

Regional Training Workshop on Wastewater Reuse in Agriculture

**U.S. Department of Agriculture & U.S. Environmental
Protection Agency**

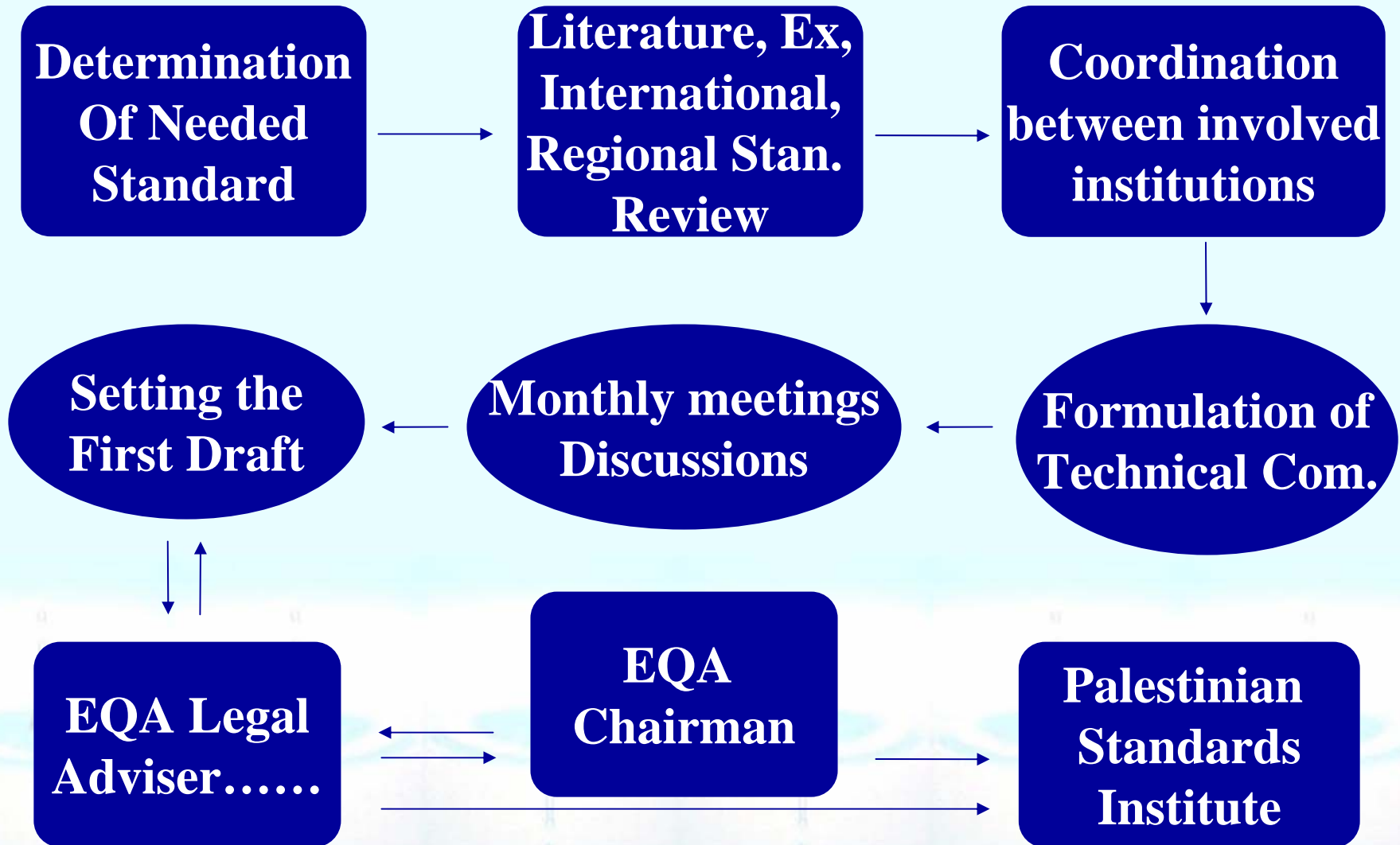
PALESTINIAN ENVIRONMENT QUALITY AUTHORITY

**RECLAIMED WATER QUALITY
CRITERIA, STANDARDS**

Prepared by : Dr. ZAHER SALEM

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Applied Procedures for Establishment Reclaimed Water Quality Standard



The Committee Philosophy and Discussions

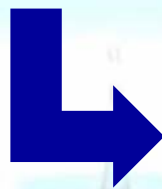
**Think Globally, Cooperate Regionally, Plan
Nationally & Act Locally**

The Standard must; a) support the national Socio-economic goals, b) take into consideration the weak capacities and capabilities in parallel with, c) the environment and public health protection.

FLEXIBLE STANDARD

The Standard must a) provide environmental & public health protection; b) consider the already deteriorated groundwater, c) current soil salinization, d) and the limitation of lands, e) the international agreements, f) regional conventions and memorandums of understanding.

STRICT STANDARD



**Decision Making
Decision support tools
Multi-criteria analysis**



**COMPROMIZED
STANDARD**

Standard Goal

- **Protect Public health** (direct exposure; workers, handlers – indirect exposure; final consumers)
- **Protect water resources** including the groundwater
- **Protect the Soil**
- **Protect the plants**



Document No 2

“The sixth draft of treated wastewater standard”, Content

1. Field : Reclaimed Wastewater & Effluent of WWTP
2. Definitions : Wastewater & Reclaimed wastewater
3. General Guidelines : reclaimed wastewater quality, irrigation periods, sensitive crops, irrigate eaten raw crops with any reclaimed wastewater is forbidden, pipelines, no mixing with fresh water, no direct infiltration, keeping 500 m offshore distance in case of sea disposal.
4. Specifications : Quality, 24-hour composite samples, requirements should be met in at least 80% of samples taken, sampling and analysis within standard met.
5. Classification of reclaimed wastewater : A, B, C, D
6. List of Restrictions “Barriers” : 11 barriers
7. Allowable crops for unrestricted irrigation : industrial crops cotton, seeds before flowering, woody crops and forests without public accessibility, fodders and fodder grass.

Classification of Reclaimed Wastewater

Classification of RWW

Class A: High quality
BOD5 = 20 mg/L,
TSS = 30 mg/L,
Faecal coliforms =
200 MPN/100 ml

Class B: Good quality
BOD5 = 20 mg/L,
TSS = 30 mg/L,
Faecal coliforms =
1000 MPN/100 ml

Class C: Medium quality
BOD5 = 40 mg/L,
TSS = 50 mg/L,
Faecal coliforms =
1000 MPN/100 ml

Class D: Low quality
BOD5 = 60 mg/L,
TSS = 90 mg/L,
Faecal coliforms =
1000 MPN/100 ml

List of Restrictions “Barriers”

Making a Cut-off between Effluent and Fruits

- ❖ A distance of at least 50 cm, above ground, between the drippers and the crop and the fruits, is considered as 2 barriers.
- ❖ A distance of at least 25 cm above ground, between the drippers and the crop and the fruits is considered as 1 barrier.
- ❖ A distance of at least 50 cm between under-canopy (branches) sprinklers or spray-irrigation, and between the fruits is considered as 1 barrier.
- ❖ A plastic groundcover, between the effluent and the fruits, is considered as 1 barrier.
- ❖ Subsurface drip-irrigation is considered 2 barriers.

List of Restrictions “Barriers”

Destroying Sickness Causes / Disinfection

- Retention of 15 days on average in a primary reservoir is considered as 1 barrier.
- A water pond that contains up till 10% of reclaimed wastewater is considered as 1 barrier.
- Disinfection of RWW in an organized device with a contact time of at least half an hour and a total residual chlorine concentration of at least 0.5 mg/L (or another disinfection means with a similar value concentration) is considered as 1 barrier.

Other Barriers

- A fruit with an inedible peel or shell (citrus, banana, nuts) is considered as 1 barrier.
- A fruit that is eaten cooked only is considered as 1 barrier.
- Sand filter is considered as 1 barrier.

Number and Type of Barriers for Different Crops and Effluent Qualities

Class A: High quality	Class B: Good quality	Class C: Medium quality	Class D: Low quality	Crop	Sand filtration or long retention of 10% effluents	Effluent disinfection	Distance from drip-irrigation.	Plastic ground cover.	Subsurface irrigation	Inedible pill or shell.
The number of required barriers					One of the 3					
Zero	Forbidden	F	F	Gardens, Play grounds, Parks						
Zero	Zero	Zero	F	Groundwater recharge by infiltration						
Zero	Zero	Zero	F	Discharge to the Sea, 500m far						
Zero	Zero	Zero	Zero	Seeds crops						
Zero	3	3	4	Artichokes	+	+	++	+	++	
Zero	3	3	4	Corn (edible).	+	+	++	+	++	+
Zero	Zero	Zero	F	Green Fodders						
Zero	Zero	Zero	Zero	Dry Fodders						
Zero	2	2	3	Citrus, with Drip irrigation	+	+	++			+

Number and Type of Barriers for Different Crops and Effluent Qualities

Class A: High quality	Class B: Good quality	Class C: Medium quality	Class D: Low quality	Crop	Sand filtration or long retention of 10% effluents	Effluent disinfection	Distance from drip-irrigation.	Plastic ground cover.	Subsurface irrigation	Inedible pill or shell.
Zero	3	3	4	Citrus, without Drip irrigation	+	+	+			+
Zero	2	2	3	Crops with Inedible pill or shell almonds, pomegranate, pistachios.	+	+	++		++	+
Zero	2	2	3	Deciduous trees (apple, prune, plum, pear, peaches, apricot) and cherry.	+	+	++			
Zero	2	2	3	Tropical fruits (mango, avocado, persimmon).	+	+	+	+	++	+

Number and Type of Barriers for Different Crops and Effluent Qualities

Class A: High quality	Class B: Good quality	Class C: Medium quality	Class D: Low quality	Crop	Sand filtration or long retention of 10% effluents	Effluent disinfection	Distance from drip-irrigation.	Plastic ground cover.	Subsurface irrigation	Inedible pill or shell.
Zero	2	2	3	Grapes with high trellis.	+	+	++	+	++	
Zero	2	2	3	Grapes with regular trellis.	+	+	+	+	++	
Zero	2	2	3	Sabras (cactus)	+	+	++	+	++	+
Zero	2	2	3	Dates.	+	+	+++	+	++	
Zero	2	2	3	Olives.	+	+	++	+	++	
Zero	2	2	3	Flowers .	+	+	+	+	++	+
Zero	Zero	Zero	Zero	Forest with no public access						
Zero	Zero	Zero	Zero	Industrial and cereal crops						

RWW Quality Monitoring

No	Indicator	Frequency	Assessment period
1	Total & Faecal Coliforms	One sample/two days	Three months
2	Pathogens	One sample/2 weeks .October-May month/One sample April-November	Additional 2 samples after 2 days if Pathogens are detected. Stop irrigation if the additional samples are positive.
3	Intestinal nematodes & protozoa	One sample/2 months	One year.
4	Regular chemicals	One sample/month	One year.
5	Heavy metals	One sample/year	One year.

Conclusions

- Setting strict standards is not difficult, but how to reach and monitor?**
- Real implementation of uniform standards could be achieved if:**
 - 1. Water and wastewater issues would be out of political conflicts**
 - 2. Developed partner would understand his developing partners needs**
 - 3. Developed partner would be ready to assist in technical and financial aspects**
 - 4. Developing partner would be positive, serious and active**
- Palestine must develop a national plan for wastewater reuse**