



Annex 1: Terms of Reference for Borehole Disinfection.

1. Introduction

The contractor shall carry out borehole disinfection by chlorinating all wells in conformity with the procedures outlined in the Terms of Reference (TOR). The Procedure and findings of the borehole disinfection exercise will form part of the completion report presented at the end of the borehole rehabilitation works.

2. Scope of Works:

The contractor, by accepting the terms of this contract with the client, accepts and understands that the primary purpose of conducting borehole disinfection is to kill the bacteria. This includes coliform bacteria that may indicate the presence of disease-causing organisms and other nuisance bacteria (examples are iron and sulphur bacteria) that can cause unpleasant taste and odor in the water.

The scope of works will be to: -

- I. Calculate the dosing rate by measuring depths and static water levels of boreholes. The contractor shall also carry out a desk study by visiting district water offices (Butaleja and Kaabong Districts) to establish the borehole design details i.e. The well diameter, well depth and screen depth for each borehole.
- II. Carry out disinfection of all boreholes using High-Strength Calcium Hypochlorite (HSCH) in powder or granular form with 70 to 74% chlorine concentration.
- III. Provide a detailed report giving at least: the static water level, diameter of the well, depth of the well, dose rate and volume of water in the well for each rehabilitated well/borehole.

3. Procedure:

- I. Dismantle the borehole removing all the below and above ground pump components leaving the pedestal open.
- II. Pour mixed chlorine solution into the open well (the suspended solids left behind after the mixture settled should be discarded). The mixed proportions of the disinfectant should be well calculated using the well dimensions. Refer to item 4 below.
- III. Using a hosepipe connected to a compressor, lowered into, and through to the bottom of the well, introduce low pressure from the compressor, adequate to agitate the water (surging); creating turbulence to only circulate the chlorinated water back and forth through the screen, gravel pack and adjacent aquifer matrix for one hour. Ensure that the chlorinated water does not flush out of the well until the disinfection exercise is complete.

- IV. Flush out the chlorinated water from the borehole for one hour or until there is no smell of chlorine in the water.

4. Calculating the chlorine dosage for disinfecting a borehole using high-strength calcium hypochlorite (HSCH)

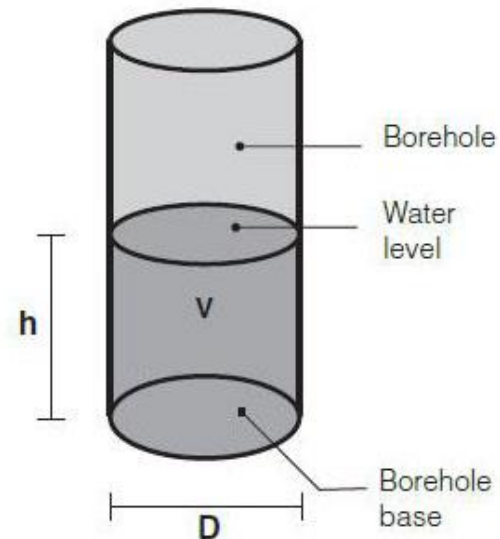
4.1 Equipment

- 20 litre buckets
- HSCH granules and powder

4.2 Calculate the volume of the water in the borehole using the formula:

$$V = \frac{\pi D^2 h}{4}$$

Where



V = volume of water in the borehole(m³)

D = diameter of the well(m)

h = depth of water(m)

$\pi = 3.142$

- Multiply your answer by 1000 to convert the answer to litres
- Divide the volume of water (in litres) in the borehole by the volume of the bucket to establish how many buckets of disinfectant will be needed to replace the total volume of water in the borehole
- Fill the bucket with clear water
- Add 1.5g of HSCH powder and stir until dissolved (0.75g for every 10 litres in the bucket) which is equivalent of 52.5mg/l of chlorine (Taking 70% of 0.75g of HSC)
- Pour the disinfectant into the borehole

Make up sufficient buckets of disinfectant to replace the total volume of water in the borehole.

4.3 Precaution

- I. HSCH gives off chlorine gas, which is a serious health hazard. In this regard, therefore, always add chlorine compounds to water rather than water to chlorine.
- II. The preparation of the Chlorine solution should be done in the open or rather in a well-aerated area with a good flow of air.
- III. Wear protective gear; especially face and eye masks and gloves.
- IV. Do not allow anyone to use the hand pump during the cleaning process.