Webinar #2
Surge Training: Emergency WASH

29 September 2022

Good webinar behaviour

IFRC

- Please keep your microphone on mute and your video switched off
- If in need of technical assistance, please send a message to Jessie at +6019 779 9374
- The total length of the webinar will be 1 hour 15 mins (presentation and Q&A session at the end)
- If you have any question, please raise it during the Q&A session at the end or post them in the chat box

Moderator and resource persons

IFRC

Moderator

Wira is a WASH delegate with the Swedish Red Cross, currently based in Yangon, Myanmar. He has worked with the ICRC and IFRC in different missions both for developmental and emergency WASH. He has a particular interest in mainstreaming PGI and green response in WASH.

Resource persons

Wendy Neoh is the Senior Officer, Emergency WASH based at the IFRC Asia Pacific Regional Office. She works closely with WASH and Health counterparts in Asia Pacific National Societies and IFRC delegations in the region. Her main responsibilities are to strengthen emergency WASH preparedness and response through technical and programme management support.

Before joining the IFRC in 2014, she was managing and implementing developmental WASH programmes in various Southeast Asia and South Asian countries, at a Malaysian-based NGO.

Jessie Lucien is the Health Programme Officer, who is providing technical support for the web platform and the webinar series, as well as managing administrative and financial matters, in relation to the surge training in Indonesia.

She has been providing support to the Health and WASH team in the IFRC Asia Pacific Regional Office since 2013.

Resource speakers

Jerome Conahap is the Assistant Manager of Disaster Management for the Malaysian Red Crescent Society (MRCS). He has been involved in this sector since 2015 and is part of the MRCS core WASH team. Jerome is on the Asia Pacific RDRT roster after undergoing WASH specialized training in Bandung, Indonesia back in 2017. He was deployed as WASH surge to deliver services in response to the earthquake and tsunami operations in Palu, Central Sulawesi, Indonesia in 2018.

He is joining us from Kuala Lumpur, Malaysia.

Den Eki Julianto (Eki), is a volunteer with the Palang Merah Indonesia. He has been involved in several emergency response operations such as in Lombok (earthquake), Palu (tsunami and liquefaction) and the Sunda Strait of Indonesia (tsunami).

Since 2017, he has been actively involved as a WASH training facilitator. In 2018, he participated in a ToT in Cox's Bazar, Bangladesh and became part of the fecal sludge field laboratory team. He is also a member of the ERU Health in Emergencies, on the IFRC Asia Pacific surge roster and in the RedR Indonesia roster.

He is joining us from Makassar, Indonesia.

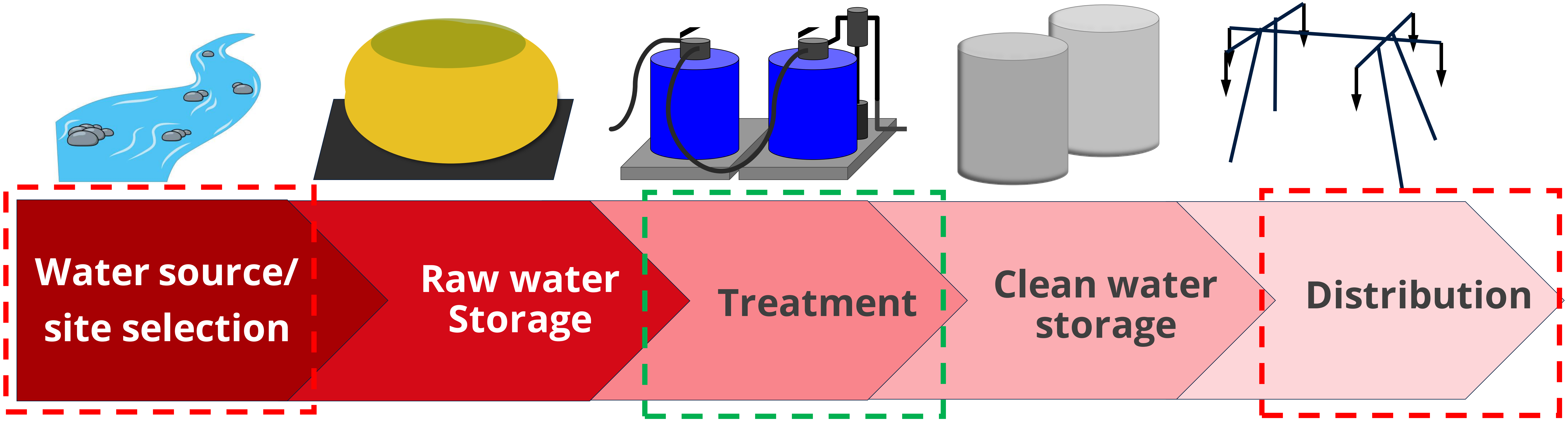
IFRC

Mass water supply: site selection, water treatment & distribution

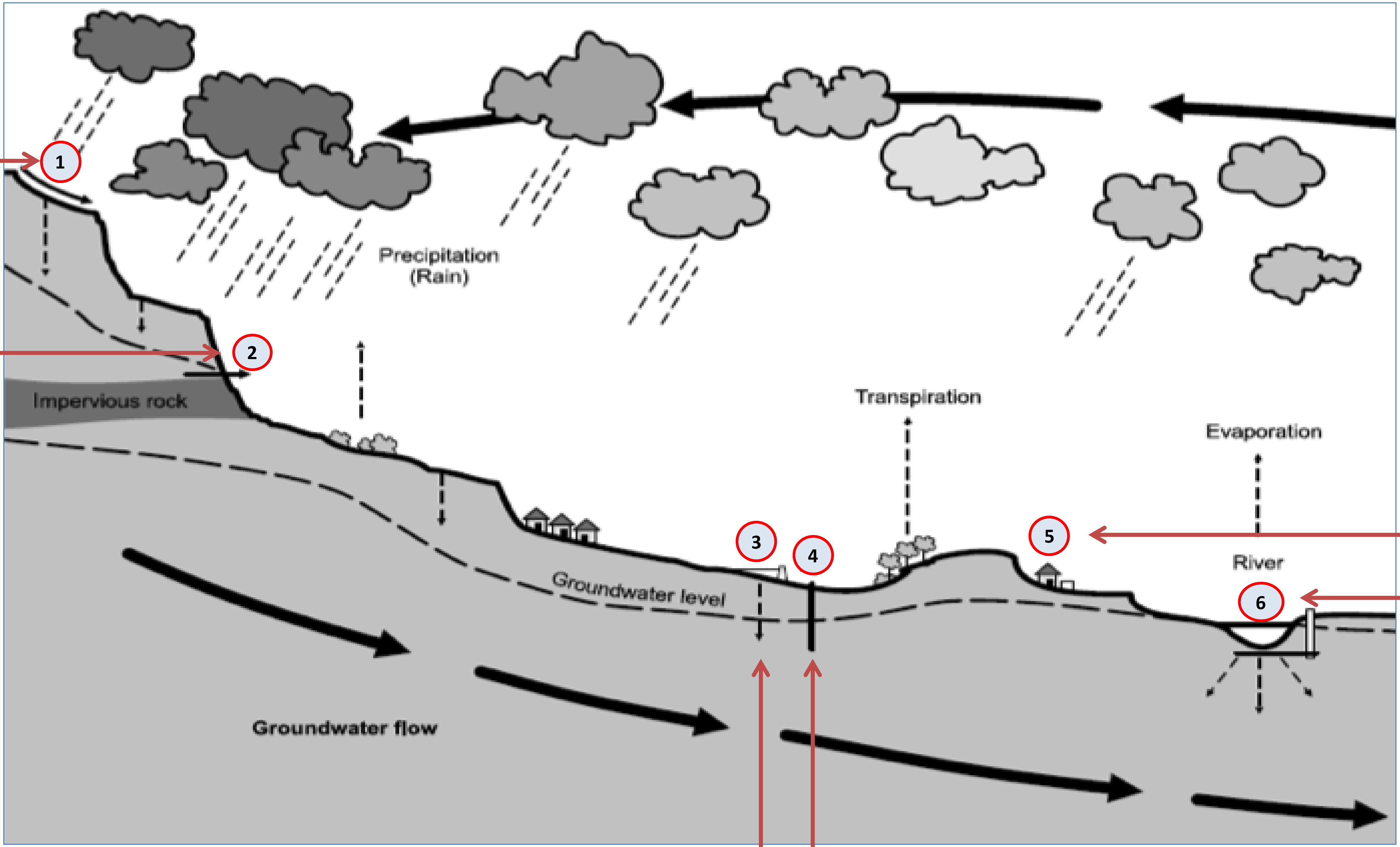
Surge training: Emergency WASH

Swiss Humanitarian Aid
CITERNE SOUPLE
FLEXIBLE TANK - CISTERNA FLEXIBLE
HAUTEUR MAXIMALE :
100 CM
CAPACITÉ :
10.000 LITRES
38-507-2014-CDE020695

Water supply chain



Types of water source



Surface run-off

Spring

Household rain catchment

River/lake with infiltration gallery

Earth dam, ground catchment

Borehole/well

IFRC

Key considerations for selection of water source

IFRC

- Quantity
- Quality
- Access
- Safety

Key considerations for selection of water source: Water quantity

IFRC

Standard 2.1 Water quantity

People have equitable and affordable access to a sufficient quantity of safe water to meet their drinking and domestic needs

Key indicators

- Average volume of water used for drinking and domestic hygiene per household (HH)
- Minimum 15 L per person per day
- Determine quantity based on context and phase of response

- Max number of people using water-based facility
- 250 people per tap
- 500 people per hand pump
- 400 people per open hand well
- 100 people per laundry facility
- 50 people per bathing facility

- % of HH income used to buy water for drinking and domestic hygiene: 5% or less
- % of targeted HHs who know where and when they will next get their water
- Distance from any HH to the nearest waterpoint: <500 metres
- Queueing time at water source: < 30 mins
- % of communal water distribution points free of standing water
- % of water systems/facilities that have functional and accountable management system in place

Key considerations for selection of water source: Water quality

IFRC

Standard 2.2 Water quality

Water is palatable and of sufficient quality for drinking and cooking, and for personal and domestic hygiene, without causing a risk to health

Key indicators

- % of affected people who collect drinking water from protected water sources
- % of HHs observed to store water safely in clean and covered containers at all times
- % of water quality tests meeting minimum water quality standards:
  - <10 CFU/100ml at point of delivery (unchlorinated water)
  - ≥0.2 to 0.5mg/L free residual chlorine at point of delivery (chlorinated water)
  - Turbidity less than 5 NTU

Key considerations for selection of water source: Access

Access:

- To the disaster area for emergency responders
- To the water source/water provided for beneficiaries
- Beneficiaries participation

Key considerations for selection of water source: Safety

- Safety/Security
- Authorities and permissions
- Other actors
- Exit strategy

Water source assessment

IFRC

Secondary Information

- Maps (hydrological, topographic, infrastructures - water supply, etc.)
- Reports (Government, RC/RC, NGOs)
- Aerial photographs, Google Earth
- WASH Cluster
- Local utilities or government authorities

On site initial rapid assessment:

- Catchment mapping
- Local knowledge (interviews)
- Sanitary survey/observation
- Water quality analysis

Water source actions

- Immediate actions as required:
  - Protect the source
  - Organize distribution
  - Provide containers for collection and storage
  - Provide community support and hygiene promotion
  - Monitor, evaluate and improve current practices
  - Provide basic water storage and treatment
  - Organize tankering if no other choice (last resort)

Summary: Site selection

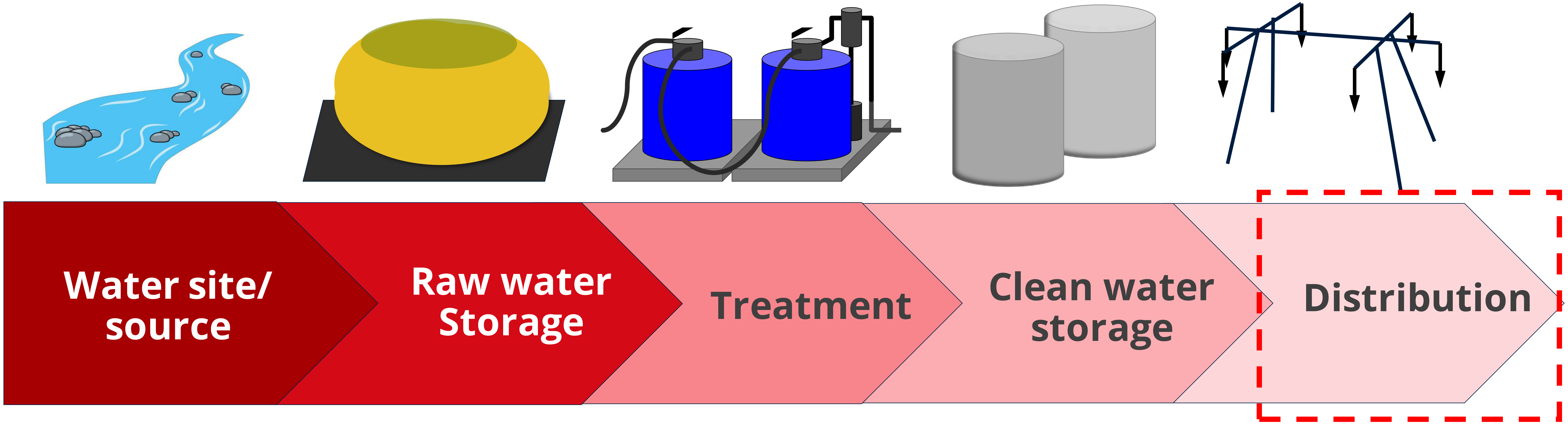
- Quantity (capacity) of water source versus needs
- Quality of water source, risks
- Access
- Safety

Do we bring the water to the people or the people to the water?

→ **Once site is selected, it is difficult to change**

[The Sphere Handbook]

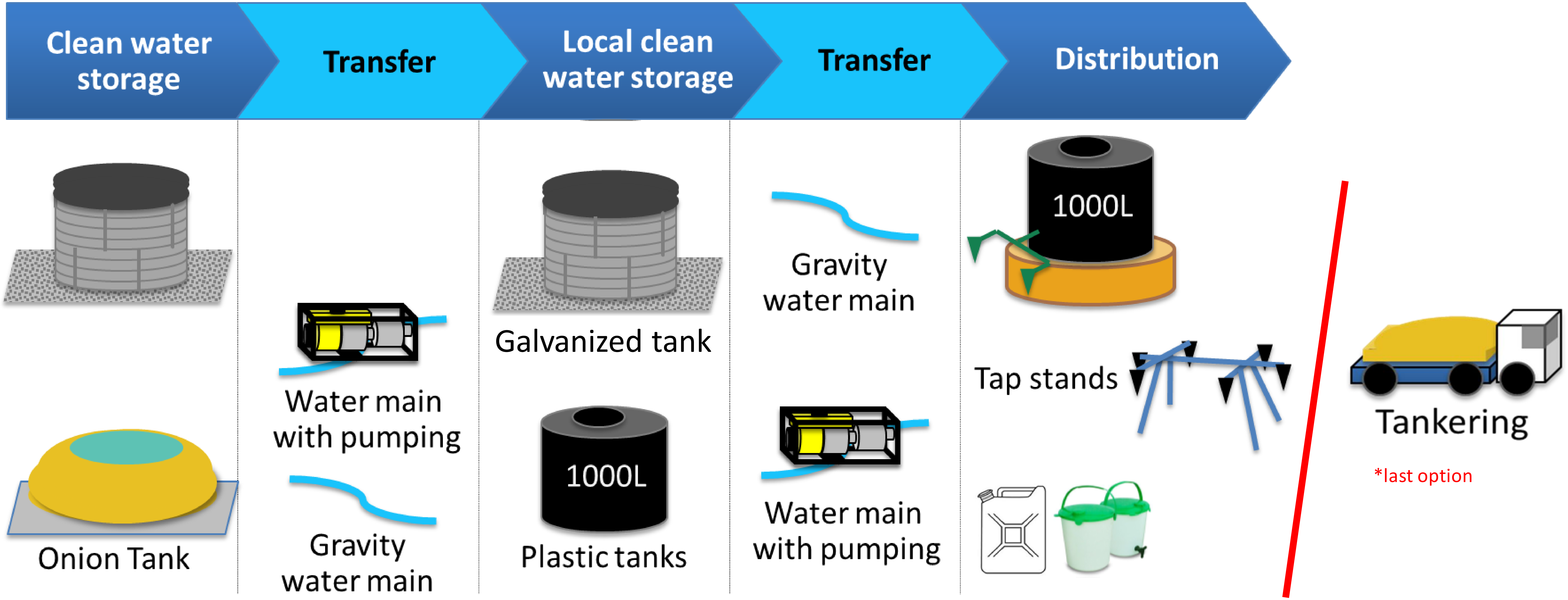
Water supply chain: Distribution



Distribution assessment

- Beneficiary driven design
- Original water and electricity system status
- Dispersion of beneficiaries and alternative water sources
- Distance and access to the water production site
- Tankering feasibility
- Suitable water distribution points
- Warehousing options
- Local procurement to integrate recovery infrastructure
- Exit strategy and recovery phasing

Distribution chain components



Distribution through tankering

- Exit strategy
- Types of trucks available and market rates
- Road conditions and maintenance
- Access to water distribution points
- Turbidity and onsite treatment
- Contingency water sources
- Access to water production site
- Distances, trips per day

Distribution through tankering

IFRC


Oxfam T11 tank

Water distribution point


Elevated tank stand
P.E

IFRC

Key messages

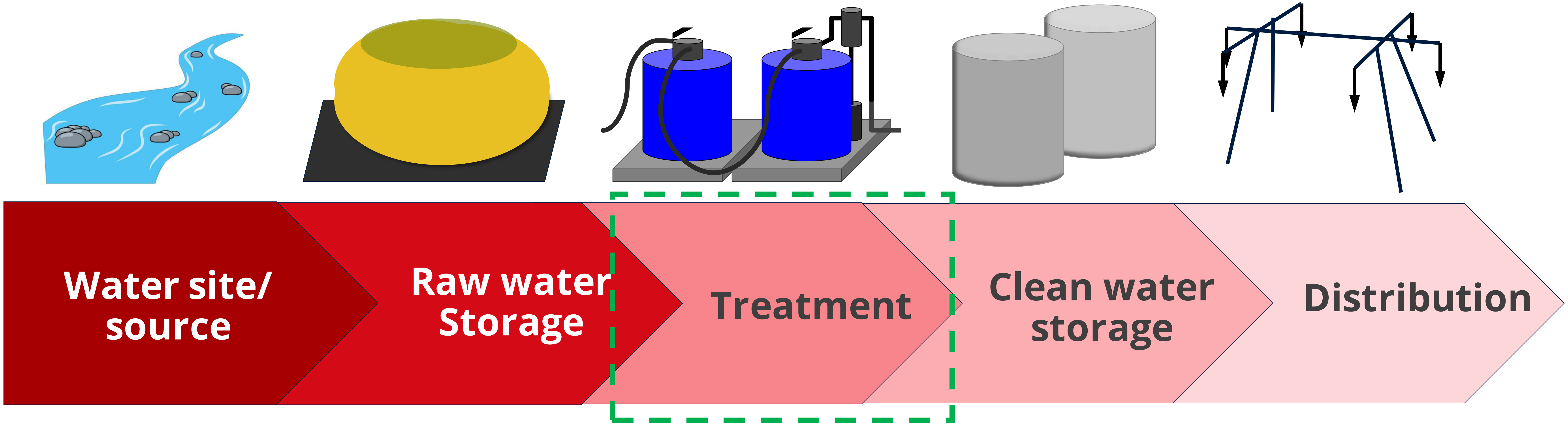
- **3 categories of water sources**: rainwater, ground water and surface water
- **4 key selection criteria**: quantity, quality, access and security
- **Key considerations when assessing water source**: Secondary information, on-site information collection, sanitary survey/observation and water quality analysis
- **Once a site has been selected, it will be difficult to change!** *(so make sure all necessary factors has been considered)*
- Take into consideration **issues related to water distribution –** for e.g., availability of water containers, how to get water to people, inclusiveness, accessibility for all groups → take **Sphere standards** as our guidance

IFRC

Mass water supply: site selection, water treatment & distribution

Surge training: Emergency WASH

Water supply chain



Objectives of emergency water supply and treatment

- Protection of water sources in order to minimise the risk of contamination
- Provision of sufficient amount of water at a reasonable quantity
- Improvement of the physical and biological quality of the water
- Improvement of access to supplies through improved water distribution networks and storage facilities

Basic water quality test – drinking water quality criteria

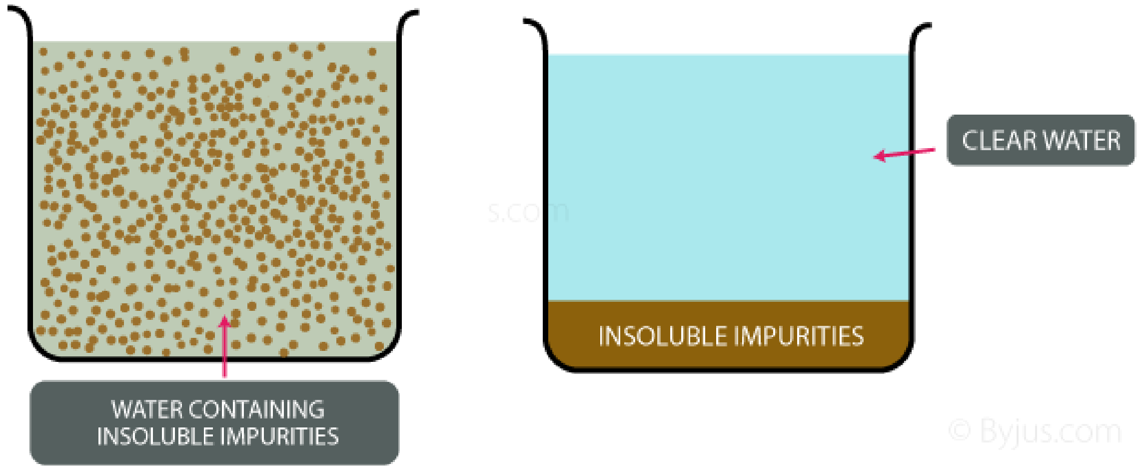
IFRC

- Conductivity: no health based target, although water will taste salty to most people between 1,000 – 1,500 µS/cm
- Turbidity ≤ 5 NTU *(NTU = nephelometric turbidity unit)*
- pH 6.5 < pH < 8.5 (not a health based target)
- Faecal coliforms ≤10 CFU/100 ml *(CFU = colony forming units)*
- Free residual chlorine (when chlorine is used as a disinfectant agent) should be ≥ 0.5 mg/l and no less than 0.2 mg/l at point of delivery - after 30-minute contact time at pH <8
- Colour, odour, taste acceptable for users

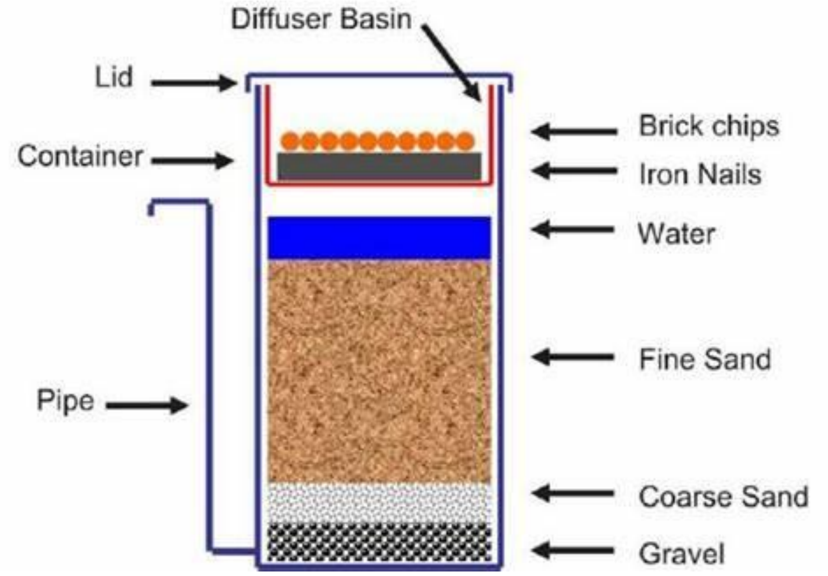
Water treatment: In summary

IFRC

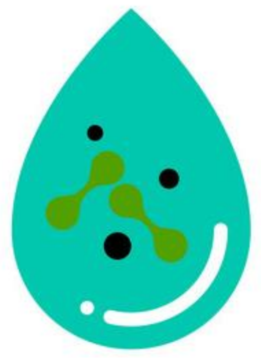
- Sedimentation – allowing dirt to fall to the bottom of a water container over time.



- Filtration – physically removing dirt by passing the water through a material such as ceramic or sand to reduce turbidity



- Disinfection – making sure water is free from disease-causing germs. This may be done by chemicals, heat or even sunlight.


Contaminated water

Disinfected water

Turbidity

- Turbidity is the cloudiness or haziness of a fluid caused by large number of particles that are generally invisible to the naked eye, similar to smoke in air.

- Highly turbid water affects the effectiveness of chlorination, and this affects the microbiological quality of the water!

- Methods include:

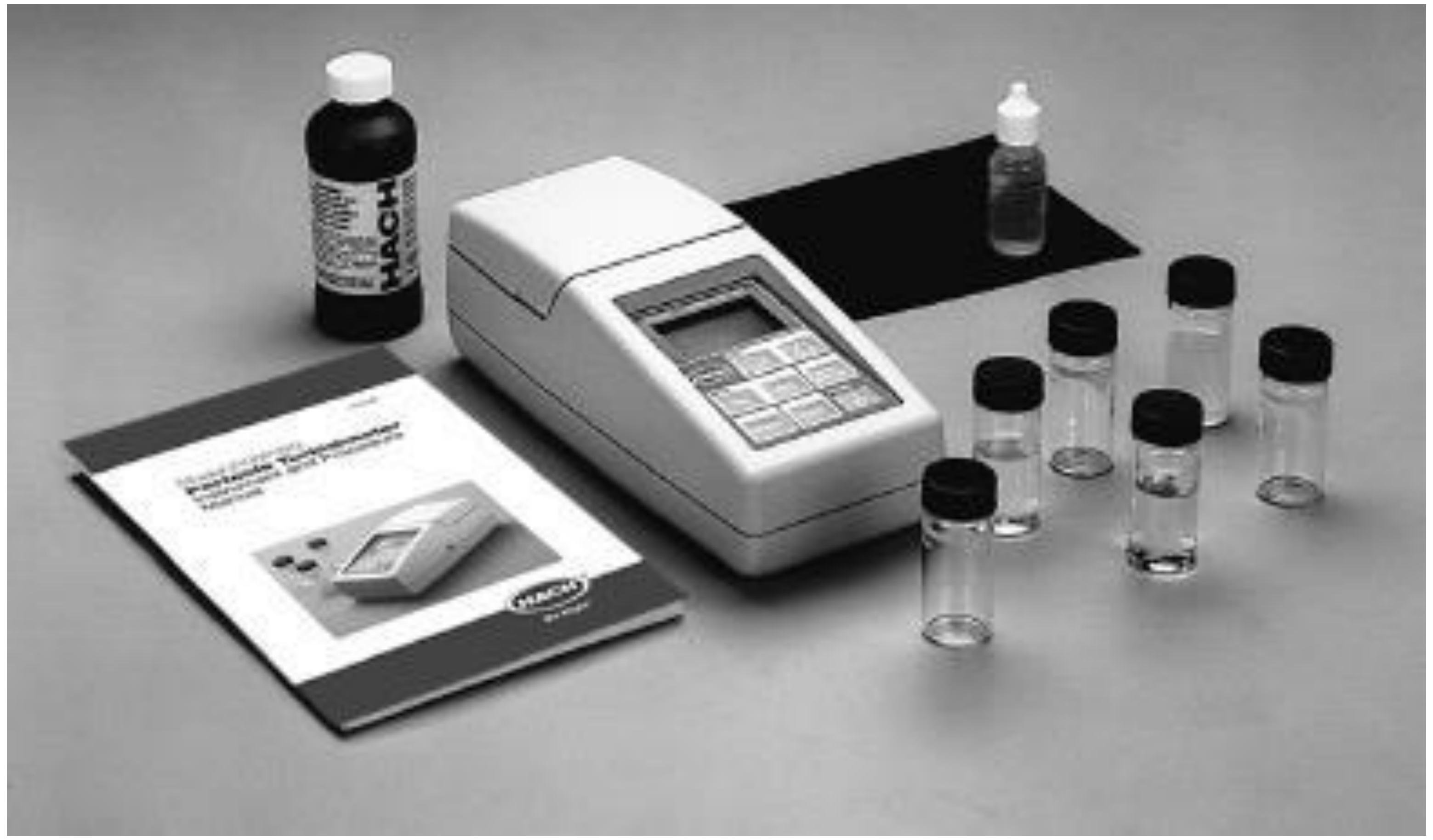
- Sedimentation
- Coagulation
- Flocculation
- Filtration

250 NTU | 100 NTU | 50 NTU | 25 NTU | 10 NTU

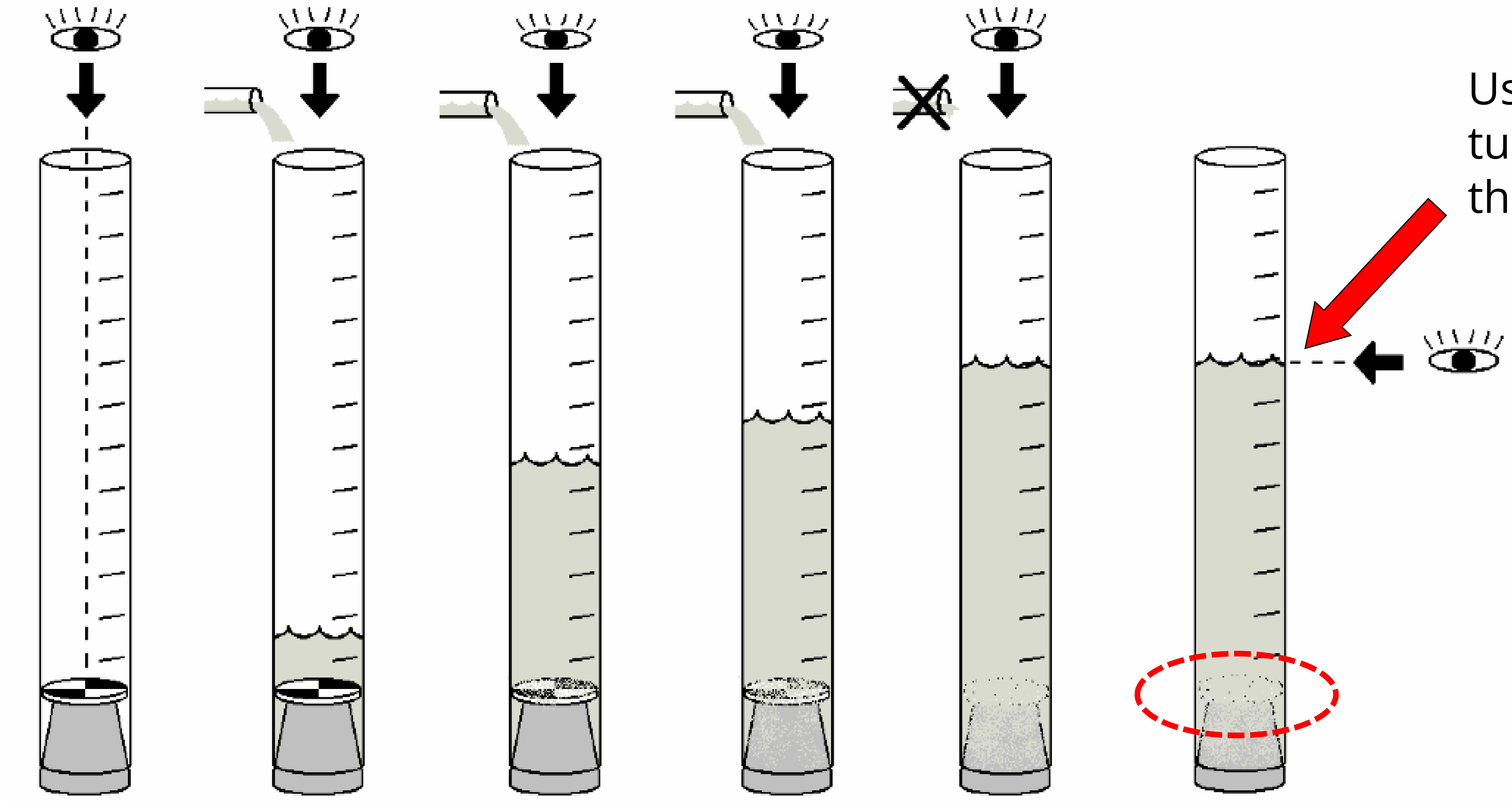
- **Coagulation** = destabilize particles through chemical reaction between coagulant and colloids
- **Flocculation** = a process of contact and adhesion whereby the particles of a dispersion form larger-size clusters

Internal

How to measure turbidity

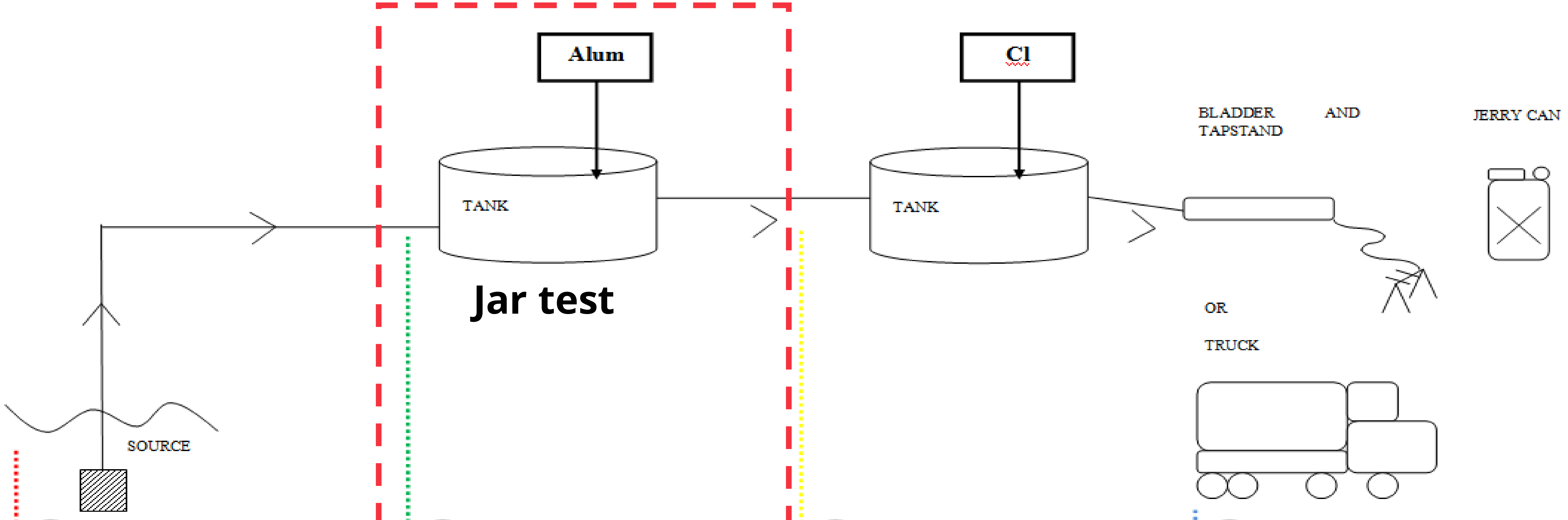


Using the turbidity tube



Use the turbidity tube to check turbidity of water and record the reading

Reducing turbidity



Site Selection

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

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
   - IF more than 5NTU → repeat jar test, add more alum

Do a **Bucket Test**

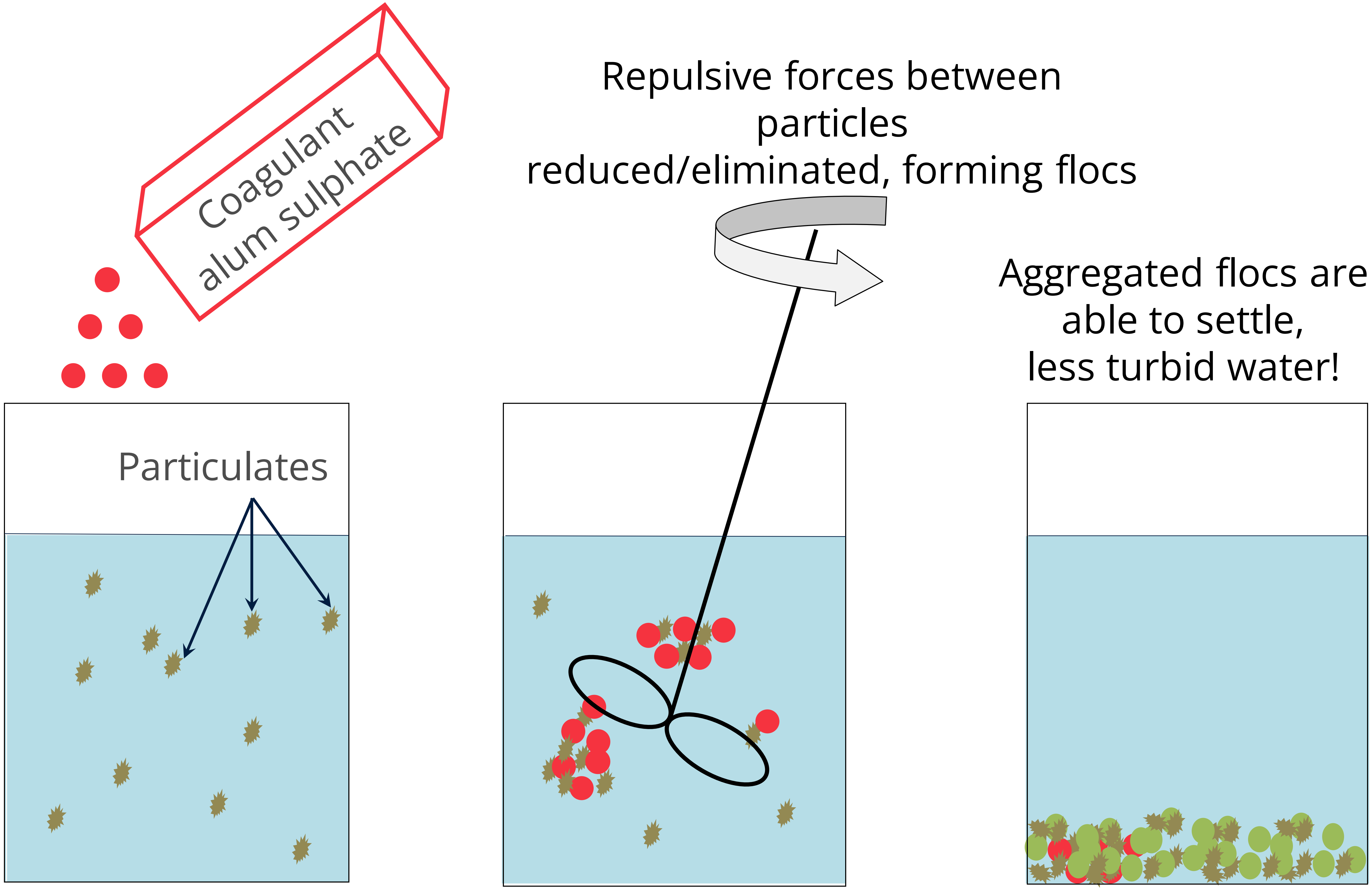
Quality Test and Distribute

Coagulation/flocculation

Settling/sedimentation

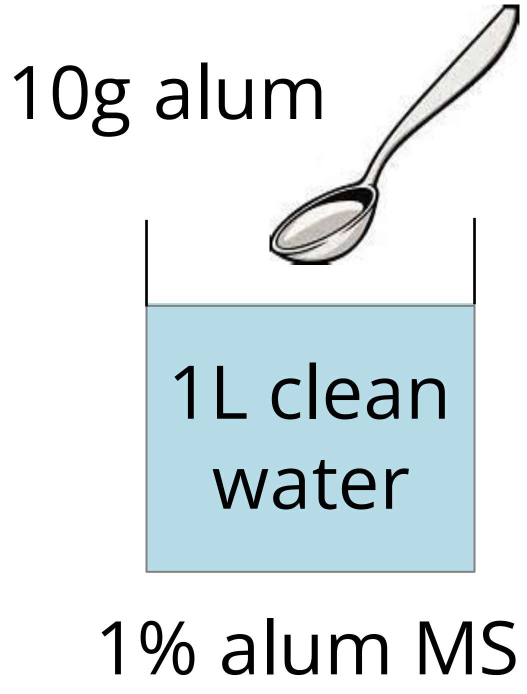
Filtration

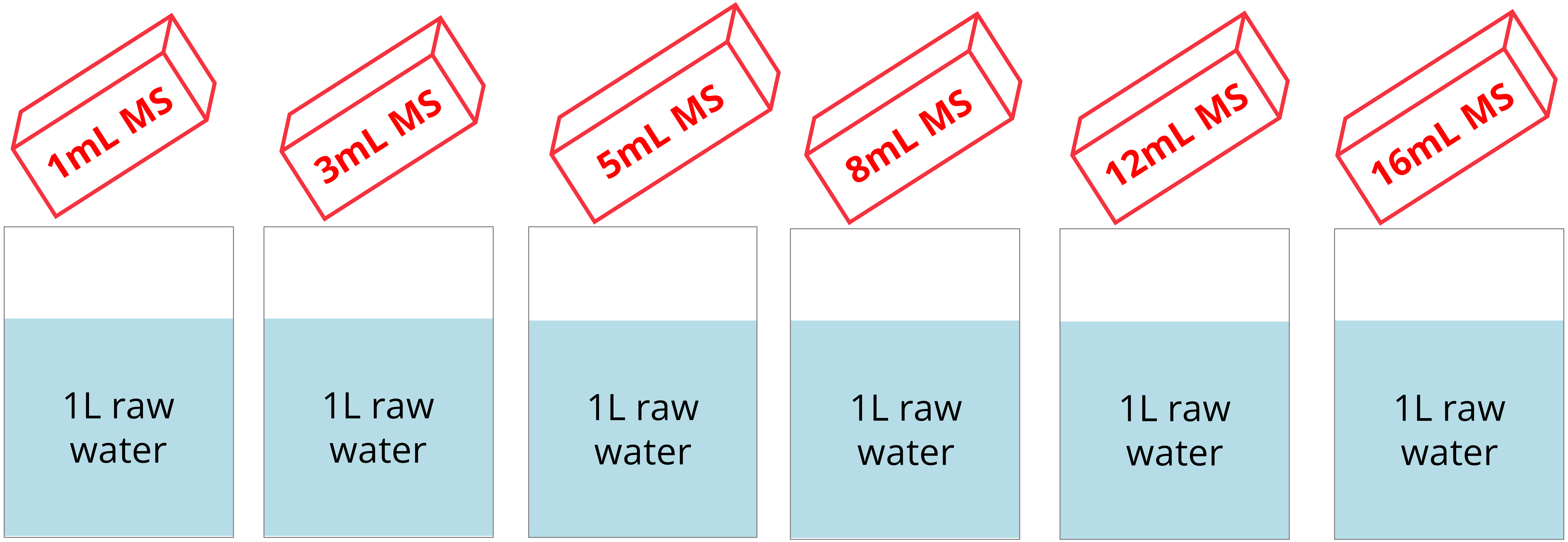
Coagulation-flocculation



Jar test: making the mother solution

Step 1	Prepare 6 buckets, each with 1 L of the water to be treated
Step 2	Make up 1% alum mother solution (MS) by dissolving 10g of granular alum in 1 L clean water
Step3	Add variable MS doses to the raw water



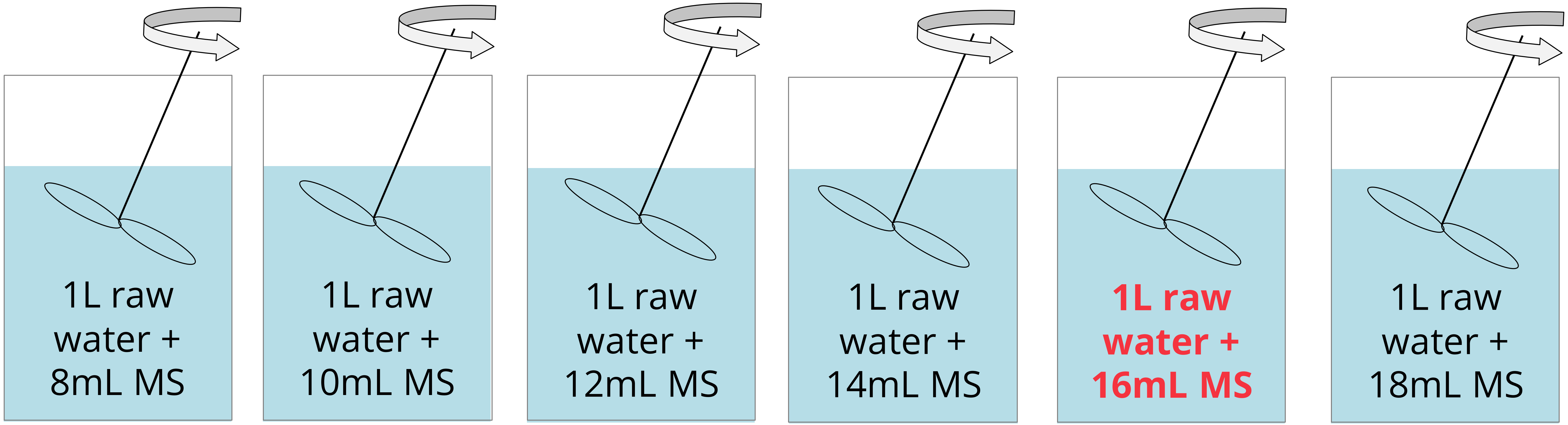


Jar test: mixing

Step 4 Stir rapidly for 10 minutes to disperse coagulant rapidly and uniformly, and to encourage formation of flocs

Step 5 Allow to settle

Step 6 Measure turbidity and record the reading → compare with the "before" reading and take note of the MS volume which gave the optimal result



Jar test: formula

General formula:

1. 1% MS (grams of alum/ 1,000mL)

X

2. Test result (mL of MS/1L)

X

3. Volume to treat (tank volume in L)

=

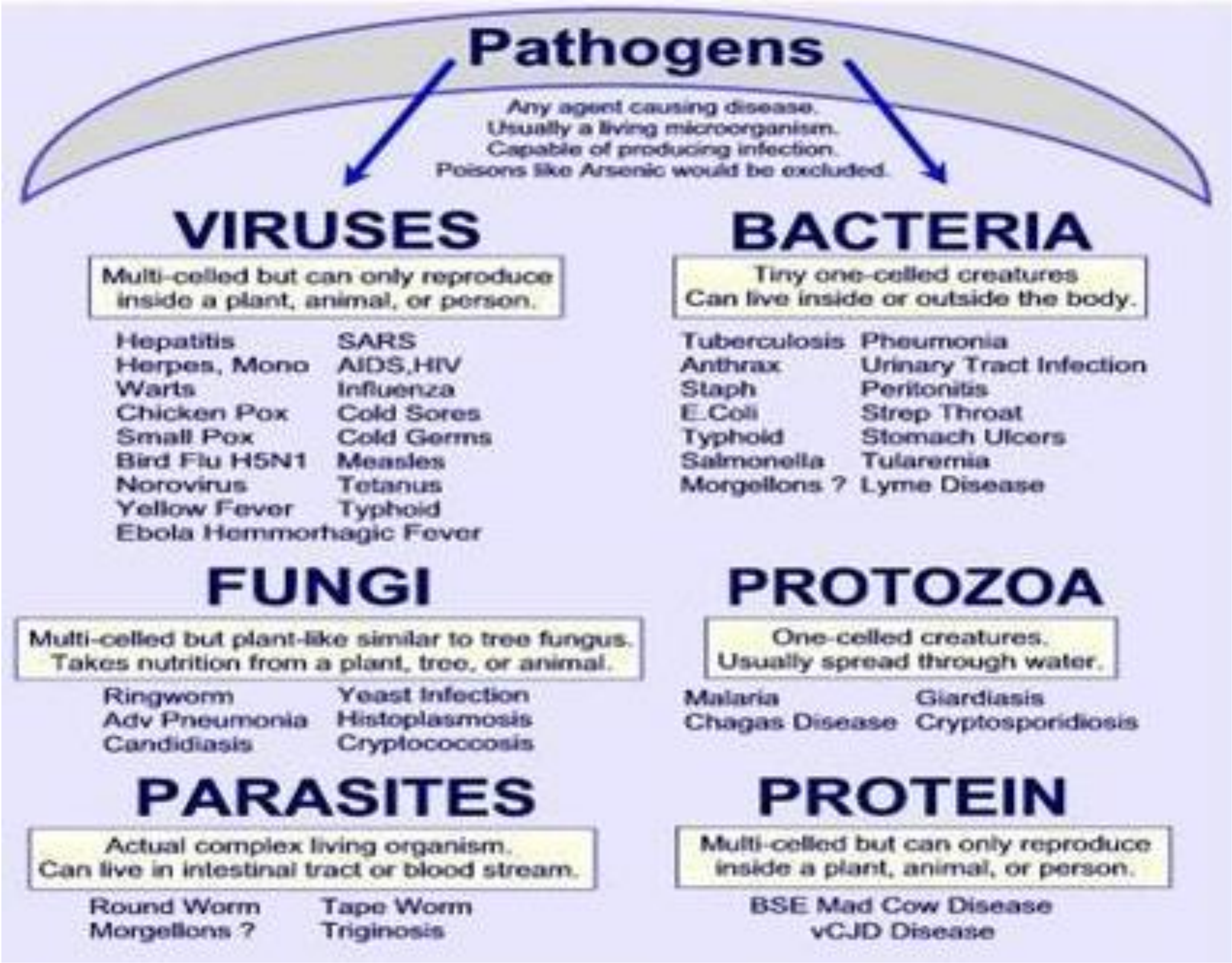
grams of alum to add

Example calculation:
Your jar test shows that 16mL of 1% MS is the optimum dosage. How much alum do we need for a tank of 15,000L?

$$\frac{10\text{g}}{1{,}000\text{mL}} \times \frac{16\text{mL}}{1\text{L}} \times 15{,}000\text{L} = \mathbf{2{,}400g\ /\ 2.4kg}$$

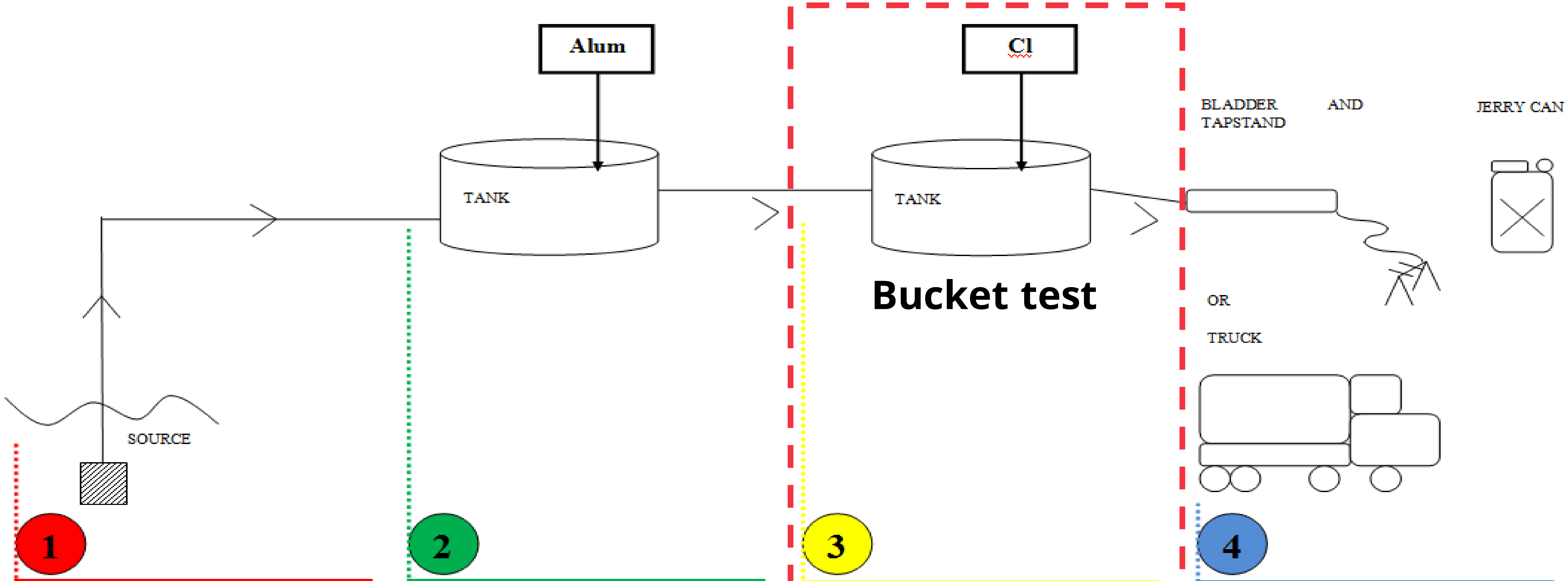
Disinfection: aims and procedures

- To destroy pathogens that are present in raw water
- To destroy pathogens introduced in the treatment and distribution systems (pipeline and storage)
- Chlorine is the most common method of disinfection during emergencies
- Physical agents: heat, UV radiation
- Chemical agents: chlorine, ozone, iodine, salts of ammonium



How do we disinfect water?

IFRC



1 – Site Selection

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

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
   - IF more than 5NTU → repeat jar test, add more alum

3

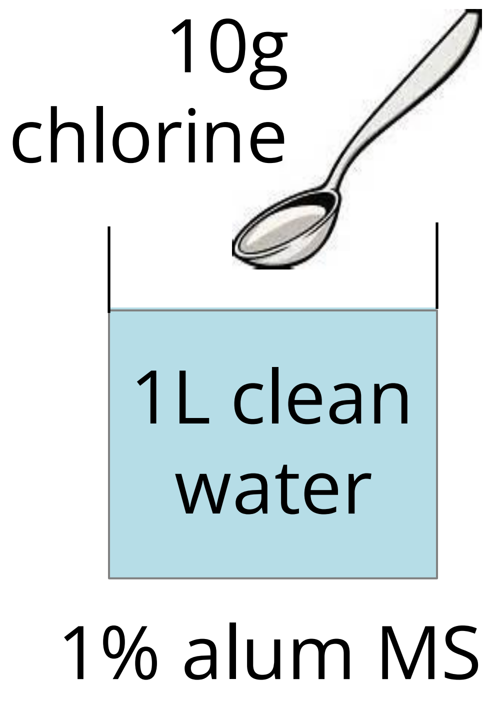
Do a **Bucket Test**

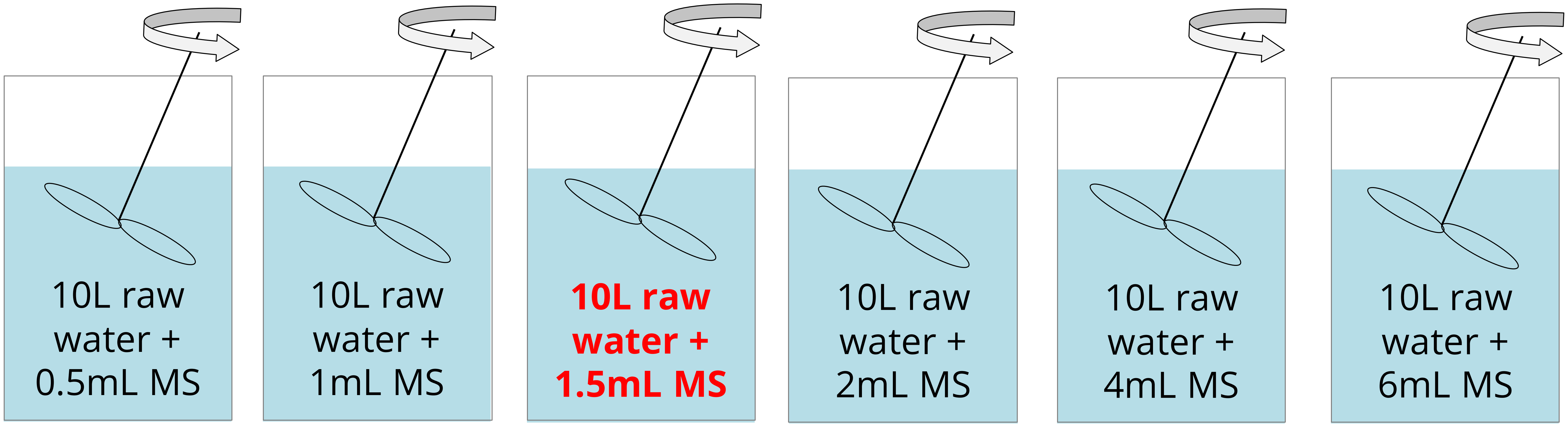
4

Quality Test and Distribute

Bucket test: making the mother solution

Step 1	Prepare 6 buckets, each with 10 L of the water to be treated
Step 2	Make the MS with 1% concentration ○ ***Guide to achieve 1% chlorine concentration: 1% = 10g Cl2/1L, or 20g of HTH/1L***
Step 3	Add variable MS doses to the water in the buckets
Step 4	Stir for 10 minutes, and leave to react with chlorine for 30 minutes
Step 5	Measure chlorine concentration of each bucket, choosing CL concentration of +/- 0.5 mg/L





Bucket test: formula

General formula:

1		2		3		
1% MS (grams of Cl/ 1,000mL)	X	Test result (mL of MS/10L)	X	Volume to treat (tank volume in L)	=	**grams of Cl to add**

Example calculation:

You have just done a bucket test with 50% concentration chlorine. The result shows that 1.5 mL of 1% MS is the optimum dosage for disinfection. How many grams of chlorine will you need to disinfect a tank of 8,000 L?

- [1,000/50% = 20 grams of chlorine per 1L of MS]

1		2		3		
$\frac{20g}{1{,}000mL}$	X	$\frac{1.5mL}{10L}$	X	8,000L	=	**24g**

Internal

Key messages

IFRC

- Immediate objectives of emergency water supply and treatment/purification are to protect water sources to minimize risk of contamination and to provide sufficient water of a reasonable quality
- When assessing water quality, take into consideration the following parameters: suspended solids, pH, fecal contamination and conductivity
- To reduce turbidity: coagulation/flocculation, settling/sedimentation and filtration
- The lower the turbidity of the water, the more effective the disinfection process will be
- To determine optimal coagulant dose → jar test, and to determine optimal chlorine dose → bucket test
- Water quality should include looking at the microbiological parameters, particularly total coliforms and *E. coli.*

Q&A session

What's next

IFRC

- Link to the dedicated **website** provided in the chat box (where you can find resources, webinar recordings, etc.)
- The **quiz** will cover key messages from the webinar presentation.
- For webinar #2, there will be **15 questions** with a passing mark of **80%**. You will be allowed **2 attempts** for each quiz and for each attempt, you will be given **30 mins** to complete. You will need to pass all quizzes to be eligible to apply for the face-to-face training in November.
- This quiz will be valid from now until 4pm KL time, 4 Oct 2022.
- By participating in this webinar, you will be now added to our regular **Health and WASH newsletter mailing list**. If you prefer not to receive these newsletters, please unsubscribe at any time by clicking the link in the newsletter.

If you have any questions in relation to the webinar series or the surge training, please drop a line to wendy.neoh@ifrc.org

Next webinar

IFRC

4 October 2022
4pm KL time

Webinar #3:
Household water treatment and safe storage