

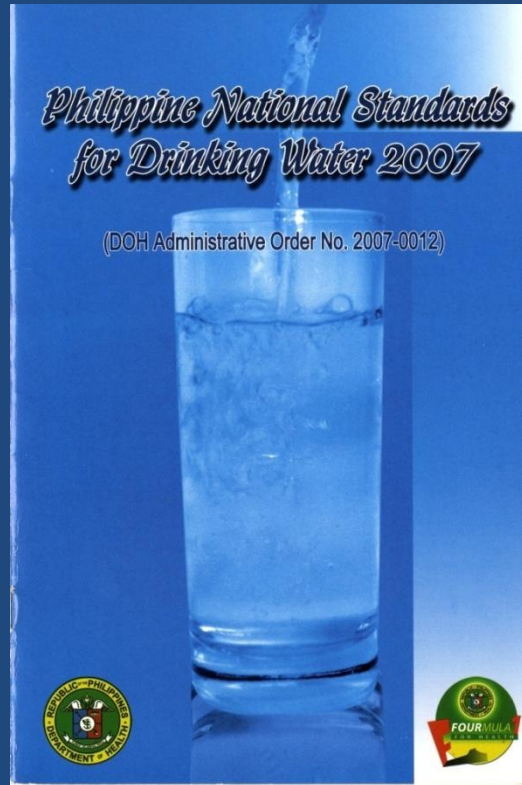


MWSS Regulatory Office

Ensuring SAFE and POTABLE WATER SUPPLY

Isabel V. Bagaporo
Principal Chemist
Water Quality Control Department

Drinking Water Standards



Water quality parameters- total of 88

Department of Health

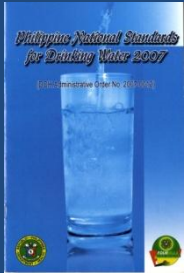
DOH AO No. 2007-0012

Philippine National Standards
for Drinking Water (PNSDW)

- ☐ Microbiological
- ☐ Inorganic
- ☐ organic incl. disinfectant
by-products incl THMs
- ☐ radioactive



Drinking Water Standards



1.4.5 Frequency of Sampling

The minimum number of samples to be collected and examined periodically must be based on the mode and source of water supply **(as shown in Table 1)**.

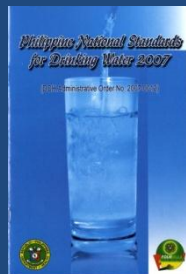
However, frequency of sampling should also take into account the past frequency of records yielding unsatisfactory results, the quality of raw water

Source and mode of supply	Population served	Minimum frequency of sampling
c. Level III	Less than 5,000	1 sample monthly
	5,000 to 100,000	1 sample per 5,000 population monthly
	More than 100,000	20 samples and additional 1 sample per 10,000 population monthly


Microbiological Examination

Source and mode of Supply	Population Served	Minimum Frequency of Sampling
a. Level I	90 – 150	Once in three (3) months
b. Level II	600	Once in two (2) months
c. Level III	Less than 5,000	1 sample monthly
e. Water Refilling Stations (product water)		1 sample monthly
		one (1) sample per 10,000 population monthly
d. Emergency Supplies of Drinking water		Before delivery to users
e. Water Refilling Stations (product water)		1 sample monthly
f. Water Vending Machines (product water)		1 sample monthly

Drinking Water Standards



1.3. Standard Methods of Detection and Values for Microbiological Quality

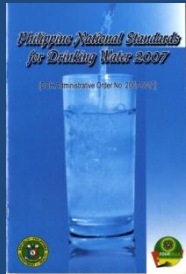
<i>Parameters</i>	<i>Method of Determination</i>	<i>Value*</i>	<i>Units of Measurement</i>	<i>Point of Compliance</i>
Total coliform 	Multiple Tube Fermentation Technique (MTFT)	< 1.1	MPN/ 100 mL	<ul style="list-style-type: none"> Service reservoirs Water treatment works Consumer's Taps Refilling Stations Water Haulers Water Vending Machines
	Chromogenic substrate test (Presence-Absence)*	Absent <1.1	MPN/100 mL	
	Membrane Filter (MF) Technique	< 1	Total coliform colonies / 100 mL	

Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998

* Should be validated and approved by Department of Health



Drinking Water Standards



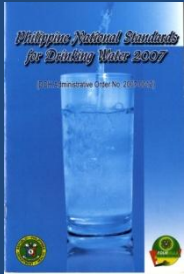
	Compliance to Total coliform			
	(a) For water systems analyzing at least 40 samples per month, no more than 5% of the monthly sample may be positive for total coliform;			▪ Consumer's Taps
	(b) For water systems analyzing fewer than 40 samples per month, no more than one (1) sample per month may be positive for total coliform			
	At least 95% of standard samples taken in each year from each reservoir are total coliform negative			▪ Service reservoirs
	No standard sample taken each month should exceed maximum allowable value specified in the above.			▪ Water treatment works ▪ Refilling stations ▪ Water haulers ▪ Water vending machines
Fecal coliform	Multiple Tube Fermentation Technique (MTFT)	< 1.1	MPN/ 100 mL	▪ Service reservoirs ▪ Water treatment works ▪ Consumer's Taps ▪ Refilling Stations ▪ Point Sources (Level 1)
	Membrane Filter Technique (MFT)	< 1	Fecal coliform colonies / 100 mL	▪ Water Haulers ▪ Water Vending Machines
	Chromogenic substrate test (Presence-Absence)*	< 1.1	MPN/100mL	
Heterotrophic Plate Count	▪ Pour Plate ▪ Spread Plate ▪ Membrane Filter Technique	<500	CFU / mL	▪ Service reservoirs ▪ Water treatment works ▪ Consumer's taps nearest the meter ▪ Refilling Station ▪ Water Vending Machines

Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998

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Drinking Water Standards



2. Chemical and Physical Quality

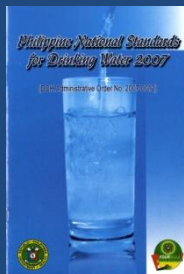
2.5 Minimum Frequency of Sampling

The minimum frequency of sampling for drinking water supply systems for physical and chemical analysis is provided in **Table 2**.

Table 2. Minimum Frequency of Sampling for Drinking-Water Supply Systems for Physical and Chemical Analysis

Source and mode of Supply	Minimum Frequency of Sampling
a. Level I	Once a year
b. Level II	
c. Level III	
d. Emergency Supplies of Drinking Water	
e. Water Refilling Stations	Twice a year
f. Water Vending Machines	

Drinking Water Standards



2.9 Standard Values for Inorganic Chemical Constituents with Health Significance - Continuation

Constituent	Maximum Level (mg/L)	Remarks (Sources/Occurrence)	Method of Analysis
Mercury (Total)	0.001	Mercury is used in industries such as in the electrolytic production of chlorine, in electrical appliances, in dental amalgams and as a raw material for various mercury compounds. Mercury occurs naturally in freshwater and groundwater in the inorganic form. Methylation of inorganic mercury occurs in freshwater and seawater.	Cold vapor AAS; ICP/MS
Nickel	0.02	Nickel is very toxic and usually occurs in water supply as a result of nickel or nickel-plated plumbing components. Although nickel could be naturally occurring in certain areas, it is not usually a raw water contaminant.	ICP/MS; EAAS; ICP; FAAS
Nitrate	50	Nitrate concentration in groundwater and surface water can reach high levels as a result of leaching or run-off from agricultural land or contamination from human or animal wastes. Anaerobic conditions may result in the formation and persistence of nitrite.	Cd Reduction Method; IC; Capillary Ion electrophoresis Colorimetric (Diazotization); IC; Flow Injection Analysis
Nitrite	3		
Selenium	0.01	Selenium occurs naturally in groundwater sources.	AAS with hydride generation; Colorimetric, Fluorometric, EAAS, ICP, ICP/MS



Water Quality Monitoring & Surveillance

Water Supply IRR - Sanitation Code of the Phils.

- Service providers – have the legal duty to ensure that the quality of water supplied does not fall below the standards at any given time (Manila Water / Maynilad Water/water districts/ coops)
- LGU - quality and sufficiency
 - establish a monitoring & surveillance framework and system guidelines to ensure that drinking water quality conforms with the Standards (both private & public)
- LOCAL Water Quality Monitoring Committee

*Metro Manila Drinking Water Quality Monitoring Committee
(MMDWQMC)*



Water Quality Monitoring & Surveillance

MWSS Privatization (1997)

➤ Creation of MWSS Regulatory Office

ROLE:

- ❑ determine Manila Water / Maynilad Water level of service in providing water supply that complies at all times with PNSDW
- ❑ Independent regulator - independent reassurance that human health is safeguarded through the provision by the Concessionaires of SAFE and POTABLE public water supplies of a quality acceptable to the customers
(random sampling)



MWSS Regulatory Office

The MWSS Regulatory Office

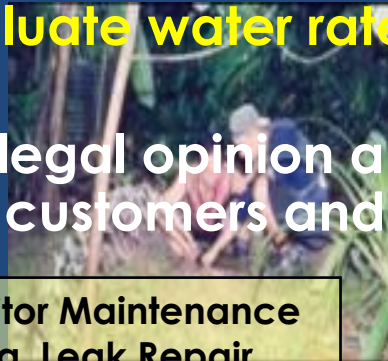
Monitoring Functions of MWSS-RO

- ❑ Technical Regulation Area: to monitor Capital Investments and Assets of the concessionaires; to monitor concessionaires' compliance on drinking water and wastewater
- ❑ Customer Service Area: to monitor customers' complaints and concerns
- ❑ Financial Service Area: to monitor income and expenses of the concessionaires as to prudence and efficiency; to evaluate water rates/tariff as to its reasonability
- ❑ Legal Area: to render legal opinion and review contracts concerning customers and concessionaires

Conduct Water Sampling



Monitor Maintenance
e.g. Leak Repair



Monitor CAPEX e.g. Pipe Laying
(infrastructure dev't proper)



Water Quality Monitoring & Surveillance

METRO MANILA DRINKING WATER QUALITY MONITORING COMMITTEE (MMDWQMC)

Chairman : DOH-Center for Health Dev't – NCR

Co- Chairman: MWSS-Regulatory Office

Members : DOH-Environmental & Occupational Health Office

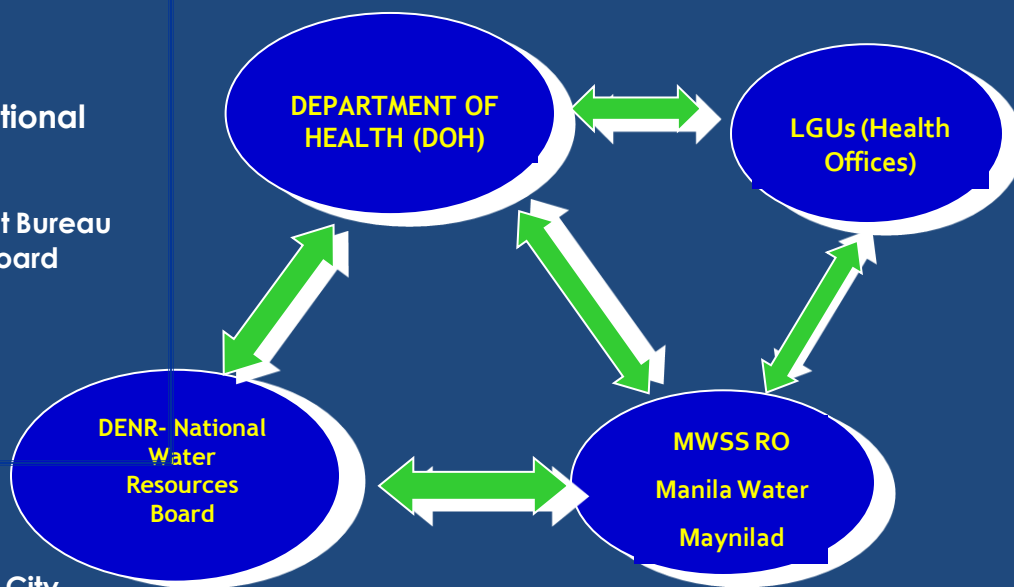
DENR-Environmental Management Bureau
DENR-National Water Resources Board

Manila Water Company, Inc.
Maynilad Water Services, Inc.

Local Health Units (17)

LHUs:
City of Manila, Marikina City, Makati City, Caloocan City, Valenzuela City, Malabon City, Navotas City, Quezon City, Taguig City, Pasig City, Pateros, San Juan City, Mandaluyong City, Las Piñas City, Muntinlupa City, Parañaque City, and Pasay City.

Linkages/Networking

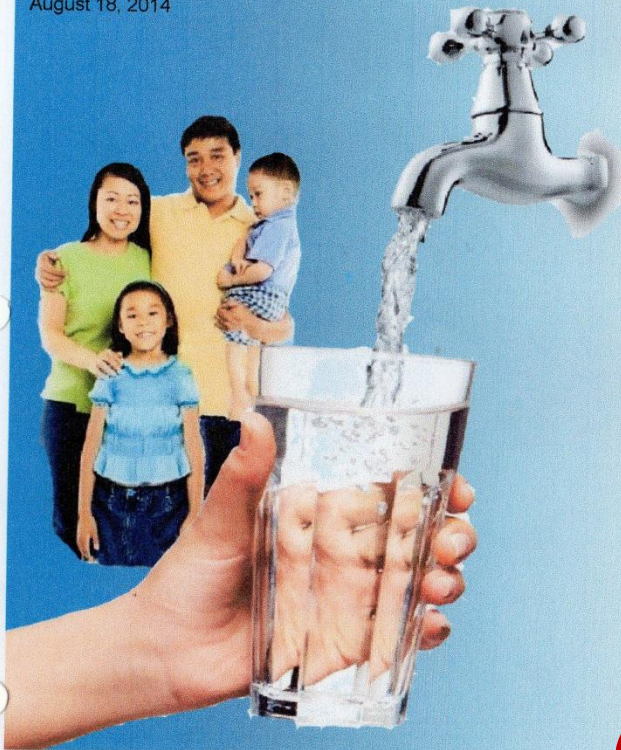


Linkages/ Networking



Linkages/ Networking

MMDWQMC Regular Update No. 2014-07
August 18, 2014



METRO WATER IS SAFE TO DRINK

The Metro Manila Drinking Water Quality Monitoring Committee (MMDWQMC) in its August 13, 2014 meeting pronounced that the water supplied by Manila Water and Maynilad at the time of sampling fully complied with the 2007 Philippine National Standards for Drinking Water (PNSDW) based on the microbiological and physico-chemical examination done on water samples collected at strategically designated Regulatory Sampling Points in their respective distribution system in the month of July 2014. In addition, both Manila Water and Maynilad also met and even surpassed the minimum sampling frequency requirement of the 2007 PNSDW for both microbiological and physico-chemical quality.

Water supplied by Manila Water and Maynilad in July 2014 is:

- ✓ 100% Fr
- ✓ 100% co
- based o
- East Zo
- Zone (M

Consumers are advised to look for the monthly microbiological quality and semi-annual physico-chemical results POSTED in their "suki" or selected refilling stations to ensure that the water they buy is **SAFE and POTABLE**

Based on the above findings, the Committee pronounced that drinking water in the Manila Water and Maynilad distribution system was of **Sanitary Quality** with adequate residual chlorine.

The committee further announced that out of 1,848 Water Refilling Stations monitored in Metro Manila for the month of July 2014, **only 1,829 passed** the standards set by PNSDW. Consumers are advised to look for the monthly microbiological quality and semi-annual physico-chemical results POSTED in their 'suki' or 'selected' refilling stations to ensure that the water they buy is **SAFE and POTABLE**.

METRO WATER IS YOUR CONCERN TOO!

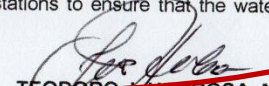
Give us feedback/report on quality of water

Email us at mmdwqmc@yahoo.com

Call us at: DOH-CHD-MM: 535 4521 • MWSS-RO: 925 6619

Manila Water Nos.: 9175900 / Hotline 1627 • Maynilad Nos.: 4302928 / Hotline 1626



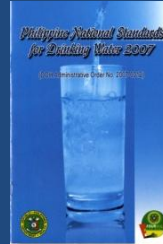

TEODORO J. HERBOSA, MD
Undersecretary of Health
Head, National Capital Region and
Metro Manila Hospitals Operations Cluster
Chairman, MMDWQMC

Caloocan • Malabon • Navotas • Valenzuela • Pasig • Pateros • Marikina • Taguig • Quezon City • Makati • Manila • Mandaluyong • San Juan • Muntinlupa • Parañaque • Las Piñas • Pasay

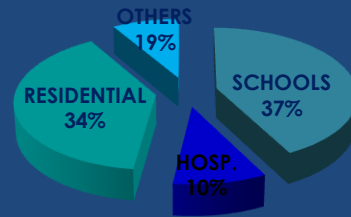
Water Sampling Points

Manila Water Co., Inc.

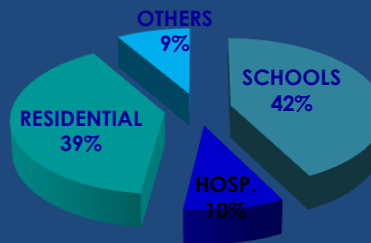
City/Municipality	NO. OF SAMPLES
Metro Manila	
Makati	72
Mandaluyong	58
Manila	28
Marikina	61
Paranaque	2
Pasig	102
Pateros	11
Quezon City	142
San Juan	23
Taguig	76
Rizal	
Angono	17
Antipolo	86
Baras	3
Binangonan	12
Cainta	46
Jala-Jala	3
Rodriguez	50
San Mateo	26
Taytay	35
Teresa	3
Total	856



no. of sampling points =
20+ (1/10,000 population)



Manila Water



Maynilad

Maynilad Water Services, Inc

City/Municipality	NO. OF SAMPLES
Metro Manila Region	
Caloocan City	136
Malabon City	37
Navotas City	23
Valenzuela City	61
City of Manila	150
Quezon City	195
Makati City	9
Pasay City	43
Parañaque City	59
Las Piñas City	46
Muntinlupa City	46
Cavite Region	
Bacoor	23
Imus	12
Kawit	4
Rosario	4
Noveleta	2
Cavite City	14
Total	865



How is monitoring conducted in the distribution system

1. Identify sampling points for the Regulations (RSP) - beginning of each year
2. Get testing services of water laboratories -
ISO 17025 accreditation, DENR Recognition, DOH Accreditation
3. *Daily-* bacteriological, res disinfectant, color, turbidity
Monthly- quarterly- semi annual- annual - physico-chemical parameters
4. Give sampling point WQ information/ advisory



Non-conformance w/ PNSDW

1. Joint resampling (Concessionaire/LGU/MWSS RO)

- ❖ Inform concerned HH / sanitary inspection
- ❖ water sampling
 - orig tap,
 - downstream,
 - upstream



2. Localized or domestic orig tap – FAIL; downstream & upstream - PASS

3. Area wide orig tap, downstream, upstream - FAIL



Non- conformance w/ PNSDW

Localized or domestic

- Inform concerned household
- provide technical assistance

Area wide

- Water Advisory- 'Boil Water Advisory', etc.
- Alternate safe and potable water supply- tankering
- corrective action- immediate
- Implement long term solution- upon approval of MWSS Regulatory office



Why drink tap water

- ❑ Tested for coliform bacteria for 1,720 or more times every month
- ❑ Tested by government-certified labs; technically competent testing labs
- ❑ Contains natural occurring minerals beneficial to health

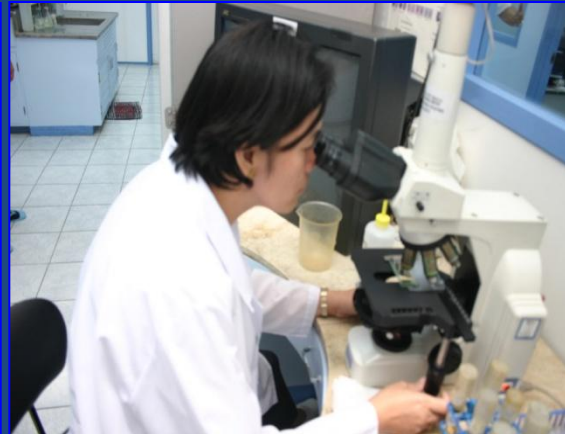


PAO ACCREDITED
TESTING LABORATORY
PNS ISO/IEC 17025:2005
LA-2006-092B

Microbiological Quality



Physical and Chemical Quality



COMPLIANCE to REGULATIONS



Why drink tap water

	Tap Water	Demineralised water- (refilling /bottled water)
freq of testing	Daily; more than 1,720 times/ month	once per month)
bacteriological	zero detection (Jan to Sept 2014)	not always zero detection
taste	palatable	Poor (bland)
pH	6.5 to 8.5 pH unit	aggressive
TDS	105 mg/l (ave.)	As low as 1mg/l
conductivity	110 μ S/cm	<2 mS/m; <0.1 mS/m
hardness	59 mg/l	<10 mg/l
res disinfectant	0.3 to 1.5 mg/l	Zero; prone to microbial regrowth
cost	PhP 0.76/ 20L	PhP 25-35/20 L (1 container)



Long-term consumption of low mineral water (WHO report)

Consequences:

- ❑ Direct effects on the intestinal mucous membrane, metabolism and mineral homeostasis or other body functions.
 - mineral and water metabolism in the body compromised- electrolyte imbalance
- ❑ Practically zero calcium and magnesium intake.
 - increased morbidity and mortality from cardiovascular disease (CVD)
- ❑ calcium- neuromuscular excitability, i.e., decreases the proper function of the conducting myocardial system, heart and muscle contractility, intracellular information transmission and the coagulability of blood
- ❑ magnesium- cofactor and activator of more than 300 enzymatic reactions including glycolysis, ATP metabolism, transport of elements such as sodium, potassium, and calcium through membranes, synthesis of proteins and nucleic acids, neuromuscular excitability and muscle contraction.



Long-term consumption of low mineral water (WHO report)

Consequences:

- ❑ Low intake of other essential elements and microelements.
 - low TDS- a risk factor for hypertension and coronary heart disease, gastric and duodenal ulcers, chronic gastritis, goiter, pregnancy complications and several complications in newborns and infants, including jaundice, anemia, fractures and growth disorders
- ❑ Possible increased dietary intake of toxic metals leached from water pipe.
- ❑ possible bacterial re-growth

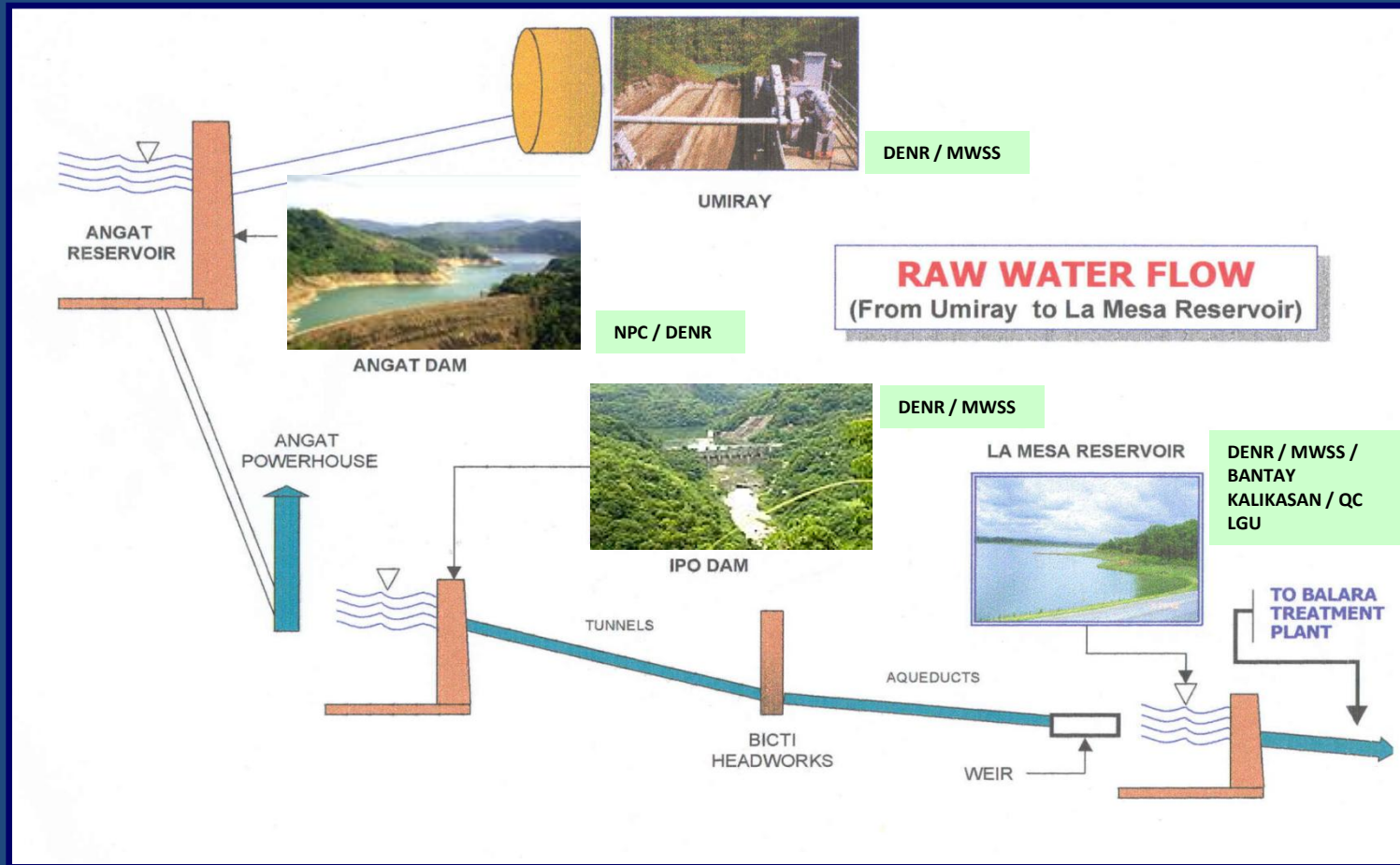


Guideline values for demineralized water (WHO, 1980)

Water quality parameter	PNSDW	Tap Water	Demineralised water- refilling	WHO guide value – demineralised water
Total dissolved solids (TDS)	500 mg/l	105 mg/l (ave.)	As low as 1mg/l	Min- 100 mg/l; Max- 250 to 500 mg/l
Hardness (CaCO ₃)	250 mg/l	59 mg/l	< 10 mg/l	HCO ₃ ion- 30 mg/l; Ca- 30 mg/l



Watershed Mgt. Protection



Water Quality Assurance



← Water sources

- Characteristics of the raw water (41 tests)
- Parameters: BOD, Chloride, Color, DO, Fecal Coliform, Nitrate as NO_3^- -N, pH, Phosphate, Temperature, TSS, Turbidity, Alkalinity, HPC, Ammonia as NH_3 -N, Barium, Boron, Fluoride, Iron, Sulfate, Arsenic, Cadmium, Chromium, Copper, Lead, Manganese, Mercury, Nickel, Zinc, Cyanide, PCBs, Phenols, Surfactants, Aldrin, Chlordane, DDT, Dieldrin, Endrin, Heptachlor, Lindane, Methoxychlor, Toxaphene.

← Treatment plant

- Effective/Efficient treatment process (50 tests)
- Parameters: Total Coliform, Fecal Coliform, HPC, Res. Chlorine, Color, Turbidity, pH, Taste, Odor, Aluminum, Iron, Manganese, Hardness, Chloride, Sodium, Sulfate, TDS, Antimony, Arsenic, Boron, Cadmium, Chromium, Cyanide, Fluoride, Lead, Mercury, Nickel, Nitrate, Nitrite, Selenium, Benzene, 1,2 Dichloroethane, 1,2-Dichloroethene, Ethylbenzene, Tetrachloroethane, Trichloroethane, Toluene, Xylene

← Distribution system

- Potability of the treated water (25 tests)
- Parameters: Total Coliform, Fecal Coliform, HPC, Res. Chlorine, Color, Turbidity, pH, Taste, Odor, Aluminum, Iron, Manganese, Copper, Zinc, Antimony, Cadmium, Chromium, Lead, Nickel, Benzene, Ethylbenzene, PAHs, Benzo-a-pyrene, Toluene, Xylene



Why drink tap water



Thank You

