Solar Powered Borehole and Electricity/Generating set Powered Borehole is a kind of Borehole where there will be a tank/container (individual or NGO determines how big the tank they want) placed by the side of the Borehole with 5 taps for the benefit of the community. This type is not common because of maintenance cost but it is better and safer than the Hand Pump Borehole but it is expensive.

Most times, cost determines the kind of Borehole constructed for the community, and the maintenance level of the community.

COST OF CONSTRUCTING BOREHOLE

The cost of the Hand Pump Borehole that I did in Kano State is **N450, 000:00 (four hundred and fifty thousand naira)** at the cost price because it is a community project, the construction company did it as their own CSR.