Water Monitoring Control System

Palestinian Water Authority in cooperation with
EMWIS project
First seminar on
Euro-Mediterranean knowing how in water sector (EMWIS)

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Level for decide the water and wastewater sector in Palestine

• Level 1 Political : consisting of the National Water Council, in charge of setting water policies.

• Level 2 Regulatory: consisting of the Palestinian Water Authority, in charge of implementing water policies.

• Level 3 Operational: consisting of regional water utility, in charge of providing services, whether on national level for a wide-scale water supply (National Water Utility), or those to be established in governorates to supply water to citizens once water supply and wastewater treatment services have been integrated.

Introductions

•Their a lot of monitoring program system between the mentioned levels in order to decrease the impact on the human health, financial, engineering design, implementations, testing and evaluating.

• The monitoring system for impact on human health taking into consideration the min requirements recommended by WHO or local specifications or guideline.

• Technical and capacity building for the targeted water sector.

Case study

Monitoring system for water related to impact on human health issues and environment.

Criteria for monitoring

• Factors for monitoring and its impact on water as pollutant that depend on types (physical, chemical and biological) characteristics.
• Sequences and time series for monitoring used.
• System to be monitored (storage tank, network and sources such as wells & springs).
• Representative and comprehensive.
• Identified parameters as term of reference (indicators) for evaluations.
• Results and recommendations according to guideline and specifications (local, regional or international) used.

Design criteria for water monitoring program

- System or area for monitoring and control.
- Purposes for monitoring.
- Systematic parameters to be control.
- No of samples required and it dependants.
- Time & sequences of monitoring.
- Site of sampling criteria (location, distance from the source of effect, impact for human, type of efficiency for implementations or treatment.
- Methods for evaluations and recommendation for design maker.
- Reporting and documentations.

Type of monitoring program

• Routine and continuous:- To be sure that water pumped to consumer every day treated within the guideline or specifications (local or international) for example:- Chlorination, some physical, chemical and biological parameters.
• Periodic:- Depend on needs time (hydrological year) or seasonal summer, winter that includes the source , distribution system, storage tank and network.
• Survey (complete or partially) for study and evaluations, that should be as Quality Assurance (QA) done by PWA for other utility, municipality, village council, water association, private and public water resources, tanks, and connection supply point.

Purposes of monitoring

1. To identify water quality (physical, chemical and biological)from the sources or network.
2. To identify the impact of pollution on human health before it reach the consumer.
3. To take all precautions in order to have representative sample for the lab to be tested.

Point criteria

- Must be know and representative.
- Distributive taking in to consideration the density of population, marginal distributions, storage tank, pump stations, network, start and end of connection and water type.
- Monitoring program must focus on sensitive point mainly take from unsafe area such as spring, shallow wells, low pressure, destructive net work and environmentally impact one.
- Representative point such as schools, hospital, medical center, commercial center, central of inhabitance and water resources.
- Must choose the place to be monitored taking in to consideration safety and easy to reach if emergency.
- Monitoring point take into consideration the aim for monitoring for example chlorination need before and after the treatment to evaluate the efficiency.

No of sample and area criteria

Area criteria:-

1. Sample must be taken from known places and fixed in sequences form.
2. Systematic form for the controlled site and possibility for time series evaluation.

Sample no depend on:-

1. Chang of water quality of the sources.
2. Change of custody.
3. Volume and quantity of the water sources.
4. Possibility for pollution and human practices around the sources.
5. Weather status (summer, winter).
6. No of population serviced.
7. QA\QC for the institutions or implement.

Monitoring control sequences

For population served through the net work depend on

1. Water source type.
2. Water quality from the sources.
3. Type of treatment (disinfections) and type of disinfectant used (liquid chlorine).
4. No of testing sample for network supplied from well is sample per two week.
5. No of testing sample from network supplied from spring is sample per week.

No of testing for sample increase by increasing the No of populations supplied from the sources to decrease the pollutions impact on the human.

No of testing increased in the following cases

1. Emergency.
2. Water deterioration from the sources.
3. Network deteriorations and it is exceeding the hypothetical ages.
4. Leakage and destructive in the network.
5. Leakage and destructive in wastewater sewage system.
6. Flooding.
7. Sequences maintenance and breakage for the network used for drinking.

No of sample must be taken from the network according to No of population recommended by WHO.

No of population (person)	**No sample must be taken**
< 5000	One sample per day
5000-100000	Ratio of sample per 5000 per day
> 100000	Ratio of sample per 10000 + 10 additional sample per day

In our cases because of pollution impact and net work oldness the controlling program must be more modified according to the following specifications as **min requirements**.

No of population (person)	**No sample must be taken**
< 5000	4 time per year or one sample per 3 month
5000 -10000	12 time per year or one sample per month
10000 - 30000	24 time per year one sample per two week

Sample take after pumping and before house entrances and in case of multi sources

Protective sources with no sources of pollutions around such as storage tank and main pipe line connection can be classified according to pipe line diameter and source productivity.

Pipe line diameter

Pipe line diameter	No of sample taken
< 10 inch	4 time per year
> 10 inch	12 time per year

Source productivity per day

Productivity of the sources (m3 per day)	No of sample must be taken
1999	4 time per year
2000 - 5000	12 time per year
5000 - 10000	24 time per year

Criteria for sampling bottle type, volume, preservation according to APHA, 1995 Standard methods for examination of water and wastewater.

Parameter	Bottle type	Min volume (ml)	Max storage	Preservation
Color	P,G	500	24 hour	Refrigerated 4 c , dark
Odor	G	500	6 hour	On site
Temperature	P,G	-	-	On site
Turbidity	P,G	100	24 hour	Refrigerated 4c , dark
Electrical conductivity	P,G	500	28 day	Refrigerated 4c
Hardness	P,G	100	6 month	HNO3 pH=2
Alkalinity	P,G	200	24 hour	Refrigerated 4c avoid gases form
pH	P,G	50	2 hour	On site
Dissolved oxygen	G	300	1\2 hour	On site
Residual chlorine	P,G	500	1\2 hour	On site
Chloride	P,G	50	28 day	-
Nitrate	P,G	100	24 hour	0n site or as soon possible
Sulfate	P,G	100	28 day	Refrigerated 4c

Stages for sample and precautions must be taken

1. Prepare the suitable bottle for sampling.
2. Collect the sample from the representative site.
3. Identify the requested field measurement and labeling on the field.
4. Sample transportation requested.
5. Handling to lab for analysis.
6. Result, recommendations and documentation.

Important issues written on sample when it is taken

1. Source name
2. Source number (wells, spring and network)
3. Locality name (places) and governorate
4. Date of sampling
5. Collecting time (hour).
6. Physical measurement taken in the field
7. Name of sampler and his signature
8. Sample sequence No for the sample in the field

When sample received in the lab make sure of the following issues

1. Make sure from the field measurement and the sample must not physical change.
2. Make sure that the sample closed and there is no mixing.
3. Make sure that the temperature is the temperate of refrigerator.
4. Make sure that the sample not polluted while transportation from each other.
5. Make sure that sample were separated (physical, biological and chemical).
6. Make sure that the requested information taken in the field existed.
7. Reporting all the information from label of the bottle to lab and separate the sample in lab manual and give each of which spatial code used internal the lab.

Sampling for Chemical purposes

1. Water pumped from well till the pH and temperature reading where stable or pump three time the volume of the casing pipe.
2. When sample taken from the water tap online flash the water fro 2-4 min to remove any suspended material.
3. When sample take from houses it must be taken from the tap after the meter to test the Net work and if the water quality inside to be tested sample take tap inside.
4. Water drainage from the tap must be in low flow rate to avoid oxidation and spelling on the sample bottle.
5. Open the bottle carefully.
6. Rinsing and wash the bottle for three time and if contain preservative take sample directly.
7. Fill the bottle and avoid spelling the preserved material and avoid space that contain ai
8. Close the sample and be care from when handling.
9. Follow the procedure for field measurements and transportation to lab and avoid any Chang should be occurred.

Sampling for biological purposes

1. The bottle must be autoclaved.
2. Water pumped from well till the pH and temperature reading where stable or pump three time the volume of the casing pipe.
3. When sample taken from the water tap online flash the water fro 2-4 min to remove any suspended material.
4. When sample take from houses it must be taken from the tap after the meter to test the Net work and if the water quality inside to be tested sample take tap inside.
5. Disinfection for the tap by using the ethanol and flame for tow min.
6. Water drainage from the tap must be in low flow rate to avoid oxidation and spelling on the sample bottle.
7. Open the bottle carefully.
8. Fill the bottle and avoid spelling the preserved material and avoid space that contain air
9. Close the sample and be care from when handling.
10. Follow the procedure for field measurements and transportation to lab and avoid any change should be occurred.