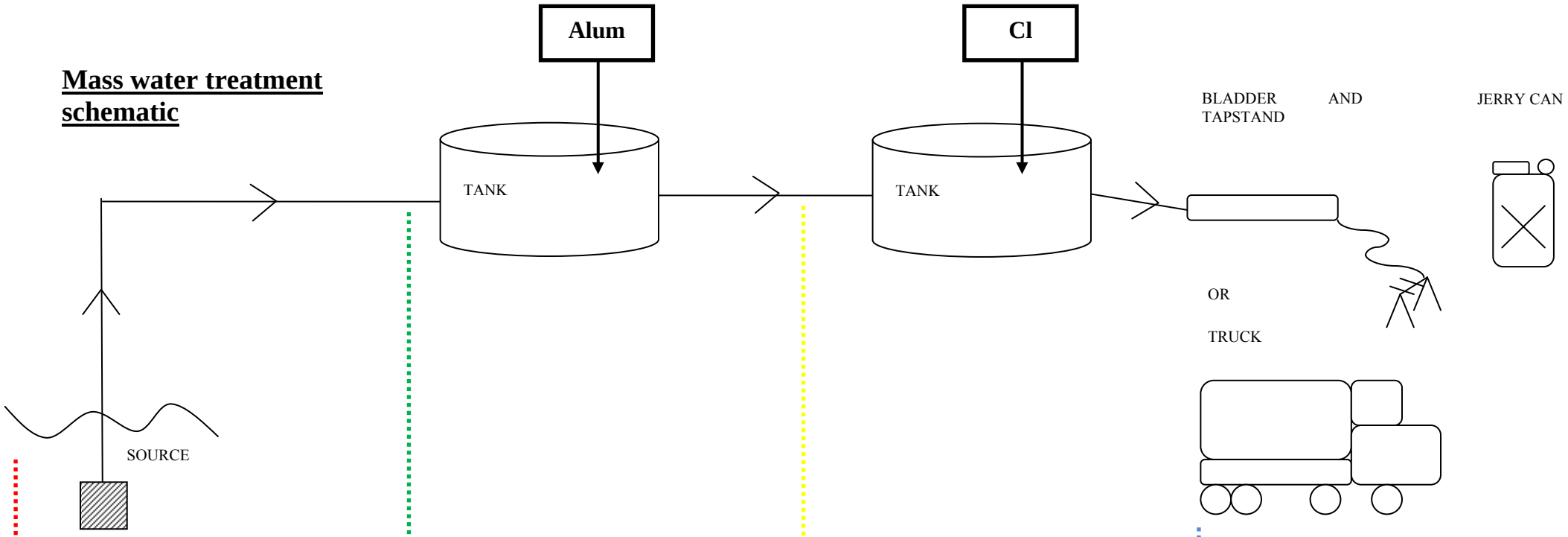
Mass water treatment schematic



1

Test source water for:

a. pH
- between 6 to 9 → OK

b. conductivity
- less than 2500 µS/cm → OK

c. turbidity
- IF more than 5NTU → need to add flocculant; go to step 2
- IF less than or equal to 5NTU → no need to add flocculant; go to step 3

2

1. Do a **Jar Test**
2. Add required amount of alum, mix and let settle for 30 minutes.

Then test water for:

a. turbidity
- IF less than 5NTU → OK, go to step 3
- IF more than 5NTU → repeat jar test, add more alum

3

1. Do a **Bucket Test**
2. Add required amount of chlorine and mix.

4

After 30 minutes contact time, **test water at tap** for free residual **chlorine**:

- IF 0.2 – 0.5 mg/L → OK
- IF less than 0.2 mg/L → repeat bucket test [step 3], add more chlorine
- IF more than 0.5 mg/L → wait for chlorine to evaporate ~ 1 – 2 hours, test again before distribution

Jar Test

Purpose:
To find out how much **aluminium sulphate (Alum)** we need to add to the turbid raw source water for effective flocculation.

Method:
1. Make 1 Litre of mother solution (MS) at 1% concentration:

$$100\% \times 10\ grams = Conc.of\ Alum(\%) \times ?\ grams$$

$$\frac{100\% \times 10\ grams}{Conc.of\ Alum\ (\%)} = \frac{1000}{Conc.of\ Alum\ (\%)} = grams\ of\ Alum\ per\ 1\ Litre\ MS$$

2. Add MS (2mL, 4mL, 6mL, 8mL, 10mL, 12mL) into the raw water jars of 1 Litre size; and stir vigorously for 5 minutes.
3. Leave to settle for 30 minutes.
4. Measure the turbidity of each jar. Out of the jars that have less than 5 NTU, the jar with the least amount of MS is the correct dosage.

General formula:

(1) **1% MS** (grams of Alum / 1000mL) × (2) **Test result** (mL of MS / 1 L) × (3) **Volume to treat** (tank volume in litres) = **grams of Alum to add**

Example calculation:
Your jar test result shows that 16mL of 1% mother solution (MS) is the optimum dosage. You used 100% Alum to make your MS. How much Alum do we need for a tank of 15,000 Litres?
[1000/100% = 10 grams of Alum per 1 Litre of MS]

(1) **10 grams / 1000mL** × (2) **16 mL / 1 L** × (3) **15,000 L** = **2400 grams or 2.4 kg**

Bucket Test

Purpose:
To find out how much **chlorine (Cl)** we need to add to clear water so that there is 0.5 mg/L of free residual chlorine (after 30 minutes contact time).

Method:
1. Make 1 Litre of mother solution (MS) at 1% concentration:

$$100\% \times 10\ grams = Conc.of\ Chlorine(\%) \times ?\ grams$$

$$\frac{100\% \times 10\ grams}{Conc.of\ Cl\ (\%)} = \frac{1000}{Conc.of\ Cl\ (\%)} = grams\ of\ Chlorine\ per\ 1\ Litre\ MS$$

2. Add MS (0.5mL, 1mL, 2mL, 3mL, 4mL, 5mL) into 10 L buckets with water; and stir for 5 minutes.
3. Leave for 30 minutes to give time for the chlorine to react.
4. Measure the chlorine concentration in each bucket. The bucket with the chlorine level closest to 0.5 mg/L is the one with the correct dosage.

General formula:

(1) **1% MS** (grams of Cl / 1000mL) × (2) **Test result** (mL of MS / 10 L) × (3) **Volume to treat** (tank volume in litres) = **grams of Chlorine to add**

Example calculation:
You have just done a bucket test with 50% concentration (HTH) chlorine. The result shows that 1.5 mL of 1% mother solution is the optimum dosage for disinfection. How many grams of chlorine will you need for dosing a tank of 8,000 Litres?
[1000/50% = 20 grams of chlorine per 1 Litre of MS]

(1) **20 grams / 1000mL** × (2) **1.5 mL / 10 L** × (3) **8,000 L** = **24 grams**