THE WATER COLLECTION FACT SHEET: Water Quality

Chemical Quality: Total Hardness (T.H.)

What is Total Hardness?

- Total hardness can be expressed as the sum of calcium and magnesium concentrations, expressed as mg/l calcium carbonate ($CaCO_3$) and is calculated by means of the following formula:

T.H. = [2,497 x calcium (mg/l))] + [4.118 x magnesium (mg/l)]

Total Hardness in water

- The total hardness of water is the value that indicates how easy or difficult soap can lather in the water.
- When the total hardness of water is low, the water is referred to as fresh, soft water, containing very low concentrations of calcium and magnesium e.g. rainwater.
- When the total hardness of water is high, the water is referred to as hard water, containing high concentrations of soluble calcium and magnesium, e.g. some groundwater.

What problems can Total Hardness cause?

- Total hardness, in some cases is beneficial for your health, contributing to your daily allowance of the calcium and magnesium.
- Sensitive people, like those with a history of kidney or gall-bladder stones and children under the age of 1 year, should avoid hard water.
- Elevated total hardness changes the taste of water, especially when preparing coffee or tea and it impairs the lather ability of soap.
- Elevated total hardness causes scaling problems in pipes and appliances.
- Lowered total hardness (soft water) causes corrosion problems in pipelines and appliances.

How can Total Hardness in water be treated?

- Water can be softened by cation exchange and mixed-bed-ion-exchange desalination to demineralise the water.
- Any demineralisation technique will decrease the total hardness.
- For large volumes of water, the accepted techniques are precipitation and sedimentation.
- Home treatment kits, using ion-exchange processes are expensive and treat only small volumes of water.

Reference: DWAF (1998). Quality of domestic water supplies. Vol. 1: Assessment Guide. WRC No. TT 101/98, pp. 21.