# <u>Water Quality Monitoring Technical Guidance Note in Nargis</u> <u>affected areas - Procedures</u>

# 1. Introduction

In the context of the Nargis emergency, the most important water quality parameters are: **E.coli., turbidity, pH, conductivity.** When chlorination is used in a distribution system (pipeline, tanker truck or small bicycle water drum), **free residual chlorine** (FRC) should be tested as well. (for additional details see *WQM Technical Guidance – general*)

## 2. How to measure the different parameters?

## 2.1 Thermo-tolerant Coliform (TTC)

Thermotolerant Coliform (TTC) is measured applying two main methods: Presence/Absence test kit and Membrane Filter methods. Presence/Absence methods use  $H_2S$  (Hydrogen Sulfide) based or pathoscreen based techniques, whereas, the membrane filter method is used by DelAgua, Wagtech, Hach and ELE.

## Presence/Absence Method

Steps for H<sub>2</sub>S based Methods

1. Take a fresh bottle, open it and fill it with the sample water. Shake well to dissolve chemicals in the bottle into the sample water.



2. Wait for next 24 hours and observe the color change in the solution.







3. Record the color change of the solution to black and or development of strong smell, which indicates the presence of TTC. No color change means absence of TTC.

## Membrane Filter Method Steps for DelAgua Kit

1. Filter the sample water through membrane filter of standard pore size.



2. Allow bacteria to grow for 18 hours in some form of growth media -Membrane Lauryl Sulphate Broth - at the standard temperature of 44 <sup>o</sup>C.



3. Count the colonies of bacteria using simple lens.



Fig 4: Sample with many colonies



Fig 5: Sample with zero Colonies

Wagtech kit also uses almost similar procedure. For detail steps for using DeAgua or Wagtech Kit, refer to kit manual.

# 2.2 Free Residual Chlorine

Check whether the free residual chlorine in sample water is more than 0.2 mg/l or not. If there is more than 0.2 mg/l and turbidity is less than 5 NTU, no need go for further steps as this indicates absence of TTC. Use pool tester to determine free residual chlorine.

## A: Prepare pool tester, methyl red and DPD1 tablet





B: Clean, rinse and fill pool tester with sample water.

C: Add DPD1 tablet into water column labeled with DPD, crush, close lid and shake well.



**D:** Compare color of the solution with color comparator and record free residual chlorine amount.

## Note:

#### 1. Difference between total and free residual chlorine

There are two types of chlorine residuals in water - total chlorine residual and free chlorine residual or simply total chlorine and residual chlorine. When chlorine is added to sample water, part of it is utilized to kill the bacteria and oxidizing the organic materials there and the rest will appear as residual chlorine to act against further bacterial intrusion.

#### 2. Importance of free residual chlorine in TTC presence/absence:

It is believed that the chlorine in water react with the certain enzymes which are necessary for metabolic processes of the bacteria and render them inactive. Such inactivation either causes the death or permanent inactivation of bacteria. Availability of free residual chlorine of at least 0.2 mg/l is enough to produce such effect.

#### 2.3 Turbidity

Turbidity is commonly measured using simple turbidity tube. It can also be measured more easily by applying a digital turbidity meter. The unit of Turbidity is NTU and Zero NTU means clearest water.



Fig 2: Turbidity Tube

Steps in using Turbidity Tube

Step 1: Rinse the turbidity tube with sample water for 2 to 3 times.

Step 2: Hold the tube vertically and pour water sample into the tube slowly in stages of few centimeters of water column at a time.

Step 3: Try to see the black cross or cycle at the bottom of the tube after each addition of water column from the top of the tube. Keep on doing this until the black cross or circle at the bottom of the tube just disappears.



Fig 3: Black circle at the bottom of turbidity tube

Step 4: Hold the tube vertically and read turbidity in NTU using the graduation on the side of the tube. The result is the value of the line nearest the water level.

#### 2.4 Total Dissolved Solid (TDS)

Total Dissolve Solid (TDS) is measured using conductivity meter in mg/l. TDS is related to conductivity which is measured in  $\mu$ S/cm. The conversion factor is as:

TDS in mg/l = (055 - 0.9) \* Conductivity in  $\mu$ S/cm.

Here, sample water is filled in a tube and placed inside the TDS meter. Press start button on and get TDS reading in digital screen.



Fig 4: Digital TDS/Conductivity meter