Water Supply Administration
For Better Management of Water Supply Services
Course（Ｂ）

Country Reports

Japan International Corporation of Welfare Services (JICWELS)

Contents

Water Supply Administration
For Better Management of Water Supply Services
Course（Ｂ）

CAMBODIA

Water Supply Administration for Better Management of Water Supply Services (B)

Course No.201984473-J002

Inception Report Presentation

Name: Sopheaktra MEAS

Position : Chief of International Project Office

Organization: Siem Reap Water Supply Authority (SRWSA)

Content of Presentation

Outline of Water Supply Services

- **Legal Basis of Water Supply Services**

Siem Reap Water Supply Authority "SRWSA" is managed based on the laws and regulations of Cambodia as following:

(i) Law on General Statute of Public Enterprises,

(ii) Sub-decree on the establishment of Siem Reap Water Supply Authority dated on 10 January 2007,

(iii) Statute of Siem Reap Water Supply Authority, and

(iv) other Laws and commercial related regulations.

And, SRWSA has two supervision ministries:

1. Ministry of Industry and Handicrafts (Technical supervision ministry)
2. Ministry of Economy and Finance (Finance supervision ministry)

- **Demarcation of Water Supply Services**

There are a few ministries in charge of water works/sectors as listed below:

Ministry of Industry and Handicrafts	(Urban water supply)
Ministry of Rural Development	(Rural water supply and community water supply)
Ministry of Water Resources and Meteorology	(Water resources)
Ministry of Public Works and Transport	(Wastewater and sewerage)

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Main Actor of Water Supply Utilities

In Cambodia, the water supply utilities are divided in group as following:

Public Water Supply Authorities	→	administrative and financial autonomy
Private Water Supply Operators	→	operated and manage by the private operator registered under and regulated by MIH
Public Water Supply Utilities	→	directly operated and managed by provincial department of industry of handicraft - MIH
Community and Rural Water Supply	→	operated and managed by provincial department of rural department - Ministry of Rural Development

Mission/Vision of Siem Reap Water Supply Authority

- The Mission: to produce and deliver portable water to residents living in Siem Reap City and surrounding areas including tourists and other economic activities.
- The Vision: SRWSA will be one of the water supply authority in Cambodia with the enhancement of technical and financial sustainability to provide all residents, tourists and other economic activities with better access to water supply services in both quality and quantity.

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My Mission/Vision in your organization

My Mission: to monitor, manage, administer and implement the projects under the loan/grand from development partners.

My Vision: to ensure all project implementation works are completed successfully in order to increase capacity of water supply system and timely respond to water demand in Siem Reap.

Whole Country:

Area : 181,035 km^2

Population : 15,228,489 Habitants

Coverage Water Supply: 75 %

Siem Reap Water Supply Authority, Siem Reap City, Cambodia

Service Area : 472 km^2

Population Served: 55,000 people

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Water Supply Service Levels

INDICATORS	2016	2018	Goals for 2025
Staff/1,000 connections	11.89	12.35	6.0
Production capacity (m^3/day)	17,000	30,000	100,000
Water quality standards	NDWQS	NDWQS	NDWQS
Coverage area	35%	38%	100%
Supply duration (hour/day)	24	24	24
Supply pressure	1 bar	1.5 bar	1.5 bar
Number of connections	7,231	9,875	44,586
Population Served	39,000	55,000	245,000
NRW	6.7%	7.0%	8.0%
Collection ratio	99.90%	99.99%	99.99%
Staff number	83	122	186

Management of Water Quality

- Current Situation and Major Challenges/Problems
  - Laboratory of SRWSA is lacking of water qualities analysis equipment and materials
  - Incidents of red water from the tap caused by leakage or old pipe
- Current Actions against Those Challenges/Problems
  - Send the water quality parameters that cannot be analyzed by SRWSA to ministry or other laboratories for analysis
  - Increase capacity of laboratory with the new additional equipment and materials
  - Update SOP on water quality analysis for proper implementation
  - Clean the pipe immediately after receiving the information of red water from distribution network
  - Replace old and poor-quality pipeline

- Water Quality Standards for Drinking Water

No	Parameter	Unit	Standard	Raw Water	Treated Water
1	Color	TCU	5	0.9	0.6
2	Turbidity	NTU/FTU	5	0.79	0.47
3	pH	n/a	6.5-8.5	5.15	6.54
4	Arsenic(As)	Mg/l	0.05	0.00	0.00
5	Total dissolved solids	Mg/l	800	20.00	65.00
6	Manganese(Mn)	Mg/l	0.1	0.019	0.003
7	Zinc(Zn)	Mg/l	3	0.06	0.07
8	Sulfate($NO4^{2}$-)	Mg/l	250	2.00	0.50
9	Cu	Mg/l	1	0.07	0.003
10	Hardness	Mg/l	300	4.30	5.26
11	Aluminum (Al)	Mg/l	0.2	0.007	0.04
12	Chloride	Mg/l	250	4.70	5.43
13	Iron (Fe)	Mg/l	0.3	1.120	0.083
14	Ammonia (NH3)	Mg/l	1.5	0.08	0.03
15	Barium (Ba)	Mg/l	0.07	0.00	0.0013
16	Cadmium (Cd)	Mg/l	0.003	0.00015	0.00
17	Chromium (Cr)	Mg/l	0.05	0	0.0067
18	Fluoride(F)	Mg/l	1.5	0.00	0.03
19	Lea d(Pb)	Mg/l	0.01	0.0129	0.0004
20	Residual chlorine	Mg/l	0.1-1.0	0	0.31
21	E.Coli	MPN/100mg	0.00	0.00	0.00
22	Mercury (Hg)	Mg/l	0.001	0.0000	0.00054
23	Nitrite (NO2)	Mg/l	3	0.003	0.008
24	Nitrite (NO3)	Mg/l	50	0.5	0.28
25	Na	Mg/l	250	5.943	5.786
26	Residual chlorine at network	Mg/l	0.1-1.0	0	0.31

- **Monitoring System or Plans for Safety of Drinking Water in Your Organization / Regulatory Body / Independent Institution /Others**

  - ✓ SRWSA has established Standard Operation Procedure (SOP) for Water Quality Analysis to ensure proper and regular water quality check.
  - ✓ SRWSA is preparing Water Safety Plan to ensure the safety of water from source to user tape

Water Quality Control of End Pipe

- **Implementation of Water Safety Plans or Similar Efforts**

SRWSA conducts regular water quality analysis: daily, quarterly, semester, and yearly at water treatment plant and weekly at the end of pipe networks.

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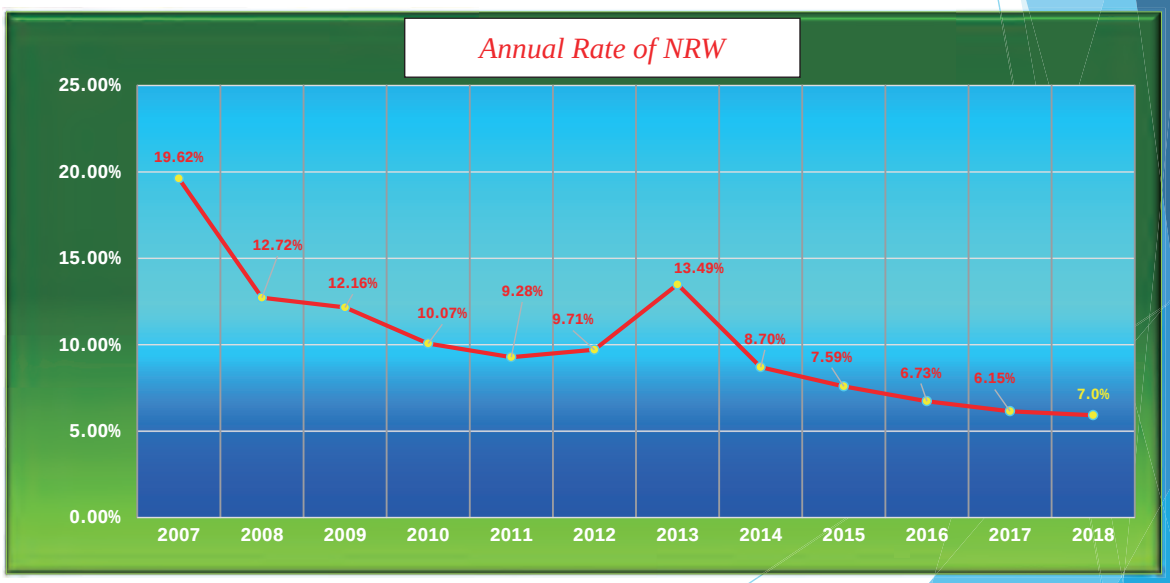
Reduction of Non-Revenue Water

System input volume	Authorized consumption	Revenue water	Billed authorized consumption	5,748,921 m^3 /year (94%)
		Non Revenue Water (NRW)	Unbilled authorized consumption (ex. fire fighting, cleaning)	4,482 m^3 /year (0.07%)
	Water losses		**Apparent losses (Unauthorized consumption (i.e. Illegal use), Customer metering inaccuracies)**	61,769 m^3 /year (1.0%)
			Real losses (Leakage)	332,898 m^3 /year (5.4%)

❖ **Leakage Detection Measures**

- ✓ Assigning the standby Leakage repairing teams
- ✓ Cooperation with related Authorities and Organizations for leakage detection at the construction site

❖ **Countermeasures for NRW**



Accounting System of Water Supply Services

SRWSA currently uses the Synergistic Utility Management System (SUMS) for the accounting system in the organization.

❖ Water Tariff in our Organization

Type of Tariff	Consumption rate	Tariff	Type of Customers
Domestic	1 – 3m³	0.22 USD	Domestic customer and Administration Public
	4 – 7m³	0.25 USD	
	8 – 15m³	0.38 USD	
	16 – 30m³	0.45 USD	
	Over 30m³	0.50 USD	
Commercial	1 – 50m³	0.48 USD	Commercial customer
	51 – 150m³	0.60 USD	
	151 – 350m³	0.73 USD	
	Over 350m³	0.85 USD	
The average water tariff bill in current day is 0.54 USD per 1m³			

❖ Balance Sheet of SRWSA

Note	Descriptions	31/12/2018 (USD)	31/12/2017 (USD)
1+2	**TOTAL ASSETS**	29,924,967	23,529,292
1	**Current assets**	4,570,897	3,153,511
11	Cash in Banks	2,337,655	2,457,384
12	Cash in Hand (riels)	7,864	5,038
14	Advances and Deposits	2,6146	8,311
15	Loan and short-term accounts	124,821	77,432
16	Inventory	2,074,410	605,346
2	**Non-current assets**	25,354,071	20,375,780
21	Long-term financial assets	4,622,883	8,696,987
22	Long-term physical assets	11,507,728	10,851,065
23	Long-term intangible assets	28,850	0
25	Assets in Progress	12,381,263	3,594,337
27	Depreciation - long-term assets	-3,184,731	-2,766,609
28	Depreciation - long-term intangible assets	-1923	0
3+4+5	**Total Liability and Owned Capital**	-29,924,967	-2,352,292
3	Capital and reserves	-10,570,150	-9,724,449
31	Capital	-5,480,348	-5,559,360
32	Reserves	-5,089,802	-4,165,089
4	Current Liability	-376,250	-168,685
41	Short-term Liability	-376,250	-168,685
5	Non-Current Liability	-18,422,189	-12,632,432
51	Long-term Liability	-18,422,189	-12,632,432

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❖ Profit and Loss Statement of SRWSA

Note	Descriptions	31/12/2018 (KHR Million)	31/12/2017 (KHR Million)
7	**Revenue**	3,423,05	3,592,020
70	Income from water charges	3,027,030	2,960,735
71	Income from services charges	151,997	152,125
72	Income from interest	125,130	105,013
73	Income from rents	1,797	6,652
74	Income from special financing	69,276	136,139
6	**Expenditure**	-2,866,677	-2,588,295
60	Staff burden	-964,326	-810,576
61	Purchases	-384,727	-357,157
62	Services	-621,718	-602,599
63	Taxations	-179,400	-254,521
64	Depreciation and drop-down price	-420,045	-420,948
65	Expense on Subsidies	-62,070	-50,400
66	Other Financial Expenses	-234,392	-90,949
67	Special expenses and other allowance	0	-1,145
	Net Profit and Loss	556,379	1,003,726

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Major Recent Achievement in improvement of water supply services

SRWSA has its recent achievement as following:

- ✓ A new Water Production Facility (15,000 m3/day) including the 6km TWTM has been constructed under the loan from AFD.
- ✓ Extended new water distribution pipelines about 22.5km and house service connections are increased up to 845 new connections.
- ✓ Increased the water production capacity up to 30,000m3/day in 2019.
- ✓ The water pressure is also significantly stronger
- ✓ Purchased required equipment for supporting construction work and pipes installation works.

Recent challenges of Water Supply Services

- The water production capacity is still not enough to supply and meet the water demand in the city, so the access to water supply service is still quite low
- SRWSA still required more efforts and commitment for reduction of NRW to become lower


THANK YOU
for your attention!
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Water Supply for Better Management of Water Supply Service (B)-Course No.201984473-J002

Inception Report

Organization: Siem Reap Water Supply Authority

Country: CAMBODIA

Name: MEAS Sopheaktra

Position: Chief of International Project Office

Contents

Water Supply for Better Management of Water Supply Service (B)-Course
No.201984473-J002

General Information of Cambodia and Siem Reap City-Province

Cambodia is located at the southern region of the Indochina Peninsula in Southeast Asia. The total surface area of Cambodia is at 181,035 square kilometers, divided into 24 provinces including 26 cities/town and one Capital City of Phnom Penh.

Cambodia is currently the 70th most populous country in the world with an estimated 2019 population of 16.49 million, an increase from 2013's estimation of 14.9 million. population density of 82 people per square kilometer (212/square mile), which ranks 118th in the world.

The current median age of the total population is 25.3 years of age, with a total life expectancy of 64.9 years of age. The GDP per Capita is 1,254 with the estimate growth of 7%. 5.7% of the GDP is directed toward health resulting in a meager. There is a fairly high infant mortality rate within the nation. Only 75% of the country has improved access to drinking water and only 42% of the population has access to improved sanitation facilities as well.

Siem Reap Province is one of province of Cambodia with one city called Siem Reap City/Municipality. It borders the provinces of Oddar Meanchey to the north, Preah Vihear and Kampong Thom to the east, Battambang to the south, and Banteay Meanchey to the west. Siem Reap is the 10th largest province in Cambodia with the total estimate population of about one million. While Siem Reap city has population of about 139,458 persons. It is the largest tourist destination to visit the Angkor World Heritage. The total tourists visiting Siem Reap is approximately 5 million annually both international and local ones. The current coverage of water supply in Siem Reap City is only about 30%.

1. Outline of Water Supply Services

1-1. Legal Basis of Water Supply Services

Siem Reap Water Supply was established in 1930 and was transferred to public enterprise as Siem Reap Water Supply Authority by Sub-decree of the Royal Government of Cambodia in 2007. SRWSA is managed by the following laws and regulations (i) Law on General Statute of Public Enterprises, promulgated by the royal decree No.CS/RKM/0693/03, dated on 17 June 1996, (ii) Sub-decree on the establishment of Siem Reap Water Supply Authority dated on 10 January 2007, (iii) Statute of Siem Reap Water Supply Authority, and (iv) other Laws and commercial related regulations.

Siem Reap Water Supply Authority has two supervision ministries, namely, Ministry of Industry and Handicaps (Technical supervision ministry) and Ministry of Economy and Finance (Finance supervision ministry) with a total of 121 employees. It has been recognized as one of lead public water supply enterprises in Cambodia with administrative and financial autonomy. The key mission of Siem Reap Water Supply Authority is to produce and distribute clean water supply to residents living in and surrounding areas of Siem Reap City including about five million tourists per year.

1-2. Demarcation of Water Supply Services

There are a few ministries in charge for water as listed below:

- Ministry of Industry and Handicrafts is in charge for urban water supply
- Ministry of Rural Development is in charge for rural water supply and community water supply.
- Ministry of Water Resources and Meteorology is in charge for water resources
- Ministry of Public Works and Transport is in charge for wastewater and sewerage.

1-3. Main Actor of Water Supply Utilities

The urban water supply in Cambodia was divided into these main following groups:

- Public Water Supply Authorities with administrative and financial autonomy. Two public autonomous water supply authorities in Cambodia are Phnom Penh Water Supply Authority and Siem Reap Water Supply Authority. It was directed by Board of Directors and a Director General. Board of Director is the highest policy maker of public autonomous water supply authorities, with the authority to determine the objective and control of management to ensure its efficiency and effectiveness. General Director is delegated the authority from Board of Director to manage the authority.

- Private Water Supply Operators are operated and managed by private operators registered under and regulated by Ministry of Industry and Handicrafts.
- Public Water Supply Utilities: These water supply utilities are operated and managed directly by respective provincial department of industry and handicraft/Ministry of Industry of Handicraft.
- Community and rural water supply are operated and managed by Provincial Department of Rural Development/ Ministry of Rural Development.

1-4. Mission/Vision of Water Supply Utilities

- The mission is to produce and deliver portable water to residents living in Siem Reap City and surrounding areas including tourists and other economic activities.
- The vision is SRWSA will be one of the best water supply authority in Cambodia with technical and financial sustainability to provide all residents, tourists and other economic activities with better access to water supply services in both quality and quantity.

1-5. My Mission/Vision in our organization

- My mission in SRWSA is to monitor, manage, administer and implement projects under the loan/grand from development partners in order to increase capacity of water supply system which contribute to achieving the mission of the authority.
- My vision is to ensure all the project implementation works are completed based on work schedule/plan in order to timely respond to water demand in Siem Reap.

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2. Water Supply Service Levels

2-1. Main Performance Indicators (PI)

Coverage area	472 km^2
Population served	55,000 people
Collection ratio	99.99%
Production capacity	30,000 m^3/day
Supply duration	24 hours/day
Supply pressure	1.5 bar
Non-Revenue Water	7.0 (%)
Water quality	National Drinking Water Quality Standard (NDWQS)
Staff number	122 staffs
Number of connections	9,875 connections
Staff/1,000 connections	12.35 staffs/1,000 connections

2-2. Any Monitoring by Performance Indicators (PI)

Power consumption/ m^3	354wh/m^3
PAC consumption/ m^3	17g/ m^3
Lime consumption/ m^3	29g/ m^3
Chlorine consumption/ m^3	2g/ m^3
Total length of Distribution	183km

3. Management of Water Quality

3-1. Current Situation and Major Challenges/Problems

SRWSA Laboratory (Water Quality Check)

The management of water quality has been done based on the SOP and National Drinking Water Quality Standards (NDWQS). As the results of water quality analysis, the SRWSA water quality meets the requirement of the NDWQS as well as WHO Standards.

The major challenges of SRWSA in water quality management are (i) Laboratory of SRWSA is lacking of water qualities analysis equipment and materials so some water quality parameters cannot be analyzed. On the other hand, there are few incidents of red water from the tap caused by leakage or old pipe.

3-2. Current Actions against Those Challenges/Problems

- Continue to send water quality parameters that cannot be analyzed by SRWSA laboratory to ministry or other laboratories for analysis.
- Plan to increase capacity of laboratory with the new additional equipment and materials for water quality analysis.
- Update SOP on water quality analysis as it is necessary and implement it properly and strictly.

- Clean the pipe immediately after receiving the information of red water coming out the distribution network
- Replace old and poor-quality pipe networks.

3-3. The Achievements in Water Quality Management

- SRWSA can maintain good water quality that meets NDWQS and WHO Standards.
- The water distribution pipes were cleaned in some locations and the frequency of red water incidents is deduced.
- Many old and poor-quality pipe networks are replaced with better quality pipes

3-4. Water Quality Standards for Drinking Water

Water quality of SRWSA meets National Drinking Water Quality Standard (NDWQS) as well as WHO Standards.

No	Parameter	Unit	Standard	Raw Water	Treated Water
1	Color	TCU	5	0.9	0.6
2	Turbidity	NTU/FTU	5	0.79	0.47
3	pH	n/a	6.5-8.5	5.15	6.54
4	Arsenic(As)	Mg/l	0.05	0.00	0.00
5	Total dissolved solids	Mg/l	800	20.00	65.00
6	Manganese(Mn)	Mg/l	0.1	0.019	0.003
7	Zinc(Zn)	Mg/l	3	0.06	0.07
8	Sulfate($NO4^{2}$-)	Mg/l	250	2.00	0.50
9	Cu	Mg/l	1	0.07	0.003
10	Hardness	Mg/l	300	4.30	5.26
11	Aluminum (Al)	Mg/l	0.2	0.007	0.04
12	Chloride	Mg/l	250	4.70	5.43
13	Iron (Fe)	Mg/l	0.3	1.120	0.083
14	Ammonia (NH3)	Mg/l	1.5	0.08	0.03
15	Barium (Ba)	Mg/l	0.07	0.00	0.0013
16	Cadmium (Cd)	Mg/l	0.003	0.00015	0.00
17	Chromium (Cr)	Mg/l	0.05	0	0.0067
18	Fluoride(F)	Mg/l	1.5	0.00	0.03
19	Lea d(Pb)	Mg/l	0.01	0.0129	0.0004
20	Residual chlorine	Mg/l	0.1-1.0	0	0.31
21	E.Coli	MPN/100mg	0.00	0.00	0.00
22	Mercury (Hg)	Mg/l	0.001	0.0000	0.00054
23	Nitrite (NO2)	Mg/l	3	0.003	0.008
24	Nitrite (NO3)	Mg/l	50	0.5	0.28
25	Na	Mg/l	250	5.943	5.786
26	Residual chlorine at network	Mg/l	0.1-1.0	0	0.31

3-5. Monitoring System or Plans for Safety of Drinking Water in Your Organization / Regulatory Body / Independent Institution /Others

SRWSA has established Standard Operation Procedure (SOP) Water Quality Analysis to ensure proper and regular water quality check. In the SOP clearly defined:

- Responsibilities of water quality analysis staff
- Location of taking sample water for analysis
- Method of taking the sample water
- Numbers of sample and locations
- Parameters to be analyzed

Water Quality Control of End Pipe

Beside SRWSA now preparing water safety plan to ensure the safety from source to user tape.

3-6. Implementation of Water Safety Plans or Similar Efforts*

SRWSA conducts regular water quality analysis: daily, quarterly, semester, and yearly at water treatment plant and weekly at the end of pipe networks.

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4. Reduction of Non-Revenue Water (NRW)

4-1. Current Situation and Major Challenges/Problems

NRW reduction and expansion production and distribution capacity are key priorities of SRWSA.

Water Leakage Searching at Night Time

Water Leakage Searching and Detection in Day Time

The Major Challenges/Problems:

- Poor quality of Pipes (Old PVC pipes still needed to be replaced)
- Pipe damages caused by other construction activities
- Malfunctioning or non-working water meters & leakage at water meters
- Zone meters were damaged
- Lack of equipment and materials for leakage repairs at the site
- Current capacity of water supply system can cover only 30% of water demand.

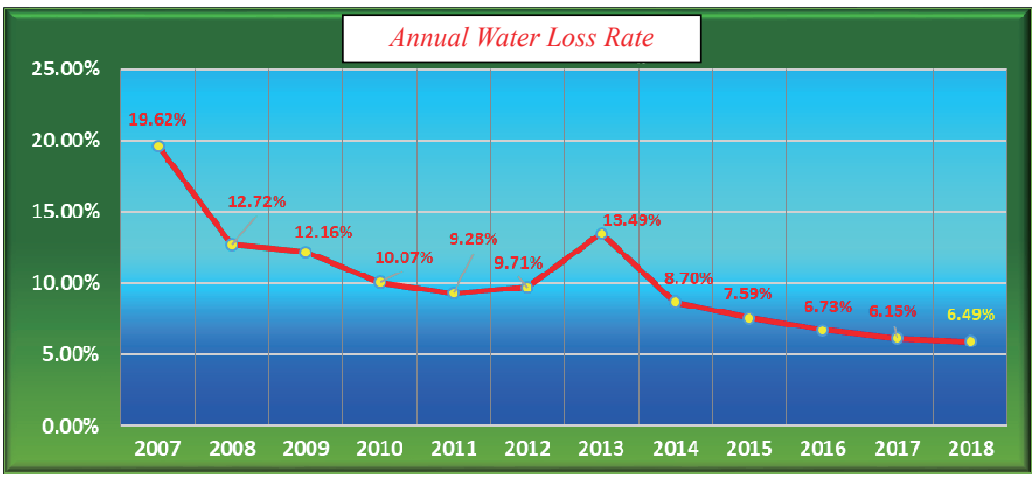
4-2. Current Actions against Those Challenges/Problems

Water Leakage Repairing

- Established a standby team for quick repairing and leak detection.
- Conducted survey for malfunctioning and non-working water meters, and repaired/cleaned/replaced them.
- Replacement of old PVC pipes by HDPE pipes
- Checked and strengthened monitoring of old water meters for each house hold connection
- Established SOP for (i) meter reading, bills distribution and collection and (ii) SOP for house connection installation
- Conducted regularly night step test for water leakage
- Cooperated with related authorities/organizations to observe any damages to pipeline caused by the excavation works at construction site.
- Purchased the equipment and materials required for water leakage repairing
- Implement new investment projects for expand production and distribution capacity.

4-3. The Achievements in Reduction on NRW

- Most of old PVC pipes have been replaced
- The water leakages have been found and successfully repaired
- The NRW decreased dramatically from 13.5% in 2013 to 6.49 % in 2018.



4-4. Constitution of NRW

Authorized consumption	**Revenue water**	**Billed authorized consumption**	**5,748,921(m^3 /year) 93.51(%)**
	Non-Revenue Water (NRW)	Unbilled authorized consumption (ex. fire fighting, cleaning)	**4,482(m^3 /year) 0.07(%)**
Water losses		Apparent losses (Unauthorized consumption (i.e. Illegal use), Customer metering inaccuracies)	**61,769(m^3 /year) 1.005(%)**
		Physical losses (Leakage)	**332,898(m^3 /year) 5.415(%)**

4-4. Situations about Leakage Detection Measures (DMA etc.)

- Assigning the standby Leakage repairing teams
- Cooperation with related Authorities and Organizations for leakage detection at the construction site

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Repairing House Service Water Meter

Installation of Interconnection

5. Accounting system of Water Supply Service

5-1. Water Tariff in your Organization

Type of Tariff	Consumption rate	Tariff	Type of Customers
Domestic	1 – 3m³	0.22 USD	Domestic customer and Administration Public
	4 – 7m³	0.25 USD	
	8 – 15m³	0.38 USD	
	16 – 30m³	0.45 USD	
	Over 30m³	0.50 USD	
Commercial	1 – 50m³	0.48 USD	Commercial customer
	51 – 150m³	0.60 USD	
	151 – 350m³	0.73 USD	
	Over 350m³	0.85 USD	
The average water tariff bill in current day is 0.54 USD per 1m³			

5-2. Balance Sheet of SRWSA

Note	Descriptions	31/12/2018 (USD)	31/12/2017 (USD)
1+2	**TOTAL ASSETS**	29,924,967	23,529,292
1	**Current assets**	4,570,897	3,153,511
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12	Cash in Hand (riels)	7,864	5,038
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3+4+5	**Total Liability and Owned Capital**	-29,924,967	-2,352,292
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41	Short-term Liability	-376,250	-168,685
5	Non-Current Liability	-18,422,189	-12,632,432
51	Long-term Liability	-18,422,189	-12,632,432

5-3. Profit and Loss Statement of SRWSA

Note	Descriptions	31/12/2018 (KHR)	31/12/2017 (KHR)
7	**Revenue**	3,423,056	3,592,020
70	Income from water charges	3,027,030	2,960,735
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72	Income from interest	125,130	105,013
73	Income from rents	1,797	6,652
74	Income from special financing	69,276	136,139
6	**Expenditure**	-2,866,677	-2,588,295
60	Staff burden	-964,326	-810,576
61	Purchases	-384,727	-357,157
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64	Depreciation and drop-down price	-420,045	-420,948
65	Expense on Subsidies	-62,070	-50,400
66	Other Financial Expenses	-234,392	-90,949
67	Special expenses and other allowance		-1,145
	Net Profit and Loss	556,379	1,003,726

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6. Major Recent Achievements in Improvement of Water Supply Services/Management

- The new Water Production Facility with the capacity 15,000m3/day under the AFD loan have been constructed and will be operated with full capacity in 2019.
- The new water distribution pipelines have been extended about 22.5Km, and the new house connections increased (845 new connections in 2018).
- Water production capacity increased from 18,000m3/day in 2018 and will be 30,000m3/day in 2019.
- Water pressure is significantly stronger
- Required equipment had been purchased for supporting the construction and pipes installation works.

7. Recent Challenges to Improvement of Water Supply Services

- The water production capacity is still not enough to supply and meet the water demand in the city, so the access to water supply service is still quite low
- Water pressure is still sometimes low in some area and at pick hours
- Reduction of NRW to be lower is still a challenge for SRWSA that need more efforts and commitment.

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8. Expectations toward Japan

8-1. Expectations toward Japanese Government and JICA

I expect to receive knowledge related to better water supply management and learning experiences from the capacity-building program of the Japanese Government and JICA.

8-2. Expectations toward Japanese Water Utilities

It is important to know and understand about the modern technologies of Japanese Water Utilities.

8-3. Expectations toward Japanese Private Companies

The Japanese private companies would introduce helpful services and ideas regarding resources for materials/equipment supplies, technology and technical supports for water supply system/services.

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9. Expectations toward the Program.

With the program, I expect to learn and understand more about the course as following:

- to be able to analyze/identify the issues/challenges regarding the water supply management and set plan to improve the situation.
- to discover more modern technology of Japanese water utilities from field visit
- to share experiences and understand the situation of water services administration and management even in Japan and from participated countries.

New Water Production Facility with Capacity 15,000 m3/day Constructed under the AFD loan

WATER SUPPLY ADMINISTRATION FOR BETTER MANAGEMENT OF WATER SUPPLY SERVICES (B)

COURSE NO.201984473-J002

Inception Report Presentation

NAME: SOKHA CHEA

POSITION: CHIEF OF ACCOUNTING OFFICE

ORGANIZATION: SIEM REAP WATER SUPPLY AUTHORITY (SRWSA)

CONTENT OF PRESENTATION

OUTLINE OF WATER SUPPLY SERVICES

- **Legal Basis of Water Supply Services**

Siem Reap Water Supply Authority "SRWSA" is managed based on the laws and regulations of Cambodia as following:

(i) Law on General Statute of Public Enterprises,

(ii) Sub-decree on the establishment of Siem Reap Water Supply Authority dated on 10 January 2007,

(iii) Statute of Siem Reap Water Supply Authority, and

(iv) other Laws and commercial related regulations.

And, SRWSA has two supervision ministries:

1. Ministry of Industry and Handicrafts (Technical supervision ministry)
2. Ministry of Economy and Finance (Finance supervision ministry)

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- **DEMARCATION OF WATER SUPPLY SERVICES**

THERE ARE A FEW MINISTRIES IN CHARGE OF WATER WORKS/SECTORS AS LISTED BELOW:

Ministry of Industry and Handicrafts	(Urban water supply)
Ministry of Rural Development	(Rural water supply and community water supply)
Ministry of Water Resources and Meteorology	(Water resources)
Ministry of Public Works and Transport	(Wastewater and sewerage)

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MAIN ACTOR OF WATER SUPPLY UTILITIES

In Cambodia, the water supply utilities are divided in group as following:

Public Water Supply Authorities	→	administrative and financial autonomy
Private Water Supply Operators	→	operated and manage by the private operator registered under and regulated by MIH
Public Water Supply Utilities	→	directly operated and managed by provincial department of industry of handicraft - MIH
Community and Rural Water Supply	→	operated and managed by provincial department of rural department - Ministry of Rural Development

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MISSION/VISION OF SIEM REAP WATER SUPPLY AUTHORITY

- THE MISSION: TO PRODUCE AND DELIVER PORTABLE WATER TO RESIDENTS LIVING IN SIEM REAP CITY AND SURROUNDING AREAS INCLUDING TOURISTS AND OTHER ECONOMIC ACTIVITIES.
- THE VISION: SRWSA WILL BE ONE OF THE WATER SUPPLY AUTHORITY IN CAMBODIA WITH THE ENHANCEMENT OF TECHNICAL AND FINANCIAL SUSTAINABILITY TO PROVIDE ALL RESIDENTS, TOURISTS AND OTHER ECONOMIC ACTIVITIES WITH BETTER ACCESS TO WATER SUPPLY SERVICES IN BOTH QUALITY AND QUANTITY.

6

My Mission/Vision in your organization

My Mission: to responsible for all accounting works , manage all expenses and Inventory control.

My Vision: to develop my all accounting works to be the best for successfully in order to increase capacity of water supply system and timely respond to water demand in Siem Reap.

WHOLE COUNTRY:

AREA : 181,035 KM^2

POPULATION : 15,228,489 HABITANTS

COVERAGE WATER SUPPLY: 75 %

SIEM REAP WATER SUPPLY AUTHORITY, SIEM REAP CITY, CAMBODIA

SERVICE AREA : 472 KM^2

POPULATION SERVED: 55,000 PEOPLE

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Water Supply Service Levels

INDICATORS	2016	2018	Goals for 2025
Staff/1,000 connections	11.89	12.35	6.0
Production capacity (m^3/day)	17,000	30,000	100,000
Water quality standards	NDWQS	NDWQS	NDWQS
Coverage area	35%	38%	100%
Supply duration (hour/day)	24	24	24
Supply pressure	1 bar	1.5 bar	1.5 bar
Number of connections	7,231	9,875	44,586
Population Served	39,000	55,000	245,000
NRW	6.7%	7.0%	8.0%
Collection ratio	99.90%	99.99%	99.99%
Staff number	83	122	186

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MANAGEMENT OF WATER QUALITY

- Current Situation and Major Challenges/Problems
  - Laboratory of SRWSA is lacking of water qualities analysis equipment and materials
  - Incidents of red water from the tap caused by leakage or old pipe
- Current Actions against Those Challenges/Problems
  - Send the water quality parameters that cannot be analyzed by SRWSA to ministry or other laboratories for analysis
  - Increase capacity of laboratory with the new additional equipment and materials
  - Update SOP on water quality analysis for proper implementation
  - Clean the pipe immediately after receiving the information of red water from distribution network
  - Replace old and poor-quality pipeline

9

- WATER QUALITY STANDARDS FOR DRINKING WATER

No	Parameter	Unit	Standard	Raw Water	Treated Water
1	Color	TCU	5	0.9	0.6
2	Turbidity	NTU/FTU	5	0.79	0.47
3	pH	n/a	6.5-8.5	5.15	6.54
4	Arsenic(As)	Mg/l	0.05	0.00	0.00
5	Total dissolved solids	Mg/l	800	20.00	65.00
6	Manganese(Mn)	Mg/l	0.1	0.019	0.003
7	Zinc(Zn)	Mg/l	3	0.06	0.07
8	Sulfate($NO4^{2}$-)	Mg/l	250	2.00	0.50
9	Cu	Mg/l	1	0.07	0.003
10	Hardness	Mg/l	300	4.30	5.26
11	Aluminum (Al)	Mg/l	0.2	0.007	0.04
12	Chloride	Mg/l	250	4.70	5.43
13	Iron (Fe)	Mg/l	0.3	1.120	0.083
14	Ammonia (NH3)	Mg/l	1.5	0.08	0.03
15	Barium (Ba)	Mg/l	0.07	0.00	0.0013
16	Cadmium (Cd)	Mg/l	0.003	0.00015	0.00
17	Chromium (Cr)	Mg/l	0.05	0	0.0067
18	Fluoride(F)	Mg/l	1.5	0.00	0.03
19	Lea d(Pb)	Mg/l	0.01	0.0129	0.0004
20	Residual chlorine	Mg/l	0.1-1.0	0	0.31
21	E.Coli	MPN/100mg	0.00	0.00	0.00
22	Mercury (Hg)	Mg/l	0.001	0.0000	0.00054
23	Nitrite (NO2)	Mg/l	3	0.003	0.008
24	Nitrite (NO3)	Mg/l	50	0.5	0.28
25	Na	Mg/l	250	5.943	5.786
26	Residual chlorine at network	Mg/l	0.1-1.0	0	0.31

❖ **MONITORING SYSTEM OR PLANS FOR SAFETY OF DRINKING WATER IN YOUR ORGANIZATION / REGULATORY BODY / INDEPENDENT INSTITUTION /OTHERS**

- ✓ SRWSA has established Standard Operation Procedure (SOP) for Water Quality Analysis to ensure proper and regular water quality check.
- ✓ SRWSA is preparing Water Safety Plan to ensure the safety of water from source to user tape


Water Quality Control of End Pipe

❖ **Implementation of Water Safety Plans or Similar Efforts**

SRWSA conducts regular water quality analysis: daily, quarterly, semester, and yearly at water treatment plant and weekly at the end of pipe networks.

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Reduction of Non-Revenue Water

System input volume	Authorized consumption	Revenue water	Billed authorized consumption	5,748,921 m^3 /year (94%)
		Non Revenue Water (NRW)	Unbilled authorized consumption (ex. fire fighting, cleaning)	4,482 m^3 /year (0.07%)
	Water losses		**Apparent losses (Unauthorized consumption (i.e. Illegal use), Customer metering inaccuracies)**	61,769 m^3 /year (1.0%)
			Real losses (Leakage)	332,898 m^3 /year (5.4%)

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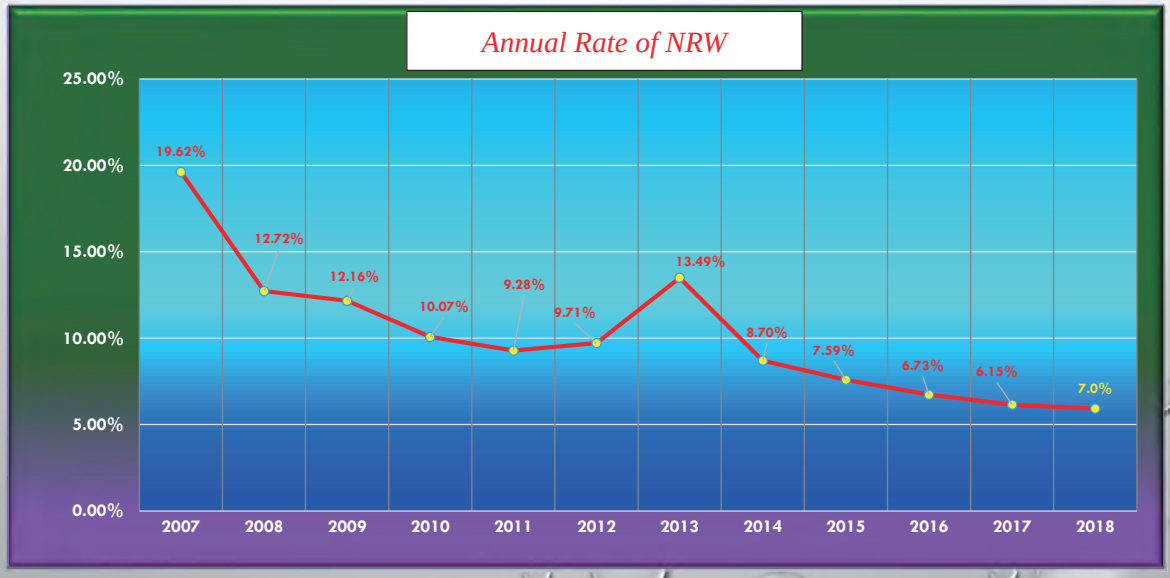
❖ Leakage Detection Measures

- ✓ Assigning the standby Leakage repairing teams
- ✓ Cooperation with related Authorities and Organizations for leakage detection at the construction site

❖COUNTERMEASURES FOR NRW



ACCOUNTING SYSTEM OF WATER SUPPLY SERVICES

SRWSA currently uses the Synergistic Utility Management System (SUMS) for the accounting system in the organization.

❖ Water Tariff in our Organization

Type of Tariff	Consumption rate	Tariff	Type of Customers
Domestic	1 – 3m³	0.22 USD	Domestic customer and Administration Public
	4 – 7m³	0.25 USD	
	8 – 15m³	0.38 USD	
	16 – 30m³	0.45 USD	
	Over 30m³	0.50 USD	
Commercial	1 – 50m³	0.48 USD	Commercial customer
	51 – 150m³	0.60 USD	
	151 – 350m³	0.73 USD	
	Over 350m³	0.85 USD	
The average water tariff bill in current day is 0.54 USD per 1m³			

❖ BALANCE SHEET OF SRWSA

Note	Descriptions	31/12/2018 (USD)	31/12/2017 (USD)
1+2	**TOTAL ASSETS**	29,924,967	23,529,292
1	**Current assets**	4,570,897	3,153,511
11	Cash in Banks	2,337,655	2,457,384
12	Cash in Hand (riels)	7,864	5,038
14	Advances and Deposits	2,6146	8,311
15	Loan and short-term accounts	124,821	77,432
16	Inventory	2,074,410	605,346
2	**Non-current assets**	25,354,071	20,375,780
21	Long-term financial assets	4,622,883	8,696,987
22	Long-term physical assets	11,507,728	10,851,065
23	Long-term intangible assets	28,850	0
25	Assets in Progress	12,381,263	3,594,337
27	Depreciation - long-term assets	-3,184,731	-2,766,609
28	Depreciation - long-term intangible assets	-1923	0
3+4+5	**Total Liability and Owned Capital**	-29,924,967	-2,352,292
3	Capital and reserves	-10,570,150	-9,724,449
31	Capital	-5,480,348	-5,559,360
32	Reserves	-5,089,802	-4,165,089
4	Current Liability	-376,250	-168,685
41	Short-term Liability	-376,250	-168,685
5	Non-Current Liability	-18,422,189	-12,632,432
51	Long-term Liability	-18,422,189	-12,632,432

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❖ PROFIT AND LOSS STATEMENT OF SRWSA

Note	Descriptions	31/12/2018 (KHR Million)	31/12/2017 (KHR Million)
7	**Revenue**	3,423,05	3,592,020
70	Income from water charges	3,027,030	2,960,735
71	Income from services charges	151,997	152,125
72	Income from interest	125,130	105,013
73	Income from rents	1,797	6,652
74	Income from special financing	69,276	136,139
6	**Expenditure**	-2,866,677	-2,588,295
60	Staff burden	-964,326	-810,576
61	Purchases	-384,727	-357,157
62	Services	-621,718	-602,599
63	Taxations	-179,400	-254,521
64	Depreciation and drop-down price	-420,045	-420,948
65	Expense on Subsidies	-62,070	-50,400
66	Other Financial Expenses	-234,392	-90,949
67	Special expenses and other allowance	0	-1,145
	Net Profit and Loss	556,379	1,003,726

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MAJOR RECENT ACHIEVEMENT IN IMPROVEMENT OF WATER SUPPLY SERVICES

SRWSA has its recent achievement as following:

- ✓ A new Water Production Facility (15,000 m3/day) including the 6km TWTM has been constructed under the loan from AFD.
- ✓ Extended new water distribution pipelines about 22.5km and house service connections are increased up to 845 new connections.
- ✓ Increased the water production capacity up to 30,000m3/day in 2019.
- ✓ The water pressure is also significantly stronger
- ✓ Purchased required equipment for supporting construction work and pipes installation works.

RECENT CHALLENGES OF WATER SUPPLY SERVICES

- The water production capacity is still not enough to supply and meet the water demand in the city, so the access to water supply service is still quite low
- SRWSA still required more efforts and commitment for reduction of NRW to become lower

THANK YOU

for your attention!

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Water Supply for Better Management of Water Supply Service (B)-Course No.201984473-J002

Inception Report

Organization: Siem Reap Water Supply Authority

Country: CAMBODIA

Name: CHEA Sokha

Position: Chief of accounting Office

July 2019

Contents

Water Supply for Better Management of Water Supply Service (B)-Course
No.201984473-J002

General Information of Cambodia and Siem Reap City-Province

ap City

Cambodia is located at the southern region of the Indochina Peninsula in Southeast Asia. The total surface area of Cambodia is at 181,035 square kilometers, divided into 24 provinces including 26 cities/town and one Capital City of Phnom Penh.

Cambodia is currently the 70th most populous country in the world with an estimated 2019 population of 16.49 million, an increase from 2013's estimation of 14.9 million. population density of 82 people per square kilometer (212/square mile), which ranks 118th in the world.

The current median age of the total population is 25.3 years of age, with a total life expectancy of 64.9 years of age. The GDP per Capita is 1,254 with the estimate growth of 7%. 5.7% of the GDP is directed toward health resulting in a meager. There is a fairly high infant mortality rate within the nation. Only 75% of the country has improved access to drinking water and only 42% of the population has access to improved sanitation facilities as well.

Siem Reap Province is one of province of Cambodia with one city called Siem Reap City/Municipality. It borders the provinces of Oddar Meanchey to the north, Preah Vihear and Kampong Thom to the east, Battambang to the south, and Banteay Meanchey to the west. Siem Reap is the 10th largest province in Cambodia with the total estimate population of about one million. While Siem Reap city has population of about 139,458 persons. It is the largest tourist destination to visit the Angkor World Heritage. The total tourists visiting Siem Reap is approximately 5 million annually both international and local ones. The current coverage of water supply in Siem Reap City is only about 30%.

1. Outline of Water Supply Services

1-1. Legal Basis of Water Supply Services

Siem Reap Water Supply was established in 1930 and was transferred to public enterprise as Siem Reap Water Supply Authority by Sub-decree of the Royal Government of Cambodia in 2007. SRWSA is managed by the following laws and regulations (i) Law on General Statute of Public Enterprises, promulgated by the royal decree No.CS/RKM/0693/03, dated on 17 June 1996, (ii) Sub-decree on the establishment of Siem Reap Water Supply Authority dated on 10 January 2007, (iii) Statute of Siem Reap Water Supply Authority, and (iv) other Laws and commercial related regulations.

Siem Reap Water Supply Authority has two supervision ministries, namely, Ministry of Industry and Handicaps (Technical supervision ministry) and Ministry of Economy and Finance (Finance supervision ministry) with a total of 121 employees. It has been recognized as one of lead public water supply enterprises in Cambodia with administrative and financial autonomy. The key mission of Siem Reap Water Supply Authority is to produce and distribute clean water supply to residents living in and surrounding areas of Siem Reap City including about five million tourists per year.

1-2. Demarcation of Water Supply Services

There are a few ministries in charge for water as listed below:

- Ministry of Industry and Handicrafts is in charge for urban water supply
- Ministry of Rural Development is in charge for rural water supply and community water supply.
- Ministry of Water Resources and Meteorology is in charge for water resources
- Ministry of Public Works and Transport is in charge for wastewater and sewerage.

1-3. Main Actor of Water Supply Utilities

The urban water supply in Cambodia was divided into these main following groups:

- Public Water Supply Authorities with administrative and financial autonomy. Two public autonomous water supply authorities in Cambodia are Phnom Penh Water Supply Authority and Siem Reap Water Supply Authority. It was directed by Board of Directors and a Director General. Board of Director is the highest policy maker of public autonomous water supply authorities, with the authority to determine the objective and control of management to ensure its efficiency and effectiveness. General Director is delegated the authority from Board of Director to manage the authority.

- Private Water Supply Operators are operated and managed by private operators registered under and regulated by Ministry of Industry and Handicrafts.
- Public Water Supply Utilities: These water supply utilities are operated and managed directly by respective provincial department of industry and handicraft/Ministry of Industry of Handicraft.
- Community and rural water supply are operated and managed by Provincial Department of Rural Development/ Ministry of Rural Development.

1-4. Mission/Vision of Water Supply Utilities

- The mission is to produce and deliver portable water to residents living in Siem Reap City and surrounding areas including tourists and other economic activities.
- The vision is SRWSA will be one of the best water supply authority in Cambodia with technical and financial sustainability to provide all residents, tourists and other economic activities with better access to water supply services in both quality and quantity.

1-5. My Mission/Vision in our organization

- My mission is responsible for all accounting works, manage all expenses and keep all original copy of all expenditures, asset and Inventory control and management.
- My vision is to develop my all accounting works to be the best for SRWSA.

---

2. Water Supply Service Levels

2-1. Main Performance Indicators (PI)

Coverage area	472 km^2
Population served	55,000 people
Collection ratio	99.99%
Production capacity	30,000 m^3/day
Supply duration	24 hours/day
Supply pressure	1.5 bar
Non-Revenue Water	7.0 (%)
Water quality	National Drinking Water Quality Standard (NDWQS)
Staff number	122 staffs
Number of connections	9,875 connections
Staff/1,000 connections	12.35 staffs/1,000 connections

2-2. Any Monitoring by Performance Indicators (PI)

Power consumption/ m^3	354wh/m^3
PAC consumption/ m^3	17g/ m^3
Lime consumption/ m^3	29g/ m^3
Chlorine consumption/ m^3	2g/ m^3
Total length of Distribution	183km

3. Management of Water Quality

3-1. Current Situation and Major Challenges/Problems

SRWSA Laboratory (Water Quality Check)

The management of water quality has been done based on the SOP and National Drinking Water Quality Standards (NDWQS). As the results of water quality analysis, the SRWSA water quality meets the requirement of the NDWQS as well as WHO Standards.

The major challenges of SRWSA in water quality management are (i) Laboratory of SRWSA is lacking of water qualities analysis equipment and materials so some water quality parameters cannot be analyzed. On the other hand, there are few incidents of red water from the tap caused by leakage or old pipe.

3-2. Current Actions against Those Challenges/Problems

- Continue to send water quality parameters that cannot be analyzed by SRWSA laboratory to ministry or other laboratories for analysis.
- Plan to increase capacity of laboratory with the new additional equipment and materials for water quality analysis.
- Update SOP on water quality analysis as it is necessary and implement it properly and strictly.

- Clean the pipe immediately after receiving the information of red water coming out the distribution network
- Replace old and poor-quality pipe networks.

3-3. The Achievements in Water Quality Management

- SRWSA can maintain good water quality that meets NDWQS and WHO Standards.
- The water distribution pipes were cleaned in some locations and the frequency of red water incidents is deduced.
- Many old and poor-quality pipe networks are replaced with better quality pipes

3-4. Water Quality Standards for Drinking Water

Water quality of SRWSA meets National Drinking Water Quality Standard (NDWQS) as well as WHO Standards.

No	Parameter	Unit	Standard	Raw Water	Treated Water
1	Color	TCU	5	0.9	0.6
2	Turbidity	NTU/FTU	5	0.79	0.47
3	pH	n/a	6.5-8.5	5.15	6.54
4	Arsenic(As)	Mg/l	0.05	0.00	0.00
5	Total dissolved solids	Mg/l	800	20.00	65.00
6	Manganese(Mn)	Mg/l	0.1	0.019	0.003
7	Zinc(Zn)	Mg/l	3	0.06	0.07
8	Sulfate($NO4^{2}$-)	Mg/l	250	2.00	0.50
9	Cu	Mg/l	1	0.07	0.003
10	Hardness	Mg/l	300	4.30	5.26
11	Aluminum (Al)	Mg/l	0.2	0.007	0.04
12	Chloride	Mg/l	250	4.70	5.43
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15	Barium (Ba)	Mg/l	0.07	0.00	0.0013
16	Cadmium (Cd)	Mg/l	0.003	0.00015	0.00
17	Chromium (Cr)	Mg/l	0.05	0	0.0067
18	Fluoride(F)	Mg/l	1.5	0.00	0.03
19	Lea d(Pb)	Mg/l	0.01	0.0129	0.0004
20	Residual chlorine	Mg/l	0.1-1.0	0	0.31
21	E.Coli	MPN/100mg	0.00	0.00	0.00
22	Mercury (Hg)	Mg/l	0.001	0.0000	0.00054
23	Nitrite (NO2)	Mg/l	3	0.003	0.008
24	Nitrite (NO3)	Mg/l	50	0.5	0.28
25	Na	Mg/l	250	5.943	5.786
26	Residual chlorine at network	Mg/l	0.1-1.0	0	0.31

3-5. Monitoring System or Plans for Safety of Drinking Water in Your Organization / Regulatory Body / Independent Institution /Others

SRWSA has established Standard Operation Procedure (SOP) Water Quality Analysis to ensure proper and regular water quality check. In the SOP clearly defined:

- Responsibilities of water quality analysis staff
- Location of taking sample water for analysis
- Method of taking the sample water
- Numbers of sample and locations
- Parameters to be analyzed

Water Quality Control of End Pipe

Beside SRWSA now preparing water safety plan to ensure the safety from source to user tape.

3-6. Implementation of Water Safety Plans or Similar Efforts*

SRWSA conducts regular water quality analysis: daily, quarterly, semester, and yearly at water treatment plant and weekly at the end of pipe networks.

---

4. Reduction of Non-Revenue Water (NRW)

4-1. Current Situation and Major Challenges/Problems

NRW reduction and expansion production and distribution capacity are key priorities of SRWSA.

Water Leakage Searching at Night Time

Water Leakage Searching and Detection in Day Time

The Major Challenges/Problems:

- Poor quality of Pipes (Old PVC pipes still needed to be replaced)
- Pipe damages caused by other construction activities
- Malfunctioning or non-working water meters & leakage at water meters
- Zone meters were damaged
- Lack of equipment and materials for leakage repairs at the site
- Current capacity of water supply system can cover only 30% of water demand.

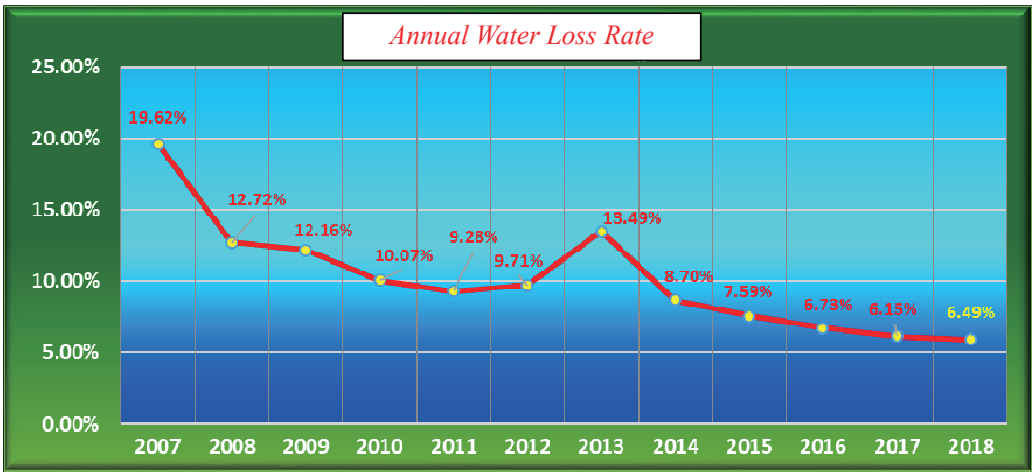
4-2. Current Actions against Those Challenges/Problems

Water Leakage Repairing

- Established a standby team for quick repairing and leak detection.
- Conducted survey for malfunctioning and non-working water meters, and repaired/cleaned/replaced them.
- Replacement of old PVC pipes by HDPE pipes
- Checked and strengthened monitoring of old water meters for each house hold connection
- Established SOP for (i) meter reading, bills distribution and collection and (ii) SOP for house connection installation
- Conducted regularly night step test for water leakage
- Cooperated with related authorities/organizations to observe any damages to pipeline caused by the excavation works at construction site.
- Purchased the equipment and materials required for water leakage repairing
- Implement new investment projects for expand production and distribution capacity.

4-3. The Achievements in Reduction on NRW

- Most of old PVC pipes have been replaced
- The water leakages have been found and successfully repaired
- The NRW decreased dramatically from 13.5% in 2013 to 6.49 % in 2018.



4-4. Constitution of NRW

Authorized consumption	**Revenue water**	**Billed authorized consumption**	**5,748,921(m^3 /year) 93.51(%)**
	Non-Revenue Water (NRW)	Unbilled authorized consumption (ex. fire fighting, cleaning)	**4,482(m^3 /year) 0.07(%)**
Water losses		Apparent losses (Unauthorized consumption (i.e. Illegal use), Customer metering inaccuracies)	**61,769(m^3 /year) 1.005(%)**
		Physical losses (Leakage)	**332,898(m^3 /year) 5.415(%)**

4-4. Situations about Leakage Detection Measures (DMA etc.)

- Assigning the standby Leakage repairing teams
- Cooperation with related Authorities and Organizations for leakage detection at the construction site

---

Repairing House Service Water Meter

Installation of Interconnection

5. Accounting system of Water Supply Service

5-1. Water Tariff in your Organization

Type of Tariff	Consumption rate	Tariff	Type of Customers
Domestic	1 – 3m³	0.22 USD	Domestic customer and Administration Public
	4 – 7m³	0.25 USD	
	8 – 15m³	0.38 USD	
	16 – 30m³	0.45 USD	
	Over 30m³	0.50 USD	
Commercial	1 – 50m³	0.48 USD	Commercial customer
	51 – 150m³	0.60 USD	
	151 – 350m³	0.73 USD	
	Over 350m³	0.85 USD	
The average water tariff bill in current day is 0.54 USD per 1m³			

5-2. Balance Sheet of SRWSA

Note	Descriptions	31/12/2018 (KHR)	31/12/2017 (KHR)
1+2	**TOTAL ASSETS**	**29,924,967**	**23,529,292**
1	**Current assets**	4,570,897	3,153,511
11	Cash in Banks	2,337,655	2,457,384
12	Cash in Hand (riels)	7,864	5,038
14	Advances and Deposits	2,6146	8,311
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16	Inventory	2,074,410	605,346
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21	Long-term financial assets	4,622,883	8,696,987
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25	Assets in Progress	12,381,263	3,594,337
27	Depreciation - long-term assets	-3,184,731	-2,766,609

28	Depreciation - long-term intangible assets	-1923	
3+4+5	**Total Liability and Owned Capital**	**-29,924,967**	**-2,352,292**
3	Capital and reserves	-10,570,150	-9,724,449
31	Capital	-5,480,348	-5,559,360
32	Reserves	-5,089,802	-4,165,089
4	Current Liability	-376,250	-168,685
41	Short-term Liability	-376,250	-168,685
5	Non-Current Liability	-18,422,189	-12,632,432
51	Long-term Liability	-18,422,189	-12,632,432

5-3. Profit and Loss Statement of SRWSA

Note	Descriptions	31/12/2018 (KHR)	31/12/2017 (KHR)
7	**Revenue**	**3,423,056**	**3,592,020**
70	Income from water charges	3,027,030	2,960,735
71	Income from services charges	151,997	152,125
72	Income from interest	125,130	105,013
73	Income from rents	1,797	6,652
74	Income from special financing	69,276	136,139
6	**Expenditure**	**-2,866,677**	**-2,588,295**
60	Staff burden	-964,326	-810,576
61	Purchases	-384,727	-357,157
62	Services	-621,718	-602,599
63	Taxations	-179,400	-254,521

64	Depreciation and drop-down price	-420,045	-420,948
65	Expense on Subsidies	-62,070	-50,400
66	Other Financial Expenses	-234,392	-90,949
67	Special expenses and other allowance		-1,145
	Net Profit and Loss	**556,379**	**1,003,726**

---

6. Major Recent Achievements in Improvement of Water Supply Services/Management

- The new Water Production Facility with the capacity 15,000m3/day under the AFD loan have been constructed and will be operated with full capacity in 2019.
- The new water distribution pipelines have been extended about 22.5Km, and the new house connections increased (845 new connections in 2018).
- Water production capacity increased from 18,000m3/day in 2018 and will be 30,000m3/day in 2019.
- Water pressure is significantly stronger
- Required equipment had been purchased for supporting the construction and pipes installation works.

7. Recent Challenges to Improvement of Water Supply Services

- The water production capacity is still not enough to supply and meet the water demand in the city, so the access to water supply service is still quite low
- Water pressure is still sometimes low in some area and at pick hours
- Reduction of NRW to be lower is still a challenge for SRWSA that need more efforts and commitment.

---

8. Expectations toward Japan

8-1. Expectations toward Japanese Government and JICA

I expect to receive knowledge related to better water supply management and learning experiences from the capacity-building program of the Japanese Government and JICA.

8-2. Expectations toward Japanese Water Utilities

To see the new technology and understand about the modern technologies of Japanese Water Utilities.

8-3. Expectations toward Japanese Private Companies

The Japanese companies may cooperate with the water supply Utilities through the international cooperation project as Consultants and Contractors for materials /equipment supplies, technology and technical supports.

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9. Expectations toward the Program.

With the program, I expect to learn and understand more about the course as following:

- to be able to analyze/identify the issues/challenges regarding the water supply management and set plan to improve the situation.
- to discover more modern technology of Japanese water utilities from field visit
- to share experiences and understand the situation of water services administration and management even in Japan and from participated countries.

New Water Production Facility with Capacity 15,000 m3/day Constructed under the AFD loan

Water Supply Administration
For Better Management of Water Supply Services
Course（Ｂ）

HONDURAS

Water Supply Administration for Better Management of Water Supply Services

Inception Report Presentation

Name: Eng. Roque R. Andrade Salazar
Position : Los Laureles Subsystem Chief
Organization: SANAA /AMDC

Inception Report Presentation

- Each applicant is kindly requested to make presentation of Inception Report (M/S Power Point file with **less than 15 slides** which cover the following 7 topics about the individual water supply company/public water supply authority to which the participant belongs.
- Presentation time: **15 minutes (including Q&A)**
- **7 topics:**

1. **Outline of Water Supply Services**
2. **Water Supply Service Levels**
3. **Management of Water Quality**
4. **Reduction of Non-Revenue Water**
5. **Accounting system of Water Supply Service**
6. **Major Recent Achievements in Improvement of Water Supply Services**
7. **Recent Challenges to Improvement of Water Supply Services**

3

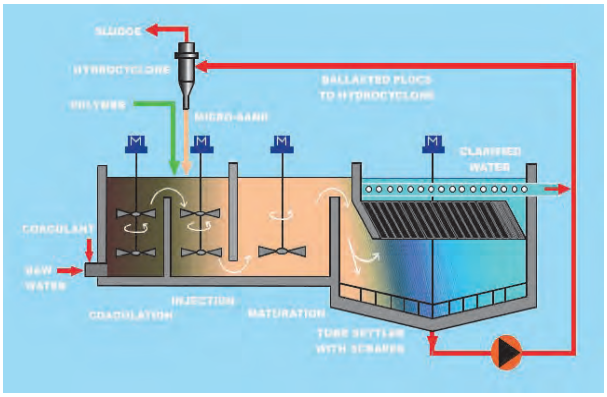
Laureles Reservoir:

30% Population of Tegucigalpa Honduras

4

Hidroneumatic DAMS

5



Treatment Facilities
(Drinking wáter)

6

7

Outline of Water Supply Services

- Legal Basis of Water Supply Services
  (What kind of laws and regulations are Water Supply Services based on?)
- Demarcation of Water Supply Services
  (Which ministry is in charge of what kind of field of water?)
- Main Actor of Water Supply Utilities
  (e.g. In Japan, most water utilities are public bureau under local government.)
- Mission/Vision of Water Supply Utilities
- Your Mission/Vision in your organization

Whole Country:

Area : Guacerique Basin with 210(km^2)

Population : 350,000 habitants Capital of Tegucigalpa

Coverage Water Supply: 30 %

Selected Water Supply System/City:

Service Area : km^2

Population Served: million/ thousand

8

Management of Water Quality

- Current Situation and Major Challenges/Problems:

Today, SANAA is in transition to Municipality of Central District (AMDC) fullfilling 2003 water law that commands to all municipalities to acquire water resources to its administration. Facing troubles that includes water contamination issues and hydric diseases causes, that provocate to look for new action plans and new technologies toward to increase capacities to solve the problem.

- Current Actions against Those Challenges/Problems:

In actuality SANAA in concordance with municipality AMDC, is developing biological investigations and new technologies research in Los Laureles Reservoir, to identification main causes of contamination, looking for the strategies to bring a permanent solution to the problem.

- Water Quality Standards for Drinking Water:

In accordance with National Law; NATIONAL NORMATIVE FOR WATER QUALITY , October 1995

Management of Water Quality

- Water Quality Standards for Drinking Water:

Due to Law, our standards are related to parameters showed below: (AWWA)

Acuerdo No. 084

Cuadros 1. Parámetros Bacteriológicos (a)

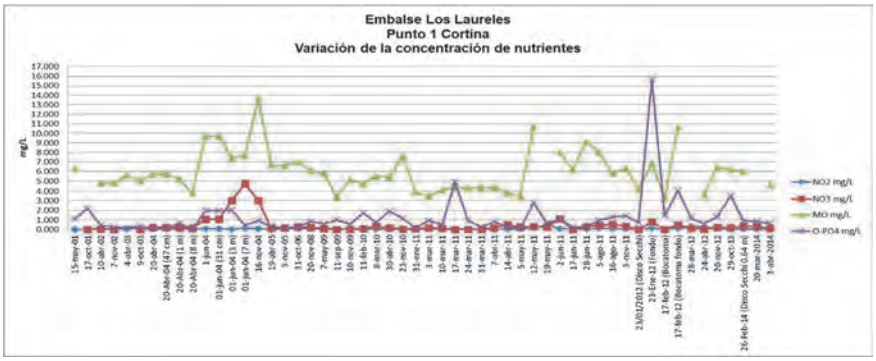
ORIGEN	PARAMETRO (b)	VALOR RECOMENDADO	VALOR MAXIMO ADMISIBLE	OBSERVACIONES
A. Abastecimiento con agua entubada.				
A1. Agua no tratada que entra en el sistema de distribución.	Coliformes Totales	0	3	En una muestra ocasional pero no en muestras consecutivas.
	Coliformes Fecales	0	0	
A2. Agua tratada que entra en el sistema de distribución	Coliformes Totales	0	0	Turbiedad <1. Para la desinfección con cloro es preferible pH<8.0 y cloro residual libre de 0.2-0.5 mg/l después de un tiempo de contacto mínimo de 30 minutos.
	Coliformes Fecales	0	0	
A3. Agua en el sistema de distribución	Coliformes Totales	0	0	En el 95% de las muestras examinadas durante el año. Cuando se trata de grandes sistemas de abastecimiento y se examinen suficientes muestras (C).
	Coliformes Fecales	0	0	
	Coliformes Totales	0	3	Ocasionalmente en alguna muestra pero no en muestra consecutivas

Acuerdo No. 084

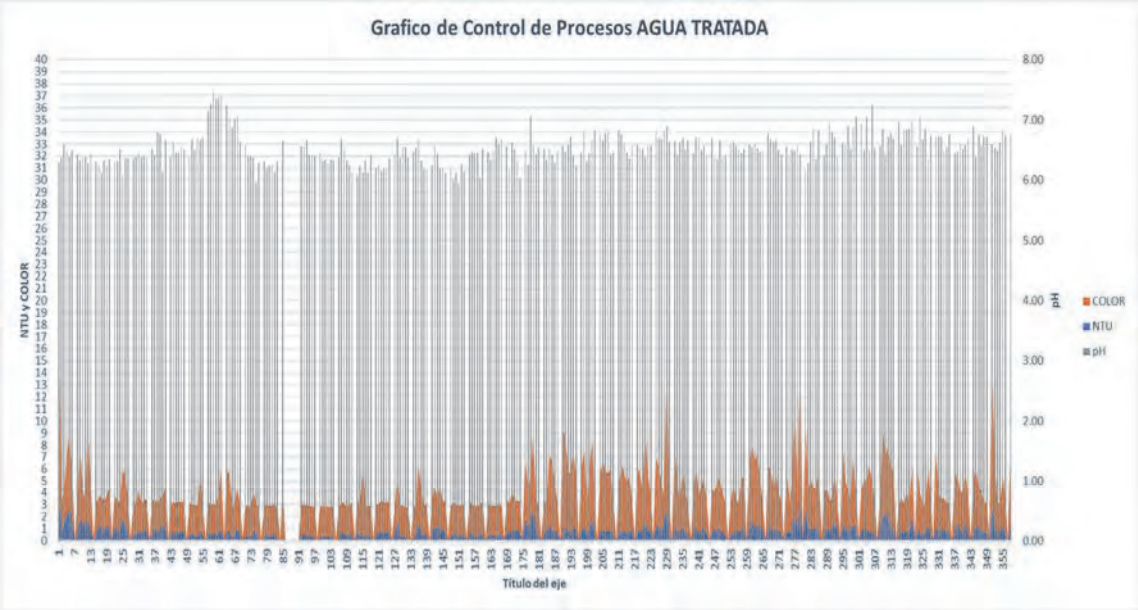
Cuadro 3. Parámetros Fisicoquímicos

PARÁMETRO	UNIDAD	VALOR RECOMENDADO	VALOR MÁXIMO ADMISIBLE
Cloro Residual	mg/l	0.5 a 1.0 (b)	(c)
Cloruros	mg/l	25	250
Conductividad	µs/cm	400	–
Dureza	mg/l CaCO3	400	–
Sulfatos	mg/l	25	250
Aluminio	mg/l	–	0.2
Calcio	mg/l CaCO3	100	–
Cobre	mg/l	1.0	2.0
Magnesio	mg CaCO3	30	50
Sodio	mg/l	25	200
Potasio	mg/l	–	10
Sol. Tot. Dis.	mg/l	–	1000
Zinc	mg/l	–	3.0

Water Quality Monitoring



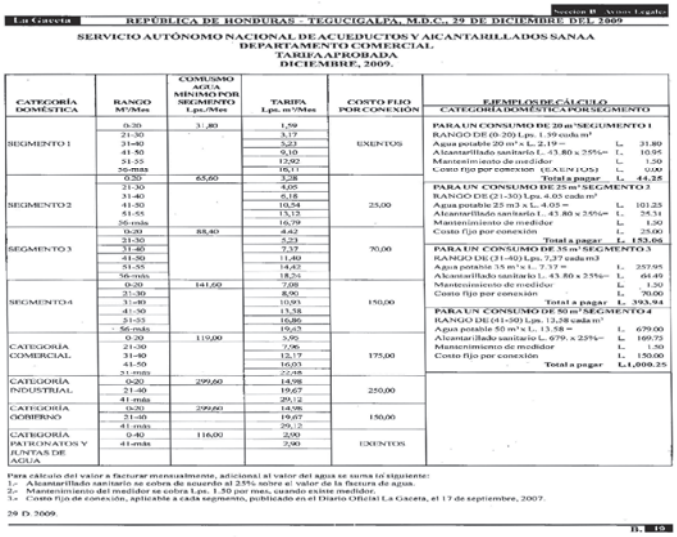
Treated wáter (drinking)



Accounting System of Water Supply Services

- Water Tariff:

Water tariff resumes all categories of SANAA clients, from the different segments No. 1 to 4, commercial segment, Industrial segment, and water that is distributed in blocks or to self-admir



La Gaceta — REPÚBLICA DE HONDURAS - TEGUCIGALPA, M.D.C., 29 DE DICIEMBRE DEL 2009

SERVICIO AUTÓNOMO NACIONAL DE ACUEDUCTOS Y ALCANTARILLADOS SANAA
DEPARTAMENTO COMERCIAL
TARIFA APROBADA
DICIEMBRE, 2009.

CATEGORÍA DOMÉSTICA	RANGO M³/Mes	CONSUMO AGUA MÍNIMO POR SEGMENTO Lps./Mes	TARIFA Lps. m³/Mes	COSTO FIJO POR CONEXIÓN
SEGMENTO 1	0-20	31,80	1,59	EXENTOS
	21-30		3,17	
	31-40		5,23	
	41-50		9,10	
	51-55		12,92	
	56-más		16,17	
SEGMENTO 2	0-20	65,60	3,28	25,00
	21-30		4,05	
	31-40		6,18	
	41-50		10,54	
	51-55		13,13	
	56-más		16,79	
SEGMENTO 3	0-20	88,40	4,42	70,00
	21-30		5,23	
	31-40		7,37	
	41-50		11,40	
	51-55		14,43	
	56-más		18,24	
SEGMENTO 4	0-20	141,60	7,08	150,00
	21-30		8,90	
	31-40		10,93	
	41-50		13,58	
	51-55		16,86	
	56-más		19,63	
CATEGORÍA COMERCIAL	0-20	119,00	5,95	175,00
	21-30		7,96	
	31-40		12,17	
	41-50		16,03	
	51-más		22,48	
CATEGORÍA INDUSTRIAL	0-20	299,60	14,98	250,00
	21-40		19,67	
	41-más		29,12	
CATEGORÍA GOBIERNO	0-20	299,60	14,98	150,00
	21-40		19,67	
	41-más		29,12	
CATEGORÍA PATRONATOS Y JUNTAS DE AGUA	0-40	116,00	2,90	EXENTOS
	41-más		2,90	

EJEMPLOS DE CÁLCULO
CATEGORÍA DOMÉSTICA POR SEGMENTO

PARA UN CONSUMO DE 20 m³ SEGUMENTO 1
RANGO DE (0-20) Lps. 1.59 cada m³
Agua potable 20 m³ x L. 2.19 = L. 31.80
Alcantarillado sanitario L. 43.80 x 25%= L. 10.95
Mantenimiento de medidor L. 1.50
Costo fijo por conexion (EXENTO) L. 0.00
Total a pagar L. 44.25

PARA UN CONSUMO DE 25 m³ SEGMENTO 2
RANGO DE (21-30) Lps. 4.05 cada m³
Agua potable 25 m3 x L. 4.05 = L. 101.25
Alcantarillado sanitario L. 43.80 x 25%= L. 25.31
Mantenimiento de medidor L. 1.50
Costo fijo por conexión L. 25.00
Total a pagar L. 153.06

PARA UN CONSUMO DE 35 m³ SEGMENTO 3
RANGO DE (31-40) Lps. 7.37 cada m3
Agua potable 35 m³ x L. 7.37 = L. 257.95
Alcantarillado sanitario L. 43.80 x 25%= L. 64.49
Mantenimiento de medidor L. 1.50
Costo fijo por conexión L. 70.00
Total a pagar L. 393.94

PARA UN CONSUMO DE 50 m³ SEGMENTO 4
RANGO DE (41-50) Lps. 13.58 cada m³
Agua potable 50 m³ x L. 13.58 = L. 679.00
Alcantarillado sanitario L. 679. x 25%= L. 169.75
Mantenimiento de medidor L. 1.50
Costo fijo por conexión L. 150.00
Total a pagar L.1,000.25

Para cálculo del valor a facturar mensualmente, adicional al valor del agua se suma lo siguiente:
1.- Alcantarillado sanitario se cobra de acuerdo al 25% sobre el valor de la factura de agua.
2.- Mantenimiento del medidor se cobra Lps. 1.50 por mes, cuando existe medidor.
3.- Costo fijo de conexión, aplicable a cada segmento, publicado en el Diario Oficial La Gaceta, el 17 de septiembre, 2007.

29 D. 2009.

Balance Sheet of your Organization:

Balance until May 2019 (Spanish).

SERVICIO AUTONOMO NACIONAL DE ACUEDUCTOS Y ALCANTARILLADOS
BALANCE GENERAL
Al 31 DE MAYO DEL 2019
Cifras en Lempiras

		MAYO 2019	%	DICIEMBRE 2018	%	AUMENTO O (DISMINUCION)	%
ACTIVOS							
FIJOS	1	6,307,479,958.53	82%	6,328,303,491.02	82%	(20,832,532.49)	0%
Bienes e Instalaciones en Serv.		4,541,110,339.92	59%	4,561,981,806.15	59%	(20,871,466.23)	0%
Proyectos en Proceso		1,766,360,818.61	23%	1,766,321,684.87	23%	38,933.74	0%
ACTIVOS DIFERIDOS	2	19,136,510.96	0%	19,136,510.96	0%	-	0%
Depositos en Garantia		116,959.95	0%	116,959.95	0%	-	0%
Costos de Depreciación		19,020,451.01	0%	19,020,451.01	0%	-	0%
Inversiones por Distribuir		-	0%	-	0%	-	0%
Cuentas Por Cobrar Proyectos		-	0%	-	0%	-	
ACTIVO CIRCULANTE		1,412,015,459.90	18%	1,346,473,841.67	18%	65,541,618.23	5%
Caja y Bancos	3	99,374,961.49	1%	60,064,917.51	1%	39,310,033.98	65%
Cuentas a Cobrar Neto	4	1,173,134,113.95	15%	1,157,606,475.80	15%	15,527,638.15	1%
Otras Cuentas por Cobrar	5	20,886,627.76	0%	18,877,068.74	0%	1,809,559.02	10%
Inventarios	6	118,819,766.70	2%	109,925,379.62	1%	8,894,387.08	8%
Gastos Anticipados		-	0%	-	0%	-	
OTROS ACTIVOS		-	0%	-	0%	-	0%
TOTAL DE ACTIVOS		7,738,622,929.39	100%	7,693,913,843.65	100%	44,709,085.74	1%
PATRIMONIO Y PASIVOS							
Aportaciones	7	5,485,710,452.62	71%	5,484,482,503.07	70%	81,227,949.55	2%
Aportación Para Proyectos	8	2,536,657,752.37	33%	2,536,657,751.30	33%	1.07	0%
SUPERAVIT (DEFICIT)		(1,835,899,219.32)	-24%	(1,821,647,630.87)	-24%	(14,051,388.45)	1%
Periodos Anteriores		(1,823,970,547.85)	-24%	(1,742,486,280.18)	-23%	(81,484,267.67)	5%
Este Periodo		(11,728,671.47)	0%	(79,161,550.69)	-1%	67,432,879.22	-85%
Cuentas por Pagar Proyectos		-	0%	-	0%	-	
Prestamos a Pagar Largo Plazo	9	225,791,220.35		-		225,791,220.35	
PASIVO CIRCULANTE		1,326,162,723.37	17%	1,574,421,420.15	20%	(248,258,696.78)	-16%
Préstamos a Corto Plazo	10	41,558,811.36	1%	272,422,065.86	4%	(230,863,254.50)	-85%
Doc. Y Cuentas por Pagar	11	1,275,274,911.16	16%	1,292,709,870.89	17%	(17,434,959.73)	-1%
Otras Obligaciones por Pagar	12	9,329,000.85	0%	9,289,483.40	0%	39,517.45	0%
TOTAL PATRIMONIO Y PASIVO		7,738,622,929.39	100%	7,693,913,843.65	100%	44,709,085.74	1%

SANAA Ing. Jorge R. Barahona
CONTADOR GENERAL
ADMINISTRADOR GENERAL

Ing. Cinthia E. Sorjas V.
GERENTE GENERAL POR LEY

Major Recent Achievement in improvement of water supply services

- Recently in Los Laureles, we have incorporated and SCADA (system for control and data Acquirement) in order to registrate the process of water treatment, and construction of new dosification system that have achieve cost reductions in chemical reactives. Also we have now last minute monitoring of process parameters that have a direct influence on treatment process, such pH, raw water NTU, Treated water NTU, allowing to have accurate quality control.

Recent Challenges to Improvement of Water Supply Services

Make a sustainable control of water quality in the reservoir and control of use of the resource water in the drainage basin, to improve techniques of treatment and tap water distribution.

Expectations toward Japan

- Expectations toward Japanese Government and JICA

Japan government has a wide support to developing countries that must be highly valuated and used to learn about how this country has identified better solutions to problems related to water issues. In that way JICA has a long and very reliable experience bringing to National technicians, the right knowledge and techniques to improve our acting.

15

- Expectations toward Japanese Water Utilities

To learn how they have installed the right way to do, for the process management and control quality monitoring.

- Expectations toward Japanese Private Companies.

To know how this companies have achieve to develop the right projects in concordance with the laws and standards. Learning used principles and way of acting.

- **Expectations toward the Program.**

Japan development in water programs, are worldwide commented and followed because the high achievement of correct approaching. In that sense is my high expectation to learn and see how can I applicate in my Country those ideas and how to do ways. In related topics such:

- Basin environmental monitoring.
- Health hazardous contaminates.
- Equipment design.
- Treatment process, conventional or modificated.
- Environmental education of the personal involved in treatment and quality control.

16

MUCHAS GRACIAS ¡¡

どうもありがとう

Dōmo arigatō

Inception Report

Date: 22 june 2019

Name: Roque R. Andrade Salazar

Country: Honduras

Organization: Servicio Autonomo Nacional de Acueductos y Alcantarillados SANAA

Position: Chief of "Los Laureles" Subsystem SANAA

---

1. Outline of Water Supply Services

1-1. Legal Basis of Water Supply Services

(What kind of laws and regulations are Water Supply Services based on?)

1. Honduras is under "Technical Normative of Water Quality Law", SANAA in an Institution responsible safe drinking water (tap water), in the Main Capital city and also gives technical support to other municipalities and organizations to achieve the normative compliance.
2. Also SANAA is during transition under municipality management, in order to apply other Environmental laws to reduce contamination and a better management of drainage basins that bring raw water supply to reservoirs and superficial water intakes.

1-2. Demarcation of Water Supply Services

(Which ministry is in charge of what kind of field of water?)

Water supply and sewer is in charge of SANAA under Health Ministry, giving technical support in related topics to national organizations.

1-3. Main Actor of Water Supply Utilities

(e.g. In Japan, most water utilities are public bureau under local government.)

Water supply main actor is SANAA to the Capital city, appling surveillance over treatment facilities and underground water, to be used to be distributed or applied in other uses, such industry and trade.

1-4. Mission/Vision of Water Supply Utilities.

To give safe water supply to the population, under National Law guidance, in order to reduce hydric origin diseases.

1-5. Your Mission/Vision in your organization

Management of Los Laureles Subsystem, which is one of the tree mayor water supply sources, through the exploitation of Dam reservoir, for supplying water treatment facility, in order to supply safe tap water to a population of the 30% (350,000 people) of main Capital city of Tegucigalpa, under National Law.

---

2. Water Supply Service Levels

2-1. Main Performance Indicators (PI)

Coverage area	Guacerique Basin with 210(km^2)
Population served	30% of Capital of Tegucigalpa
Collection ratio	(%)
Production capacity	64,800 (m^3/day)
Supply duration	24 (hour/day)
Supply pressure	
Non-Revenue Water	(%)
Water quality	National Water Law
Staff number	20 people
Number of connections	According to distribution data
Staff/1,000 connections	(people/1,000 connections)

2-2. Any Monitoring by Performance Indicators (PI)

Monitoring of water quality for distribution, in order to achieve Physical and microbiological stated standards in national Law.

---

3. Management of Water Quality

3-1. Current Situation and Major Challenges/Problems.

Today, SANAA is in transition to Municipality of Central District (AMDC) fullfilling 2003 water law that commands to all municipalities to acquire water resources to its administration. Facing troubles that includes water contamination issues and hydric diseases causes, that provocate to look for new action plans and new technologies toward to increase capacities to solve the problem.

3-2. Current Actions against Those Challenges/Problems

In actuality SANAA in concordance with municipality AMDC, is developing biological investigations and new technologies research in Los Laureles Reservoir, to identification main causes of contamination, looking for the strategies to bring a permanent solution to the problem.

3-3. Any Achievements in Mater Quality Management

Accomplishing of Normative Law in tap water, reaching 96 % of efficiency in Los Laureles facility.

3-4. Water Quality Standards for Drinking Water

Due to Law, our standars are related to parameters showed below

Acuerdo No. 084

Cuadro 3. Parámetros Fisicoquímicos

PARÁMETRO	UNIDAD	VALOR RECOMENDADO	VALOR MÁXIMO ADMISIBLE
Cloro Residual	mg/l	0,5 a 1.0 (b)	(c)
Cloruros	mg/l	25	250
Conductividad	µs/cm	400	–
Dureza	mg/l CaCO3	400	–
Sulfatos	mg/l	25	250
Aluminio	mg/l	–	0.2
Calcio	mg/l CaCO3	100	–
Cobre	mg/l	1.0	2.0
Magnesio	mg CaCO3	30	50
Sodio	mg/l	25	200
Potasio	mg/l	–	10
Sol. Tot. Dis.	mg/l	–	1000
Zinc	mg/l	–	3.0

Phisic parameters

Acuerdo No. 084

Cuadros 1. Parámetros Bacteriológicos (a)

ORIGEN	PARAMETRO (b)	VALOR RECOMENDADO	VALOR MAXIMO ADMISIBLE	OBSERVACIONES
A. Abastecimiento con agua encubada.				
A1. Agua no tratada que entra en el sistema de distribución.	Coliformes Totales	0	3	En una muestra ocasional pero no en muestras consecutivas.
	Coliformes Fecales	0	0	
A2. Agua tratada que entra en el sistema de distribución	Coliformes Totales	0	0	Turbiedad <1. Para la desinfección con cloro es preferible pH<8.0 y cloro residual libre de 0.2-0.5 mg/l después de un tiempo de contacto mínimo de 30 minutos.
	Coliformes Fecales	0	0	
A3. Agua en el sistema de distribución	Coliformes Totales	0	0	En el 95% de las muestras examinadas durante el año. Cuando se trata de grandes sistemas de abastecimiento y se examinen suficientes muestras (C).
	Coliformes Fecales	0	0	
	Coliformes Totales	0	3	Ocasionalmente en alguna muestra pero no en muestra consecutivas.

Bacteriological parameters

Cuadro 4 Parámetros para sustancias no deseadas

PARÁMETRO	UNIDAD	VALOR RECOMENDADO	VALOR MÁXIMO ADMISIBLE
Nitratos-N03	mg/l	25	50
Nitritos-N02	mg/l		(1)
Amonio	mg/l	0.05	0.5

Not desired sustances parameters

Nota : V.M.P= Valor recomendado.
Cuadro 5 Parámetros para sustancias Inorgánicas con Significado para la Salud

PARÁMETRO	UNIDAD	VALOR MÁXIMO ADMISIBLE
Arsénico	mg/l	0.01
Cadmio	mg/l	0.003
Cianuro	mg/l	0.07
Cromo	mg/l	0.05
Mercurio	mg/l	0.001
Níquel	mg/l	0.02
Plomo	mg/l	0.01
Antimonio	mg/l	0.005
Selenio	mg/l	0.01

Inorganical sustances parameters with healt significate

3-5. Monitoring System or Plans for Safety of Drinking Water in Your Organization / Regulatory Body / Independent Institution /Others

SANAA applies surveillance in all treatment facilities, making monitoring in all stages of potabilization process. That labour is developed by our Quality Control Laboratory, unit that is in charge of the verification of normative standars.

Also in the actuality, is developing surveillance over drainage basin, in order to regulate discharges in to the river.

3-6. Implementation of Water Safety Plans* or Similar Efforts

(* Water Safety Plans: refer to the following URL and review before participating in the Course, the Chapter 4 "Water Safety Plans" of the "Guidelines for drinking-water quality, third edition"
URL: http://www.who.int/water_sanitation_health/dwq/gdwq3_4.pdf)

In Capital city of Tegucigalpa, its necessary to develop an specific system, to be able to affront mayor problems that are been caused due to increase of population over drainage basins. Those population is causing to discharge in to the rivers nutrients that can cause raw water to decrease its quality, making necessary to develop new techniques and identification of potential risks, with the objective of make a pan to ensure safe drinking water is going to be supplied to the capital City.

4. Reduction of Non-Revenue Water

4-1. Current Situation and Major Challenges/Problems

From revenue water, the major challenge is to control all water that is taken from the river, without control, situation that is potencied by a weak measurement of the river. This situation is because hydric monitoring is not extended to all apportaries of the rivers that are in the basin.

In NRW to distribution into the City, the mayor challenge is to make an accurate measurement between produced water in the facilities (actually reliable data) and the water that is being distributed to the different secondary reservoirs of treated water tanks. That leak of information, makes very difficult to determinate with an acceptable proximity, the real loses of water in the distribution system.

4-2. Current Actions against Those Challenges/Problems

To establish a regular hydric monitoring, that can be able to show the hydrological data, to develop and strong characterization of basin water production, to be compared with the water is entering to the reservoir. That information can be suitable to determinate action plans to control extractions of water and identificate suitable technologies, either to irrigation or other uses.

4-3. Any Achievements in Reduction on NRW

If a regulated control of NRW is established, probably it will be more water to treat and distribute to the population.

4-4. Constitution of NRW (If you have the data, please fill in the table.)

Authorized consumption	Revenue water	Billed authorized consumption	71,000,000(m^3/year) (%)
	Non-Revenue Water (NRW)	Unbilled authorized consumption (ex. firefighting, cleaning)	15,000,000(m^3/year) 2 (%)
Water losses		Apparent losses (Unauthorized consumption (i.e. Illegal use), Customer metering inaccuracies)	10 5,000,000 (m^3/year) (%)
		Physical losses (Leakage)	21,000,000(m^3/year) Approximately 30(%)

4-4. Situations about Leakage Detection Measures (DMA etc.)

Right now, leakage loses are constituted by commercial loses, that includes non-facture used water and clandestine and Physical loses in most of the way caused by and old distribution system.

For the detection measures, SANAA has one unit dedicated to identify by sector loses with the support of electronic devices and revision of hydraulic circuits.

5. Accounting system of Water Supply Service

5-1. Water Tariff in your Organization:

SERVICIO AUTÓNOMO NACIONAL DE ACUEDUCTOS Y ALCANTARILLADOS SANAA
DEPARTAMENTO COMERCIAL
TARIFA APROBADA
DICIEMBRE, 2009.

CATEGORÍA DOMÉSTICA	RANGO M³/Mes	CONSUMO AGUA MÍNIMO POR SEGMENTO Lps./Mes	TARIFA Lps. m³/Mes	COSTO FIJO POR CONEXIÓN
SEGMENTO 1	0-20	31,80	1,59	EXENTOS
	21-30		3,17	
	31-40		5,23	
	41-50		9,10	
	51-55		12,92	
	56-más		16,11	
SEGMENTO 2	0-20	65,60	3,28	25,00
	21-30		4,05	
	31-40		6,18	
	41-50		10,54	
	51-55		13,12	
	56-más		16,79	
SEGMENTO 3	0-20	88,40	4,42	70,00
	21-30		5,23	
	31-40		7,37	
	41-50		11,40	
	51-55		14,42	
	56-más		18,24	
SEGMENTO 4	0-20	141,60	7,08	150,00
	21-30		8,90	
	31-40		10,93	
	41-50		13,58	
	51-55		16,86	
	56-más		19,42	
CATEGORÍA COMERCIAL	0-20	119,00	5,95	175,00
	21-30		7,96	
	31-40		12,17	
	41-50		16,03	
	51-más		22,48	
CATEGORÍA INDUSTRIAL	0-20	299,60	14,98	250,00
	21-40		19,67	
	41-más		29,12	
CATEGORÍA GOBIERNO	0-20	299,60	14,98	150,00
	21-40		19,67	
	41-mas		29,12	
CATEGORÍA PATRONATOS Y JUNTAS DE AGUA	0-40	116,00	2,90	EXENTOS
	41-más		2,90	

EJEMPLOS DE CÁLCULO
CATEGORIA DOMÉSTICA POR SEGMENTO

PARA UN CONSUMO DE 20 m³ SEGUMENTO 1
RANGO DE (0-20) Lps. 1.59 cada m³
Agua potable 20 m³ x L. 2.19 = L. 31.80
Alcantarillado sanitario L. 43.80 x 25%= L. 10.95
Mantenimiento de medidor L. 1.50
Costo fijo por conexión (EXENTOS) L. 0.00
Total a pagar L. 44.25

PARA UN CONSUMO DE 25 m³ SEGMENTO 2
RANGO DE (21-30) Lps. 4.05 cada m³
Agua potable 25 m3 x L. 4.05 = L. 101.25
Alcantarillado sanitario L. 43.80 x 25%= L. 25.31
Mantenimiento de medidor L. 1.50
Costo fijo por conexión L. 25.00
Total a pagar L. 153.06

PARA UN CONSUMO DE 35 m³ SEGMENTO 3
RANGO DE (31-40) Lps. 7,37 cada m3
Agua potable 35 m³ x L. 7.37 = L. 257.95
Alcantarillado sanitario L. 43.80 x 25%= L. 64.49
Mantenimiento de medidor L. 1.50
Costo fijo por conexión L. 70.00
Total a pagar L. 393.94

PARA UN CONSUMO DE 50 m³ SEGMENTO 4
RANGO DE (41-50) Lps. 13,58 cada m³
Agua potable 50 m³ x L. 13.58 = L. 679.00
Alcantarillado sanitario L. 679. x 25%= L. 169.75
Mantenimiento de medidor L. 1.50
Costo fijo por conexión L. 150.00
Total a pagar L. 1,000.25

Para cálculo del valor a facturar mensualmente, adicional al valor del agua se suma lo siguiente:
1.- Alcantarillado sanitario se cobra de acuerdo al 25% sobre el valor de la factura de agua.
2.- Mantenimiento del medidor se cobra Lps. 1.50 por mes, cuando existe medidor.
3.- Costo fijo de conexión, aplicable a cada segmento, publicado en el Diario Oficial La Gaceta, el 17 de septiembre, 2007.

29 D. 2009.

B. 15

Water tariff resumes all categories of SANAA clients, from the different segments No. 1 to 4, commercial segment, Industrial segment, and water that is distributed in blocks or to self-administration groups, in different zones of the city.

5-2. Balance Sheet of your Organization:

Balance until May 2019 (Spanish).

SERVICIO AUTONOMO NACIONAL DE ACUEDUCTOS Y ALCANTARILLADOS
BALANCE GENERAL
Al 31 DE MAYO DEL 2019
Cifras en Lempiras

		MAYO 2019	%	DICIEMBRE 2018	%	AUMENTO O (DISMINUCION)	%
ACTIVOS							
FIJOS	1	6,307,479,958.53	82%	6,328,303,491.02	82%	(20,832,532.49)	0%
Bienes e Instalaciones en Serv.		4,541,110,339.92	59%	4,561,981,906.15	59%	(20,871,466.23)	0%
Proyectos en Proceso		1,766,360,618.61	23%	1,766,321,684.87	23%	38,933.74	0%
ACTIVOS DIFERIDOS	2	19,136,510.96	0%	19,136,510.96	0%	-	0%
Depositos en Garantia		116,059.95	0%	116,059.95	0%	-	0%
Costos de Depreciación		19,020,451.01	0%	19,020,451.01	0%	-	0%
Inversiones por Distribuir		-	0%	-	0%	-	0%
Cuentas Por Cobrar Proyectos		-	0%	-	0%	-	
ACTIVO CIRCULANTE		1,412,015,459.90	18%	1,346,473,841.67	18%	65,541,618.23	5%
Caja y Bancos	3	99,374,951.49	1%	60,064,917.51	1%	39,310,033.98	65%
Cuentas a Cobrar Neto	4	1,173,134,113.95	15%	1,157,606,475.80	15%	15,527,638.15	1%
Otras Cuentas por Cobrar	5	20,686,627.76	0%	18,877,068.74	0%	1,809,559.02	10%
Inventarios	6	118,819,766.70	2%	109,925,379.62	1%	8,894,387.08	8%
Gastos Anticipados		-	0%	-	0%	-	
OTROS ACTIVOS		-	0%	-	0%	-	0%
TOTAL DE ACTIVOS		7,738,622,929.39	100%	7,693,913,843.65	100%	44,709,085.74	1%
PATRIMONIO Y PASIVOS							
Aportaciones	7	5,485,710,452.82	71%	5,484,482,563.67	70%	81,227,849.55	2%
Aportación Para Proyectos	8	2,536,667,752.37	33%	2,536,667,751.30	33%	1.07	0%
SUPERAVIT (DEFICIT)		(1,835,899,219.32)	-24%	(1,821,647,936.87)	-24%	(14,051,388.45)	1%
Periodos Anteriores		(1,823,970,547.85)	-24%	(1,742,486,288.18)	-23%	(81,484,287.67)	5%
Este Periodo		(11,728,671.47)	0%	(79,161,550.69)	-1%	67,432,879.22	-85%
Cuentas por Pagar Proyectos		-	0%	-	0%	-	
Prestamos a Pagar Largo Plazo	9	225,791,220.35		-		225,791,220.35	
PASIVO CIRCULANTE		1,326,162,723.37	17%	1,574,421,420.15	20%	(248,258,696.78)	-16%
Prestamos a Corto Plazo	10	41,568,811.36	1%	272,422,065.86	4%	(230,853,254.50)	-85%
Doc. Y Cuentas por Pagar	11	1,275,274,911.16	16%	1,292,709,870.89	17%	(17,434,959.73)	-1%
Otras Obligaciones por Pagar	12	9,329,000.85	0%	9,289,483.40	0%	39,517.45	0%
TOTAL PATRIMONIO Y PASIVO		7,738,622,929.39	100%	7,693,913,843.65	100%	44,709,085.74	1%

SANAA Ing. Cesar R. Barahona
CONTADOR GENERAL

Ing. Cinthia E. Sorjas V.
GERENTE GENERAL POR LEY

5-3. Profit and Loss Statement of your Organization:

Not available at moment. (solicitated to management)

(*[Public Utilities] (1) Profit and Loss Account

(2) Capital Income and Expenditures of your Organization)

(* You can check the case of Tokyo in the chapter 4 "Financial System and Future Financial Management" of this file.

URL: http://www.waterprofessionals.metro.tokyo.jp/pdf/wst_02.pdf)

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6. Major Recent Achievements in Improvement of Water Supply Services/Management

Recently in Los Laureles, we have incorporated and SCADA (system for control and data Acquirement) in order to registrate the process of water treatment, and construction of new dosification system that have achieve cost reductions in chemical reactives.

Also we have now last minute monitoring of process parameters that have a direct influence on treatment process, such pH, raw water NTU, Treated water NTU, allowing to have accurate quality control.

7. Recent Challenges to Improvement of Water Supply Services

Make a sustainable control of water quality in the reservoir and control of use of the resource water in the drainage basin, to improve techniques of treatment and tap water distribution.

8. Expectations toward Japan

8-1. Expectations toward Japanese Government and JICA

Japan government has a wide support to developing countries that must be highly valuated and used to learn about how this country has identified better solutions to problems related to water issues. In that way JICA has a long and very reliable experience bringing to National technicians, the right knowledge and techniques to improve our acting.

8-2. Expectations toward Japanese Water Utilities

To learn how they have installed the right way to do, for the process management and control quality monitoring.

8-3. Expectations toward Japanese Private Companies

To know how this companies have achieve to develop the right projects in concordance with the laws and standards. Learning used principles and way of actin

9. Expectations toward the Program.
(Any comments and requests are appreciated.)

Japan development in water programs, are worldwide commented and followed because the high achievement of correct approaching. In that sense is my high expectation to learn and see how can I applicate in my Country those ideas and how to do ways. In related topics such:

1. Basin environmental monitoring.
2. Health hazardous contaminates.
3. Equipment design.
4. Treatment process, conventional or modificated.
5. Environmental education of the personal involved in treatment and quality control.

Water Supply Administration
For Better Management of Water Supply Services
Course（Ｂ）

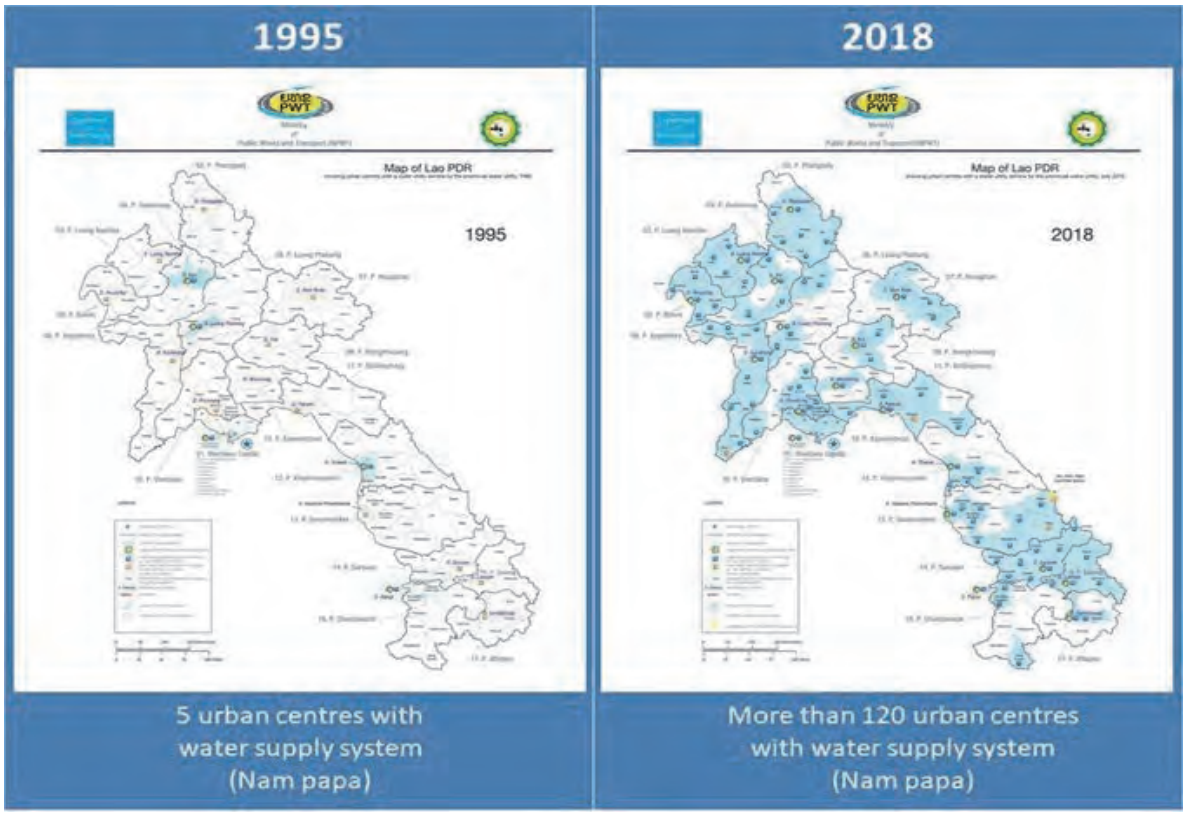
LAOS

Water Supply Administration for Better Management of Water Supply Services

INCEPTION REPORT

Name: Mr. Khamphouvong SIKHOLOM
Position： Director of Regulation Division
Organization: Department of Water Supply,
Ministry of Public Works and Transport

Contents



1995 = Infrastructure problem → 2019 = Issues of technical, financial and operational sustainability

Outline of Water Supply Services

- **Legal Basis of Water Supply Services**
  (What kind of laws and regulations are Water Supply Services based on?)

❑ Enterprise Law (2005) introduced to define the legal framework for the operation of state-owned enterprises – update in 2013;

❑ Water Supply Law (2009) approved to shape and guide the sector for the future – replaced 37/PM and 191/PM.

- **Demarcation of Water Supply Services**
  (Which ministry is in charge of what kind of field of water?)

❑ **The Ministry of Public Works and Transport (MPWT)** is the ministry responsible for development of water utilities supplying treated water in urban and rural areas and sanitation in urban areas of Lao PDR.

❑ **The Ministry of Health (MOH)** is responsible for facilitation, coordination and direction of all rural water supply and environmental hygiene activities in Lao PDR

❑ **The Ministry of Natural Resources and Environment (MoNRE)** was created in 2011 by merging the Water Resource and Environment Administration (WREA)

Outline of Water Supply Services

- **Main Actor of Water Supply Utilities**
  (e.g. In Japan, most water utilities are public bureau under local government.)

❑ The Department of Water Supply (DWS) is in MPWT responsible for national development of treated water supply by water utility state enterprise (Nam Papa) in urban and rural areas and sanitation in urban areas.

❑ Provincial Nam Papa's (PNPs) are the provincial water enterprises that have the overall responsibility of planning, developing, and managing water supply systems in the urban and emerging town areas of the province. PNPs report to the provincial governments and the Department of Water Supply under MPWT.

- **Mission/Vision of Water Supply Utilities**

  Promoting access to safe and reliable water supply and sanitation for everyone.

  Mission/Vision prepared by DWS.

- **Your Mission/Vision in your organization**

  Develop Water Supply Services' access to population in urban areas to 85% by 2025 and sanitation included achieving 100% access to toilets by 2030 in Lao.

Outline of Water Supply Services

- **Whole Country:**
- Area : 236.800 km^2
- Population : 6.386 million people
- Coverage Water Supply: 71%
- **Selected Water Supply System/City:**
- Service Area : *No information for whole country* km^2
- Population Served: 1.59 million nationally

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Water Supply Service Levels

INDICATORS	2000	2017	Goals for 2025
Staff/1,000 connections	22	9	
Production capacity (m^3/day)	65,000	426.429	524.454
Water quality standards	None	(currently testing 5 of 23 parameters) 19%	(testing 20 of 23 parameters) %
Coverage area	20%	71%	%
Supply duration (hour/day)	10	23,9	
Supply pressure	0.2 bar	7,7 m high	m high
Number of connections	26,8	310.711	
Population Served	147,840	1.595.354	1.909.931
NRW	72%	28,67%	%
Collection ratio	48%	80%	95%
Staff number	1,226	2,129	2,445

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Management of Water Quality

- **Current Situation and Major Challenges/Problems**

- Water Treatment Plant over production but under-capacity at treatment plants
- Raw Water: high turbidity in rainy season (>2.000 NTU)
- Laboratory tool & equipment not enough

- **Current Actions against Those Challenges/Problems**

- Build more water treatment plant facilities; but lack funding and investment.
- Expensive imported chemicals to treat water and reduce turbidity: difficult to solve.

  Upland spring sources have good quality water but low flow and not sustainable. Main rivers have low quality water, high turbidity, but are sustainable for water abstraction.

- Need support for laboratory and tools at regional level.

Management of Water Quality

- **Water Quality Standards for Drinking Water**

❑ According to Decision on Management of Quality Standard for Drinking Water and Household Water Supply Guideline October 2014, Ministry of Health, one year could test 23 parameters.

- **Monitoring System or Plans for Safety of Drinking Water in Your Organization / Regulatory Body / Independent Institution /Others**

❑ Ministry of Health, Department of Health and Hygiene Promotion

- **Implementation of Water Safety Plans or Similar Efforts**

❑ Water Safety Plans are required for state water utility but no budget to implement. Training of Trainer completed already.

Reduction of Non-Revenue Water

System input volume	Authorized consumption	Revenue water	Billed authorized consumption	109.119.164 m^3 /year 70%
		Non Revenue Water (NRW)	Unbilled authorized consumption (ex. fire fighting, cleaning)	1.399.111 m^3 /year 1%
	Water losses		Apparent losses (Unauthorized consumption (i.e. Illegal use), Customer metering inaccuracies)	3.264.591 m^3 /year 2%
			Real losses (Leakage)	41.973.318 m^3 /year 27%

Reduction of Non-Revenue Water

- **Leakage Detection Measures**

❑ DMA started in Vientiane Capital, Champasak and Luangnamtha NPSE.

- **Countermeasures for NRW**

❑ DWS is trying to support NPSEs to set NRW as a priority activity for its standards and be not more than 25% NRW.

❑ Set up customer complaints call center and emergency leak repaired teams.

❑ Prepare tools and vehicle needs.

❑ Improved pipe installation standard.

- **Any Achievements in Reduction on NRW**

❑ Old pipe network replacement activities, old water meter replacement activities, redrawing pipe network keep to computer in electronic file and etc.

Accounting System of Water Supply Services

- **Water Tariff in your Organization**

❑ Province request to Ministry. Then DWS reviews and have recommendation, then province implement.

- **Balance Sheet of your Organization**

❑ Water Supply Regulatory Division of DWS collects data from all NPSE on Balance Sheets and summarizes for annual report year by year.

- **Profit and Loss Statement of your Organization**

❑ As above WSRD collection data from NPSE on P&L Statement and summarizes for annual report year by year.

Profit and Loss Statement ('000 KIP)

Name of NPP	Income	Expenditure	Profit/Loss
Vientiane Capital	168,616,365	169,684,818	(1,068,453)
Vientiane Province	14,540,278	12,907,594	1,632,684
Phongsaly	2,366,106	3,876,008	(1,509,902)
Houaphan	165,976	6,356,068	(6,190,092)
Xiengkhuang	7,658,681	8,805,887	(1,147,206)
Bokeo	6,241,148	7,253,145	(1,011,997)
Xaysomboon	1,105,365	1,343,175	(237,810)
Oudomxay	14,387,932	13,596,716	791,216
Luangnamtha	5,360,925	7,052,717	(1,691,792)
Luangprabang	28,773,594	30,117,498	(1,343,904)
Xayabuly	13,833,216	13,308,798	524,418
Borikhamxay	8,786,775	9,842,759	(1,055,984)
Khammouan	7,311,046	10,183,112	(2,872,066)
Savannakhet	4,025,761	5,664,532	(1,638,771)
Saravan	5,939,125	6,537,322	(598,197)
Champasak	29,194,987	29,735,928	(540,941)
Sekong	4,783,260	5,188,809	(405,549)
Attapua	3,253,363	3,154,745	98,618
Total	**326,343,903**	**344,609,631**	**(18,265,728)**

Balance Sheet ('000 KIP)

Assets('000 KIP) / Liabilities&Equity('000 KIP)

Name of NPP	Total Fixed Assets	Total Current Assets	Total Assets	Total Current Liabilities	Long-Term Debt	Equity
Vientiane Capital	422,120,194	93,887,786	516,007,981	54,707,989	22,326,232	438,973,759
Vientiane Province	55,112,313	13,466,433	68,578,746	24,433,739	9,524,907	34,620,100
Phongsaly	54,635,401	2,913,383	57,548,784	26,000	6,307,697	51,215,087
Houaphan	43,680,894	5,727,575	49,408,469	5,934,906	5,216,494	38,257,067
Xiengkhuang	32,895,052	7,586,152	40,481,204	639,265	13,168,679	26,673,260
Bokeo	8,729,289	2,921,306	11,650,596	639,229	11,011,367	-
Xaysomboon	6,236,045	1,893,701	8,129,746	99,661	746,458	7,283,627
Oudomxay	55,775,996	12,400,086	68,176,082	3,626,455	3,626,455	55,222,876
Luangnamtha	28,806,620	2,231,750	31,038,370	1,299,970	15,542,897	15,542,897
Luangprabang	92,831,180	36,261,825	129,093,005	1,169,160	19,291,128	108,632,716
Xayabuly	80,959,811	19,650,519	100,610,330	14,647,168	12,764,095	73,199,067
Borikhamxay	29,279,994	8,455,027	37,735,026	1,238,534	411,165	36,075,322
Khammouan	63,220,096	4,476,650	67,696,746	5,481,295	1,741,331	60,474,120
Savannakhet	60,620,008	50,031,320	110,651,328	53,406,386	2,433,580	54,811,362
Saravan	22,539,848	5,677,891	28,217,739	4,181,256	3,900,667	20,135,817
Champasak	83,522,369	24,620,068	108,142,436	43,194,290	20,499,503	44,448,644
Sekong	27,795,820	1,405,252	29,201,072	3,444,746	8,908,272	16,848,055
Attapua	10,598,972	4,732,324	15,331,296	2,375,848	97,719	12,857,580
Total	**1,179,359,902**	**298,339,048**	**1,477,698,956**	**220,545,897**	**157,518,646**	**1,095,271,356**

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Major Recent Achievement in improvement of water supply services

- ❑ Since 1999, the provincial water utilities have progressed from heavily subsidized government units to more efficient state-owned enterprises.
- ❑ Short- to medium-term financial resilience is improving as can be seen in the corporate plans, but we recognize that these plans should be set within a longer-term plan examining the financial impacts of future debt service and asset replacement.
- ❑ Service Agreements between the provincial government and provincial water utility set out the tariffs approved and the KPIs that are required to be met – effectively a basic regulatory contract.
- ❑ Economic regulation effected in each province by the Provincial Assembly acting on technical advice of Department of Water Supply.
- ❑ Tariffs approved every 3-years with annual adjustments as necessary
- ❑ Increase the capacity of water production
- ❑ controlling non-revenue water to be in a range 20-25% by year 2025
- ❑ expansion pipe network to town areas to ensure people be able to get water supply coverage 85% by year 2025

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Recent challenges of Water Supply Services

- ❑ The human resources in the Water Supply and Sanitation sector are limited
- ❑ Financial support is a constraint
- ❑ Scope of Urban Rural Water Supply Mandate Unclear
- ❑ Unit costs for new installation service high (because low density population)
- ❑ Operation of state water utilities not yet profitable
- ❑ Cost of Water supply production is very high, e.g. Electricity, imported chemicals, administration costs, labor costs etc.

Thank You
Your Attention

Inception Report

Date: 23 July 2019
Name: Mr. Khamphouvong SIKHOLOM
Country: Laos
Organization: Department of Water Supply
Position: Director of Division, Regulation

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1. Outline of Water Supply Services

1-1. Legal Basis of Water Supply Services

(What kind of laws and regulations are Water Supply Services based on?)

- Enterprise Law (2005) introduced to define the legal framework for the operation of state-owned enterprises – update in 2013;
- Water Supply Law (2009) approved to shape and guide the sector for the future – replaced 37/PM and 191/PM.

1-2. Demarcation of Water Supply Services

(Which ministry is in charge of what kind of field of water?)

- **The Ministry of Public Works and Transport (MPWT)** is the ministry responsible for development of water and sanitation sector in Lao PDR.
- **The Ministry of Health (MOH)** is responsible for facilitation, coordination and direction of all rural water supply and environmental hygiene activities in Lao PDR.
- **The Ministry of Natural Resources and Environment (MoNRE)** was created in 2011 by merging the Water Resource and Environment Administration (WREA).

1-3. Main Actor of Water Supply Utilities

(e.g. In Japan, most water utilities are public bureau under local government.)

- The Department of Water Supply (DWS) is in MPWT responsible for development of treated water supply by water utility state enterprise in urban and rural area and sanitation in urban areas.
- Provincial Nam Papa's (PNPs) are the provincial water enterprises that have the overall responsibility of planning, developing, and managing water supply systems in the urban and emerging town areas of the province. PNPs report to the provincial governments and the Department of Water Supply under MPWT.

1-4. Mission/Vision of Water Supply Utilities

Promoting access to safe and reliable water supply and sanitation for everyone. Vision/Mision prepared by DWS.

1-5. Your Mission/Vision in your organization

Develop Water Supply Services access to population in urban area to 85% by 2025 and sanitation in Lao included achieving 100 % access to toilets by 2030.

---

2. Water Supply Service Levels

2-1. Main Performance Indicators (PI) Data year 2017

Coverage area	No information (km^2)
Population served	1.595.354
Collection ratio	71%
Production capacity	426.429 m^3/day
Supply duration	23,9 hour/day
Supply pressure	7,7 m high
Non-Revenue Water	18 water utilities average 28,67%
Water quality	(testing of 23 parameters) 19%
Staff number	2.129 peoples
Number of connections	310.711 meter
Staff/1,000 connections	9 (people/1,000 connections)

2-2. Any Monitoring by Performance Indicators (PI)

Water Supply Guidelines Performance Indicator (PI) by DWS and JICA base on Twenty-three (23) PIs: Performance Indicator for Safety, Performance Indicator for Stability and Performance Indicator for Sustainability

---

3. Management of Water Quality

3-1. Current Situation and Major Challenges/Problems

- Water Treatment Plant over production but under-capacity at treatment plants
- Raw Water: high turbidity in rainy season(>2.000 NTU)
- Laboratory tool & equipment not enough

3-2. Current Actions against Those Challenges/Problems

- Build more water treatment plant facilities but lack funding and investment;
- Expensive chemicals to test water and reduce turbidity: difficult to solve. Upland spring sources have good quality water but low flow and not sustainable. Main rivers have low quality water, high turbidity, but are sustainable for water abstraction.
- Need support for laboratory and tools at regional level.

3-3. Any Achievements in Water Quality Management

According to Decision on Management of Quality Standard for Drinking Water and Household Water Supply Guideline October 2014, Ministry of Health, one

year could test 23 parameters.

3-4. Water Quality Standards for Drinking Water

(See above)

3-5. Monitoring System or Plans for Safety of Drinking Water in Your Organization / Regulatory Body / Independent Institution /Others

Ministry of Health, Department of Health and Hygiene Promotion

3-6. Implementation of Water Safety Plans* or Similar Efforts

(* Water Safety Plans: refer to the following URL and review before participating in the Course, the Chapter 4 "Water Safety Plans" of the "Guidelines for drinking-water quality, third edition"

URL: **http://www.who.int/water_sanitation_health/dwq/gdwq3_4.pdf**)

Water Safety Plans are required for state water utility but no budget to implement. Training of Trainer completed already.

---

4. Reduction of Non-Revenue Water

4-1. Current Situation and Major Challenges/Problems

Non-revenue water is 30% *data year 2017*

Non- revenue water planned to reduction lower to 25% by year 2025

- Biggest challenge is the old pipes used in the system which are broken.
- Urban centers are growing very fast; new building and new roads are using earth packing techniques that break new pipes
- Old water meters are inaccurate but cannot afford to replace.
- NRW monitoring lacks qualified technicians.

4-2. Current Actions against Those Challenges/Problems

- DWS is trying to support NPSEs to set NRW as a priority activity for its standards and be not more than 25% NRW.
- Set up customer complaints call center and emergency leak repaired teams.
- Prepare tools and vehicle needs.
- Improved pipe installation standard.

4-3. Any Achievements in Reduction on NRW

- Old pipe network replacement activities, old water meter replacement activities, redrawing pipe network keep to computer in electronic file and etc.

4-4. Constitution of NRW (If you have the data, please fill in the table.)

Authorized consumption	Revenue water	Billed authorized consumption	109.119.164 m^3 /year 70%
	Non-Revenue Water (NRW)	Unbilled authorized consumption (ex. fire fighting, cleaning)	1.399.111 m^3 /year 1%
Water losses		Apparent losses	

		(Unauthorized consumption (i.e. Illegal use), Customer metering inaccuracies)	3.264.591 m³ /year 2%
		Physical losses (Leakage)	41.973.318 m³ /year 27%

4-4. Situations about Leakage Detection Measures (DMA etc.)

DMA started in Vientiane Capital, Champask and Luangnamtha NPP.

---

5. Accounting system of Water Supply Service

5-1. Water Tariff in your Organization

Province request to Ministry, Then DWS reviews and have recommendation, then province implement.

5-2. Balance Sheet of your Organization

Regulation Division collects data from all NPSE on Balance Sheets and summarises for annual report year by year.

5-3. Profit and Loss Statement of your Organization

(*[Public Utilities] (1) Profit and Loss Account
(2) Capital Income and Expenditures of your Organization)

(* You can check the case of Tokyo in the chapter 4 "Financial System and Future Financial Management" of this file.
URL: **http://www.waterprofessionals.metro.tokyo.jp/pdf/wst_02.pdf**)

As above

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6. Major Recent Achievements in Improvement of Water Supply Services/Management

- Since 1995, expansion of water utility service from 5 urban centres to in 2019 more than 100 urban centres.
- Since 1999, the provincial water utilities have progressed from heavily subsidized government units to more efficient state-owned enterprises.
- Short- to medium-term financial resilience is improving as can be seen in the corporate plans, but we recognize that these plans should be set within a longer-term plan examining the financial impacts of future debt service and asset replacement.
- Service Agreements between the provincial government and provincial water utility set out the tariffs approved and the KPIs that are required to be met – effectively a basic regulatory contract.
- Economic regulation effected in each province by the Provincial Assembly acting on technical advice of Department of Water Supply.

- Tariffs approved every 3-years with annual adjustments as necessary
- Increase the capacity of water production
- controlling non-revenue water to be in a range 20-25% by year 2025
- expansion pipe network to town areas to ensure people be able to get water supply coverage 85% by year 2025

---

7. Recent Challenges to Improvement of Water Supply Services

- The human resource on Water Supply and Sanitation has limited
- Financial support is constraint
- Scope of Urban Rural Water Supply Mandate Unclear
- Unit costs for new installation service high
- Operation of state water utilities not yet profitable
- Cost of Water supply production are very high, e.g. Electricity, chemical, administration cost, labor costs etc.

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8. Expectations toward Japan

8-1. Expectations toward Japanese Government and JICA

8-2. Expectations toward Japanese Water Utilities

8-3. Expectations toward Japanese Private Companies

The Government of Lao PDR highly respects the long-term support from the Japanese Government and JICA, and looks forward to continuing the close relationship in the future.

---

9. Expectations toward the Program.

(Any comments and requests are appreciated.)

(Please add sheets of paper if necessary.)

Water Supply Administration
For Better Management of Water Supply Services
Course（Ｂ）

MICRONESIA

PUC Pohnpei Utilities Corporation

JICA Japan International Cooperation Agency

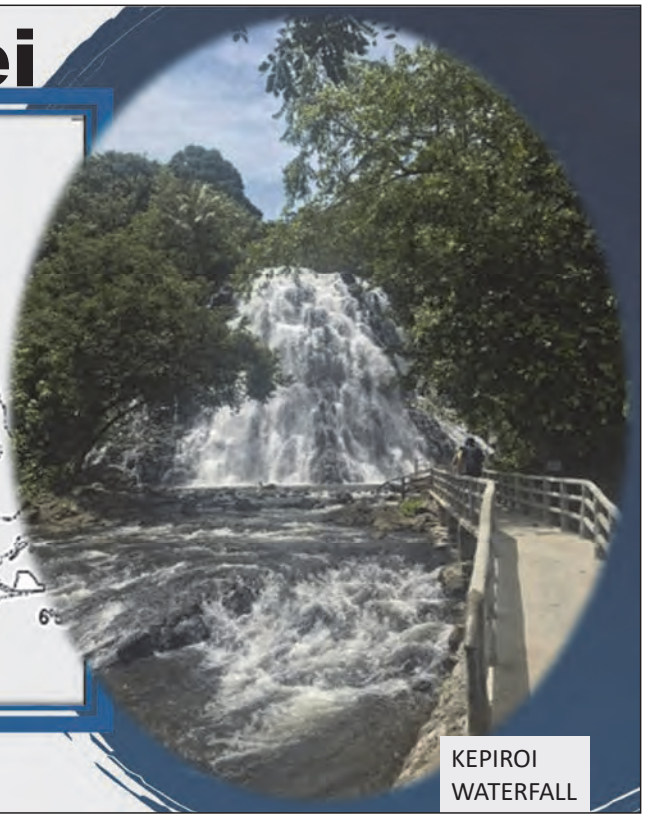
Nov, 13 2019

LOCATION MAP

1,644 KILOMETER

Island of Pohnpei

- POPULATION : 36,196 (C-2010)
- LOCATION: 6.8500° N, 158.2333° E



KEPIROI WATERFALL

POHNPEI UTILITIES CORPORATION ENCOMPASSES

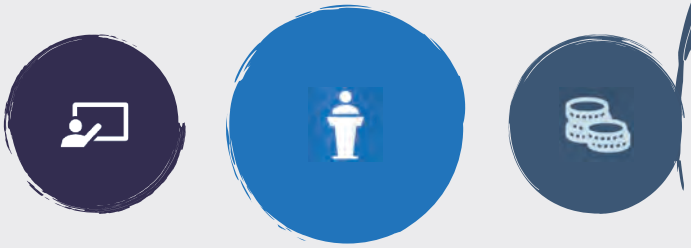
DEPARTMENT OF FINANCE

DEPARTMENT OF POWER GENERATION AND DISTRIBUTION

DEPARTMENT OF WATER AND SEWER

ENGINEERING AND PLANNING SERVICES

DEPARTMENT OF WATER AND SEWER



ROLES AND RESPONSIBILITIES

ISSUES

NEW DEVELOPMENT AND STUTUS

Roles and Responsibilities of Water Works Division

Water Division

Pohnpei Utilities Corporation (PUC) is the major provider of water on Pohnpei. The division of Water responsible for the operation and maintenance of the Four Water Systems. The water systems are combination of Surface and groundwater system are as follows.

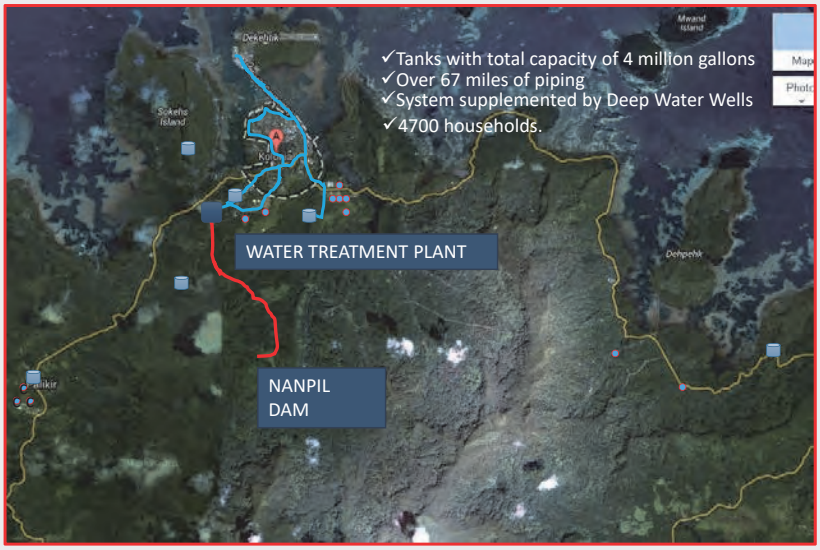
1. Central Water System (SW & GW)
2. Palikir Water System (GW)
3. Lukop Water system (GW)
4. Wapar Water System (GW)

Roles and Responsibility

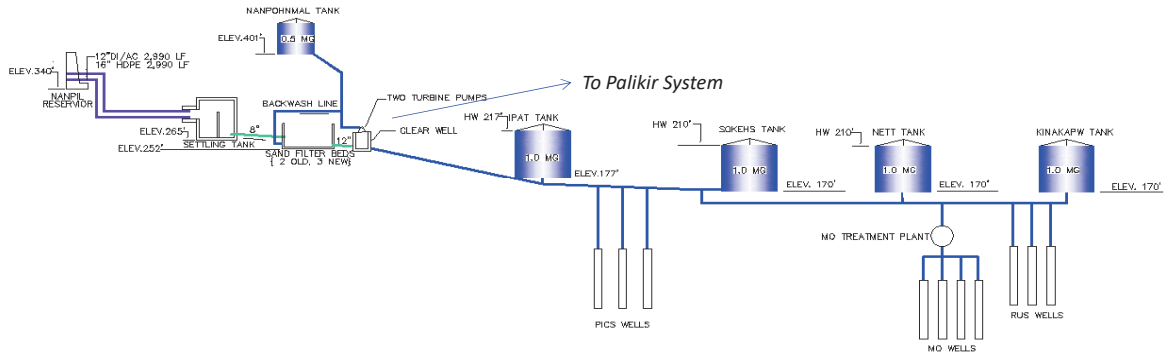
PUC is a public corporation of the Pohnpei State Government and is the primary provider of Power, **Water** and Sewer services for the island. It is underthe governance of a seven- Board members , appoints by the Governor and approved by the Legislature of Pohnpei State, The General Manager who is hired by the Board of Directors oversees the overall operation of PUC.

Current Service Area

Kolonia, Sokehs, Nett, Uh a Portion of Madolenihmw

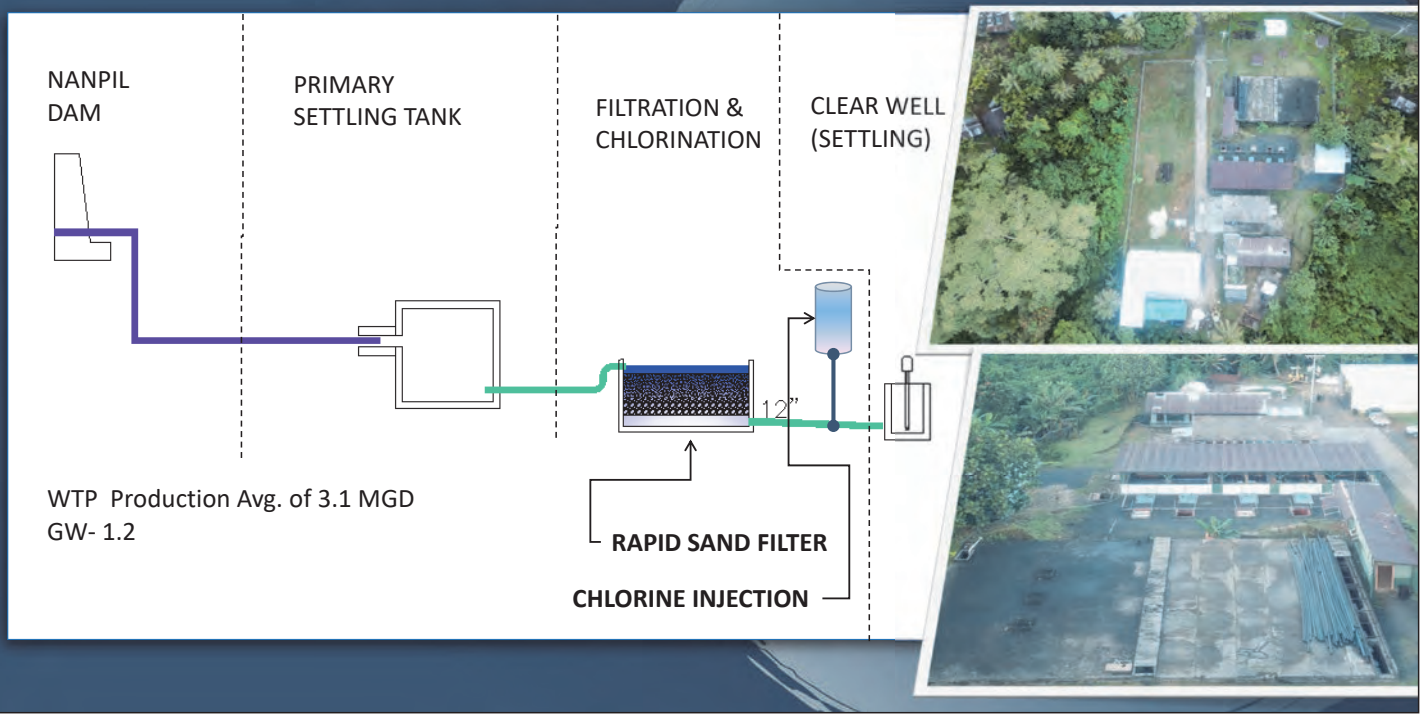


SYSTEMATIC PROFILE OF WATER SYSTEM



SYSTEMATIC PROFILE OF WATER SYSTEM

WATER TREATMENT PLANT



WTP Production Avg. of 3.1 MGD
GW- 1.2

MO Plant (Iron Removal Plant)

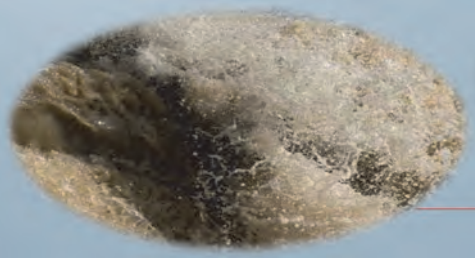
Water extracted from ground water and transmits into the Iron Removal Plant for process.

Plant produces 400 GPM

- Water Stress in Plant (drought season)

Water Scarcity (due to upland activities) Deforestation and etc.

ISSUES



High Turbidity, During rainy season due to the upland activities

Aging of the existing system.

DEVELOPMENT

1. JICA proposal – 15 Millions to upgrade the existing water system
2. Ground Water Development proposal 700K- to purchase Drill Rig w/ Training, Ground Water Investigation (Hydrogeologist) FSM Congress
3. Upgrade of Existing Iron Removal Plant 3 Million
4. Cash Water (Prepaid Meter conversion) proposal (1 M from US Compact Grant)
5. 7 M Waterline extension to south west of PNI (7.8 M)
6. Waterline extension east to Madolehniwm (est. 9 M)

THANK YOU

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Date: 7/25/19

Name: Leerenson Airens

Country: Federated States of Micronesia

(Pohnpei State)

Organization: Pohnpei Utilities Corporation

Position: Manager, Water Division

INCEPTION REPORT

1. Outline of Water Supply Services

1-1 Legal Basis of Water Supply Services

The existence of the Pohnpei utilities corporation was transferred from the Pohnpei state public works under the public law S.L No.2L-179-91 for puc to took over the responsibilities and duties of the power generation and distribution system.
In 1993, the Pohnpei Legislature further amended the Public Law S.L No. 2L -179-91for public law s.l. no. 3l-41-93 for the corporation to take the full responsibilities and duties of water and wastewater to incorporate into its mandates.

ON the third special session 2012, the eight legislatures amended the existing public law 2L-179-91 to s.l. no. 8l-09-12 enacted additional responsibilities, duties and power of the corporation. Under section 1-102 of title 34 of Pohnpei code, highlighted several responsibilities, duties and power of the corporation as referred to "public utilities services" to the people of Pohnpei.

1-2 Demarcation of Water Supply Services

Currently PUC is the solely responsible for the water supply as given and authorized by the Pohnpei state legislature, the Pohnpei EPA responsible only for water act in conjunction to water quality parameters.

1-3 Main Actor of Water Supply Utilities

The Pohnpei Utilities Corporation is a public corporation as the main water provider

1-4 Mission/Vision of Water Supply Utilities

Mission: To provide clean water to improve the quality lives and the economy of Pohnpei Sate

Vision: Dedicate to provide Efficient, Reliable, Accessible and Cost-Effective Utility Services to Improve and Sustain the Quality of Life in Pohnpei

2. Water Supply Services

2-1. Main Performance Indicators (PI)

Coverage Area (see image 1,2 &3)	107.826 KM (71 %)
Population Served	3,700 House hold (meters) with the total population of 22200 (this is by using the 2010 FSM census as 6 persons per household)
Collection Ratio	(70 %)
Production Capacity	11,356 (m^3/day)
Supply Duration	24 (hour/day)
Supply Pressure	689.4 kpa at lower points, 275.7 kpa at high point and 551.5 kpa at normal elevations
Non-Revenue Water	(%)
Water Quality	WTP- process of chlorine (Hypochlorite 65% concentration) performing the absent and present procedures
Staff Number	26
Number of Connections	3,700
Staff/1000 Connections	(People/1,000 connections)

3. Management of Water Quality

3-1 Current Situation and major challenges/problems

The challenges on water quality are mainly on high turbidity during rainy days and iron content specifically from the ground water located at the public health area. During rainy seasons, we received high turbidity from surface water at Nanpihl due to the impact of upland activities. The iron content is mainly from the ground water located at Pohnpei Public health, due to the high iron content presence in the ground water. An iron removal plant constructed in the early 80's which today the deficiencies of the plant is showing ineffective process of the filtration medias.

3-2 Current Actions against those challenges/problems

Solutions and way forward already identified, but with funding issue is the main constraint to implement and address the issues pertaining to water quality, In the effort to minimize the high turbidity received at the Water Treatment Plant, PUC water operators maintain the main valves to control the incoming raw water during the rainy days to minimize the impact of high turbidity receive at the water treatment plant before transmit to the rapid sand filters for filtration process. The high iron content, there is not much action taken as the overall concept of the plant require to upgrade. In order to minimize the impact of the iron diluted to the surface water, the operation of the plant runs on certain number of hours to limit the impact of iron intrude into the system.

3-3 Any achievements in mater quality management

*Currently there is not much improvement on water quality due to the constraints mainly on funding. PUC is currently looking for funding to support some of the water quality in terms of turbidity and iron content. This is to address existing infrastructure, see **annex 1** for detail conceptual proposal.*

3-4 Water Quality Standards for Drinking Water

In conjunction to Pohnpei Sate EPA water quality drinking water act or regulations

3-5 Monitoring System or plans for safety of drinking water in your organization

The unavailability of a comprehensive water safety plan with PUC, recently we are working to have a water safety plan for PUC Water as overall. Currently, the practical approach to maintain our services to the public. We entertain the procedures of the absent and present water quality procedures. Pohnpei EPA is currently entertain the overall aspect of water quality surveillance and testing of PUC water system. In the effort to establish the water safety plan, in general, we identified the potential key factors that shall require to entertain into the water safety plan. ***See annex 2.***

3-6 Implementation of Water Safety Plans or Similar efforts

Practically, we maintain the quality and quantity portion of the overall Water safety plan, with the support and availability of the water safety plan. The detail procedures and way forward shall proceed accordingly to WSP.

4. Reduction of Non-Revenue Water

4-1 Current Situation and Major Challenges/problems

The major Challenges or problems attributes from passive, actives leaks, meter problems and inconsistency of data from public safety for the division of fire fighter.

4-2 Current Actions against those challenges/problems

The replacement and upgrade of the existing GI pipes, Repaired of all active leaks and some of the passive leaks. There is not much on water demand management due to the missing system components, such as bulk meter, district meter or in general flow meter at the require point in the distribution network. The absent of such important apparatus, contributes to demand management and inaccuracies of data root to the inconsistency of accurate data.

4-3 Any Achievements in reduction on NRW

A slide change from 40% to 38%.

4-4 Constitution of NRW (if you have the data, please fill in the table)

Authorized consumption	Revenue Water	Billed authorized consumption	54, 067,017.60 Gallons per Month, check again
Water production at 91,690,000 Million gallons per month (416830.9921 M^3 per month)	$ 88,715.95 collected last month, sometimes the collection varies for each month, it average range at 70% collection rate for a month.	Unbilled authorized consumption (ex. Fore fighting, cleaning) Backwash water from the WTP	Not known 15,812,000 Million gallons per month need to check again

		Apparent losses (unauthorized consumption (ie. Illegal use), customer metering inaccuracies)	8,000,000 gallons per month specifically for malfunction meters
		Physical Losses (leakage)	40% Water loss, this is derived from the water production versus water billed, with the known apparent loss from malfunction meter, therefore the actual loss will decrease to 38%.

5. Accounting system of water supply service

5-1 Water Tariff Organization

Minimum charge	5 USD
Metered rate	2.37 USD/ 1,000Gallon (3.78m^3)
Connection fee	10 USD

5-2 Balance sheet of your organization: See annex3

5-3 profit and loss statement of your organization See annex4,5,6 &7

6. Major Recent Achievements in improvement of water supply services/management

Replacement of the existing GI pipes, identified the main deficiencies existed in the water system and improve the concepts of collection effort by adopting the prepaid water meter program. In various pilot project done few years ago to distinguish the alteration from using conventional meters to prepaid meter. Recently PUC have secure funding under the compact to support the installation and replacement of the conventional meter to prepaid meter. Recently PUC water division have installed over 300 prepaid water meters.

7. Recent challenges to improvement of water supply services

Recent challenges to improve of water supply services pertaining to the water quality in the distribution network especially at the areas that receiving color water mainly from the iron presence.

8. Expectations toward Japan

8-1 Expectations toward Japanese Government and JICA

There are so many expectations relate to the over concepts of water, on the building capacity portion a potential improvement of understanding and knowing the relevant aspect of a full water stewardship is expected as an advantage to gain, in order to implement accordingly with the standards. The other support is also expected from both the Japan Government and JICA, the support of building capacity and others to elevate the current situation of our water system is expected to learn and experience.

8-2 Expectations toward Japanese Water Utilities

In most utilities, the buddy system methodology is always an expectation towards utilities, sharing the knowledge on the overall aspect of water operations and technical areas is expected to learn from, with the Japanese utilities at the level of standards, lots of expectation is indeed will assist us to learn and adopt

8-3 Expectations toward Japanese Private Companies

Some of the important expectation on how the private companies are dealing with in terms of conservation, usage and repetitive of payments.

9. Expectations toward the program.

It is indeed important to learn and able to put into practice, as mentioned in the program module, these are some of the important factors that a water provider require to posses to deliver its mandates accordingly. The overall concept of the program is important, it will enable a comprehensive knowledge on the technical to management of water stewardship. It is expected that I can deliver what I learn from the program to apply to me daily management of the water system here on Pohnpei and others.

ANNEX 1

1. **Upgrading of Nanpil Dam:**

   a) Installation of New Settling/Sedimentation Tank

   - *The vulnerability of high sedimentation experiences at the Water Treatment Plant especially during rainy days is drastic, that hinder the daily output of the water production. In experiencing the facts of high turbidity, the concept of new settling/sedimentation tank to be located at the intake site, is highly recommended to allow the settlement of fragments or other debris present during operation. The construction of new settling or sedimentation tank, will enable to decrease high turbidity or sedimentations transmitted to the Water Treatment Plant. The proposed concept is to enhance effective filtration process by eradicating any forms of particles present in the water. This process will allow all suspended particles to settle out of the water during its operation, where all sludge is settled in the settling tank and disposal of sludge shall carry out when require.*

     ***Scope of Work**: The project entail engineering design of appropriate structure for the sedimentation process and independent or reliable contractor to carry out the construction works.*

     Project Amount: $ 300,000.00

ANNEX 1

2. New Secondary Water Treatment Plant and Primary Tank

a) New Secondary Treatment Plant

- *In experiencing of high turbidity receives at the treatment plant is an intimidating issue, that causes of high operation cost in relation to manpower, chemical usages and even wastage of water mainly during backwash routine. The current conditions and production of the filtration is evidently decreasing to due aging of the system. The reversible of the water source conditions from its past water characteristics versus today is significantly variance. It is understandable that during those days, the current treatment facility was suitable to utilized, as the water characteristics was ecologically intact. But today with so many disturbances occur at the watershed area from human activities and animals, the existing treatment plant function is sometimes cannot cope with the incoming raw water from the dam during rainy seasons, in the effort to subside the issues of high turbidity, the possibility to incorporate additional filtration system to be the secondary filtration system is doable, as the existing filtration system will consider as the primary treatment. The operation of the secondary system will only operate during rainy seasons. Therefore, the cost of operation will only depend on the weather condition where sustainability of quality and quantity of the water is up to the standards.*

***Scope of Work**: The project shall encompass of engineering design, construction, provide training and provide operation manual.*

3. New Iron Removal Plant

- The construction of a New Iron Removal Plant is indeed one of the priorities that PUC is so longing for and seeking of funding for a new plant. In the Hydrogeological study shows that the water aquifer at this particular area contain lots of water but high in iron content. In the 1980's the construction of an iron removal plant was constructed with the maximum output of 400 GPM, since the transfer of the water system from the Pohnpei Government, Under the ADB project, PUC re-drilled and drilled additional wells from 4 wells to 6 wells with deeper depth from the exiting boreholes. In the eagerness of financial needs, PUC is therefore seeking funding for a new Iron Removal Plant with higher capacity, that will able to take in all the existing wells at one operation is recommended. With the capacity and inefficient of

the existing plant, that during operation a maximum of two to three wells can start up and maximize the output of the plant. A total of six (6) boreholes are located adjacent to the plant, during those times of demand needs, the treatment plant is not equipped to operate the six (6) wells. The deodorization of the system and its components are evidently showing all its defects, the proposed new Iron removal plant at 800 GPM minimum with new various filtration medias is indeed optional to meet the demand when require. The treatment plant requires to have a similar setup where the plant can run on an automated mode operation with disinfection process of chlorine injector and analyzer unit. In forecasting the new plant, there are many contributions it will provide to the overall operation of the water system. It was originally design to supplement the surface water but directly to the Pohnpei State Hospital.

The general concepts are to construct a new structure with all the components that require as a removal plant and when natural disaster occur that will hinder the power supply, it is vital to have its own independent power sources, therefore a standby generator rated at 200 KVA is adequate to run the whole facility.

Scope of Work: *The project will consist of Bidding of Engineering Plan and design and construction of an appropriate Iron Removal Plan that will fit the Characteristics of the Ground Water at the area. Provide building capacity on how to operate the plant with all the components and also provide operation manual.*

ANNEX 2

Water System Components	Hazard Events	Hazard	Risk	
Catchment	Upland Farming	Deforestation	Water Quality & Quantity	
	Protection of the Nanpil Dam from encroachment and increased sedimentation.			
Transmission	Vandalism	Untreated Water	Water Born Diseases	
	"	Leakages	Water Quantity	
WTP	Absent of Laboratory	Quality Damage	Public health	
	Protecting of the Filtration system from animals and other Amphibians	Water quality concern	Pathogen	
	Unavailability of Raw Waterline meter Production	Unaccounted Raw water	Water Quantity	
	incapacity of Primary Tank	Quantity Damage	Water Quantity	
	Incapacity of Filtration System	Water Quality	Pathogens	
Distribution System	Leaking/Rusted GI pipes	Pathogens	Public Health	
	Unavailability of FH at some locations	Fire Fighting	Public Security	
	Unavailability of BOV at some locations	Increasing of sedimentations or turbidity	Water Quality	
	Deodorizations of Cadothic at the Reservoirs	Aging	Water capacity and life of span of reservoirs	
	AC Pipes	Existence of AC pipes	Public health	

ANNEX 3

(With comparative totals as of September 30, 2017)

	Power and Utility	Water and Sewer	Totals 2018	Totals 2017
Assets				
Current assets:				
Cash and cash equivalents	$ 1,388,441	$ -	$ 1,388,441	$ 1,011,846
Time certificates of deposit	228,788	-	228,788	227,524
Accounts receivable, net	1,316,142	57,232	1,373,374	1,291,850
Divisional (payable) receivable	(1,385,819)	1,385,819	0	-
Prepayments	58,974	-	58,974	274,847
Materials and fuel inventory, net	151,593	35,023	186,616	139,269
Total current assets	1,758,119	1,478,074	3,236,193	2,945,336
Other noncurrent assets:				
Long-term deposits	1,256,912	-	1,256,912	1,256,912
Restricted - cash and cash equivalents	517,473	-	517,473	516,937
Total other noncurrent assets	1,774,385	-	1,774,385	1,773,849
Utility plant, at cost:				
Electric plant in service	36,680,866	-	36,680,866	42,382,809
Water and sewer plant in service	-	29,933,322	29,933,322	30,818,426
	36,680,866	29,933,322	66,614,188	73,201,235
Less accumulated depreciation	(23,825,917)	(13,232,022)	(37,057,939)	(41,195,846)
Depreciable assets	12,854,949	16,701,300	29,556,249	32,005,389
Construction work-in-process	646,199	203,868	850,067	432,844
Total utility plant	13,501,148	16,905,168	30,406,316	32,438,233
	$ 17,033,652	$ 18,383,242	$ 35,416,894	$ 37,157,418
Liabilities and Net Position				
Current liabilities:				
Notes payable	$ 536,636	$ -	$ 536,636	$ 549,131
Current portion of long-term debt	63,427	411,643	475,070	577,064
Accounts payable:				
Operations	677,602	2,262,549	2,940,151	2,658,087
Fuel, lubricants and kwh purchased	603,096	-	603,096	911,000
Unearned revenue	627,100	-	627,100	391,989
Accrued taxes and other liabilities	334,462	-	334,462	233,389
Employees' annual leave	123,132	-	123,132	127,426
Total current liabilities	2,965,455	2,674,192	5,639,647	5,448,086
Noncurrent liabilities:				
Loan payable - RUS	-	472,091	472,091	485,675
Loan payable - BOG	642,223	-	642,223	695,232
Loan payable - BFSM	-	-	0	13,024
Loans payable - ADB	-	6,813,230	6,813,230	7,290,406
Total liabilities	3,607,678	9,959,513	13,567,191	13,932,423
Net position:				
Net investment in capital assets	12,815,824	9,208,206	22,024,030	23,500,610
Restricted	723,686	-	723,686	723,150
Unrestricted	(113,536)	(784,477)	(898,013)	(998,765)
Total net position	13,425,974	8,423,729	21,849,703	23,224,995
	$ 17,033,652	$ 18,383,242	$ 35,416,894	$ 37,157,418

See accompanying Independent Auditors' Report.

Annex 4

POHNPEI UTILITIES CORPORATION
(A COMPONENT UNIT OF THE STATE OF POHNPEI)

Statements of Revenues, Expenses and Changes in Net Position
Years Ended September 30, 2018 and 2017

	2018	2017
Operating revenues:		
Electricity sales	$ 12,191,748	$ 10,928,691
Water sales	1,578,366	1,419,534
Other sales	189,810	18,383
Total operating revenues	13,959,924	12,366,608
Bad debts	(506,464)	(775,031)
Net operating revenues	13,453,460	11,591,577
Operating and maintenance expenses:		
Production fuel	6,390,446	5,869,428
Depreciation	2,109,349	2,218,758
Kwh purchased	2,106,591	1,384,348
Administrative and general	1,769,348	1,780,326
Generation	1,013,720	861,928
Water and sewer	917,516	705,809
Distribution	688,505	760,697
Provision for inventory obsolescence	45,931	-
Total operating and maintenance expenses	15,041,406	13,581,294
Operating loss	(1,587,946)	(1,989,717)
Nonoperating revenues (expenses), net:		
Interest expense, net	(199,977)	(193,315)
Grants and subsidies	100,000	-
Loss on disposal of utility assets	(420,031)	(939)
Other income	132,325	118,960
Total nonoperating (expenses) income, net	(387,683)	(75,294)
Loss before capital contributions	(1,975,629)	(2,065,011)
Capital contributions:		
Capital contributions	600,337	107,485
Total capital contributions	600,337	107,485
Change in net position	(1,375,292)	(1,957,526)
Net position at beginning of year	23,224,995	25,182,521
Net position at end of year	$ 21,849,703	$ 23,224,995

See accompanying notes to financial statements.

Annex 5

POHNPEI UTILITIES CORPORATION
(A COMPONENT UNIT OF THE STATE OF POHNPEI)

Statements of Cash Flows
Years Ended September 30, 2018 and 2017

	2018	2017
Cash flows from operating activities:		
Cash received from customers	$ 13,504,262	$ 12,427,884
Cash payments to suppliers for goods and services	(10,635,691)	(9,114,465)
Cash paid to employees	(2,543,164)	(2,066,647)
Net cash provided by operating activities	325,407	1,246,772
Cash flows from investing activities:		
Interest and dividends on investments and bank account	1,501	394
Net cash provided by investing activities	1,501	394
Cash flows from noncapital financing activities:		
Net decrease in note payable	(12,495)	-
Operating grants received	100,000	-
Net cash provided by noncapital financing activities	87,505	-
Cash flows from capital and related financing activities:		
Interest paid	(202,742)	(195,795)
Principal repayment of long-term debt	(160,567)	(444,977)
Cash receipts from grantor for capital projects	913,475	-
Acquisition of utility plant	(587,448)	(49,734)
Net cash used in capital and related financing activities	(37,282)	(690,506)
Net change in cash and cash equivalents	377,131	556,660
Cash and cash equivalents at beginning of year	1,528,783	972,123
Cash and cash equivalents at end of year	$ 1,905,914	$ 1,528,783
Reconciliation of operating loss to net cash provided by operating activities:		
Operating loss	$ (1,587,946)	$ (1,989,717)
Adjustments to reconcile operating loss to net cash provided by operating activities:		
Depreciation	2,109,349	2,218,758
Bad debts	506,464	775,031
Inventory obsolescence	45,931	-
Other income	132,325	118,960
(Increase) decrease in assets:		
Accounts receivable	(587,988)	(142,104)
Prepayments	215,873	96,907
Materials and fuel inventory	(93,278)	26,785
Long-term deposits	-	(108,475)
Increase (decrease) in liabilities:		
Accounts payable	(434,075)	162,521
Unearned revenue	(78,027)	84,420
Accrued taxes and other liabilities	101,073	(23,673)
Employees' annual leave	(4,294)	27,359
Net cash provided by operating activities	$ 325,407	$ 1,246,772

Supplemental information of noncash operating, capital and related financing activities :

During the years ended September 30, 2018 and 2017, loan payments of $408,235 and $249,652, respectively, were made by by Pohnpei State Government. As a result, PUC increased its accounts payable and reduced its long-term debt by the same amount.

During the year ended September 30, 2018, PUC was allocated a decrease of $89,985 of balance adjustments relating to currency re-evaluation changes associated with the ADB loans. As a result, PUC decreased its capital assets and its long-term debt by the same amount.

During the year ended September 30, 2018, PUC performed a physical inspection of all capital assets and wrote off a total of $6,667,287 of capital assets not in existence, which resulted in recognition of loss of $420,031.

See accompanying notes to financial statements.

Annex 6

POHNPEI UTILITIES CORPORATION
(A COMPONENT UNIT OF THE STATE OF POHNPEI)

Combining Statement of Revenues, Expenses and Changes in Net Position
Year Ended September 30, 2018
(With comparative totals for the year ended September 30, 2017)

	Power and Utility	Water and Sewer	Totals 2018	Totals 2017
Operating revenues:				
Residential	$ 74,550	$ 1,118,525	$ 1,193,075	$ 1,186,298
Cash power	7,457,504	-	7,457,504	6,745,002
Cash water	-	12,315	12,315	28,573
Commercial	2,778,641	216,222	2,994,863	2,585,325
Government	1,881,053	231,304	2,112,357	1,803,027
Other sales	172,985	16,825	189,810	18,383
Total operating revenues	12,364,733	1,595,191	13,959,924	12,366,608
Bad debts	(34,424)	(472,040)	(506,464)	(775,031)
Net operating revenues	12,330,309	1,123,151	13,453,460	11,591,577
Operating and maintenance expenses:				
Production fuel	6,390,446	-	6,390,446	5,869,428
Depreciation	1,319,389	789,960	2,109,349	2,218,758
Administrative and general:				
Salaries and wages	416,747	-	416,747	442,877
Employee benefits	444,603	-	444,603	470,979
Travel	153,961	-	153,961	136,759
Vehicle, POL	87,026	-	87,026	96,605
Insurance	61,263	-	61,263	68,668
Communications	60,032	-	60,032	64,969
Contractual services	50,140	-	50,140	73,240
Consumables and supplies	26,876	-	26,876	33,349
Customer service and collection	81,851	-	81,851	89,664
Repairs and maintenance	56,124	-	56,124	50,343
Other	330,725	-	330,725	252,873
	1,769,348	-	1,769,348	1,780,326
Kwh purchased	2,106,591	-	2,106,591	1,384,348
Generation:				
Salaries and wages	440,191	-	440,191	451,035
Repairs and maintenance	508,480	-	508,480	381,739
Other	65,049	-	65,049	29,154
	1,013,720	-	1,013,720	861,928
Distribution:				
Salaries and wages	644,739	-	644,739	693,726
Repairs and maintenance	5,974	-	5,974	8,897
Consumables and supplies	37,792	-	37,792	58,074
	688,505	-	688,505	760,697
Water and sewer:				
Salaries and wages	-	499,846	499,846	506,368
Chemicals	-	-	-	7,400
Consumables and supplies	-	-	-	61,678
Employee benefits	-	61,922	61,922	65,705
Repairs and maintenance	-	261,856	261,856	50,486
Other	-	93,892	93,892	14,172
	-	917,516	917,516	705,809
Provision for inventory obsolescence	44,246	1,685	45,931	-
Total operating and maintenance expenses	13,332,245	1,709,161	15,041,406	13,581,294
Operating loss	(1,001,936)	(586,010)	(1,587,946)	(1,989,717)

See accompanying Independent Auditors' Report.

Annex 7

POHNPEI UTILITIES CORPORATION
(A COMPONENT UNIT OF THE STATE OF POHNPEI)

Combining Statement of Revenues, Expenses and Changes in Net Position, Continued
Year Ended September 30, 2018
(With comparative totals for the year ended September 30, 2017)

	Power and Utility	Water and Sewer	Totals 2018	Totals 2017
Nonoperating revenues (expenses), net:				
Interest expense, net	-	(199,977)	(199,977)	(193,315)
Grants and subsidies	100,000	-	100,000	-
Loss on disposal of utility assets	(10,280)	(409,751)	(420,031)	(939)
Other income	-	132,325	132,325	118,960
Total nonoperating revenues (expenses), net	89,720	(477,403)	(387,683)	(75,294)
Loss before capital contributions	(912,216)	(1,063,413)	(1,975,629)	(2,065,011)
Capital contributions:				
Capital contributions	600,337	-	600,337	107,485
Total capital contributions	600,337	-	600,337	107,485
Change in net position	(311,879)	(1,063,413)	(1,375,292)	(1,957,526)
Net position at beginning of year	13,737,853	9,487,142	23,224,995	25,182,521
Net position at end of year	$ 13,425,974	$ 8,423,729	$ 21,849,703	$ 23,224,995

See accompanying Independent Auditors' Report.

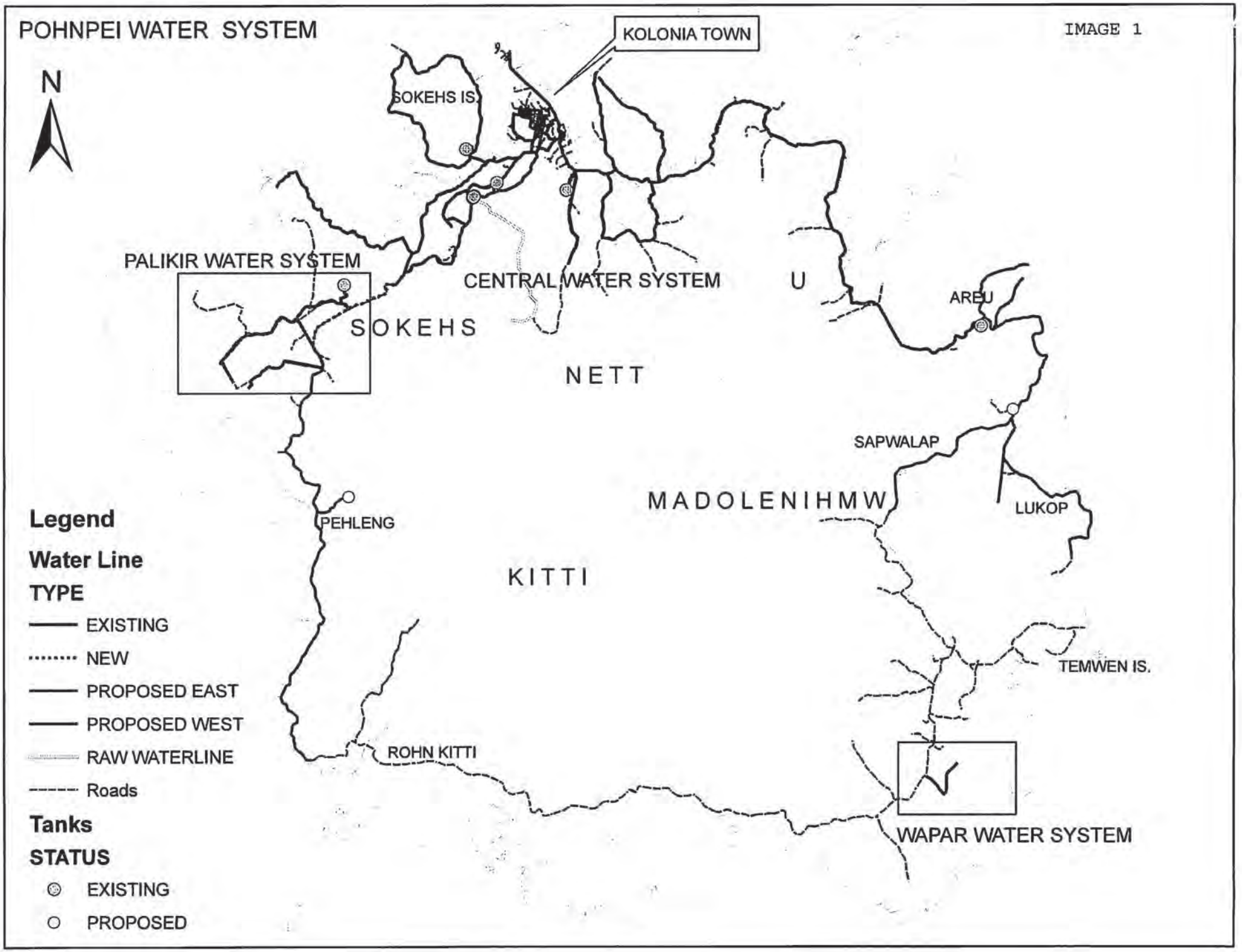
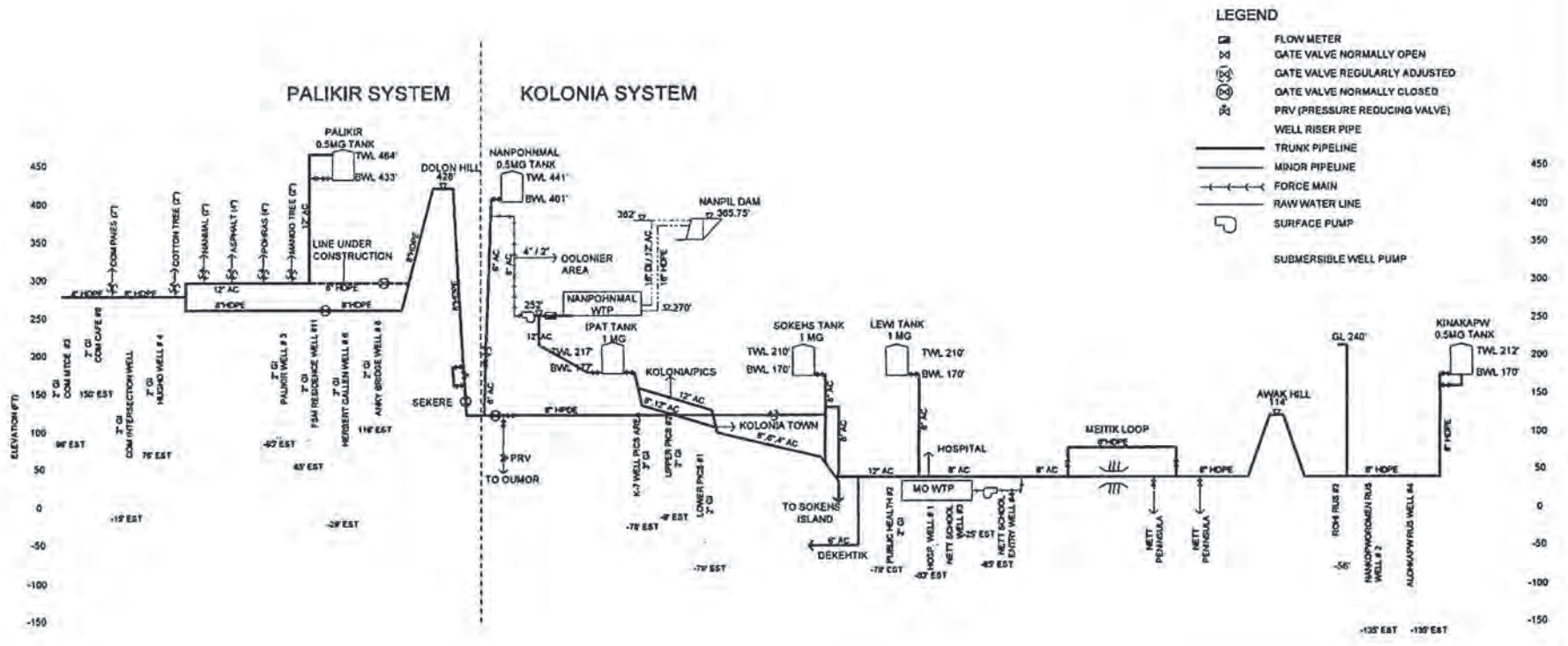

POHNPEI WATER SYSTEM
IMAGE 1
N
KOLONIA TOWN
SOKEHS IS.
PALIKIR WATER SYSTEM
CENTRAL WATER SYSTEM
U
AREU
SOKEHS
NETT
SAPWALAP
MADOLENIHMW
LUKOP
PEHLENG
KITTI
TEMWEN IS.
ROHN KITTI
WAPAR WATER SYSTEM
Legend
Water Line
TYPE
EXISTING
NEW
PROPOSED EAST
PROPOSED WEST
RAW WATERLINE
Roads
Tanks
STATUS
EXISTING
PROPOSED

IMAGE 2

REVISIONS			
REV	DESCRIPTION	BY	DATE
–	WATER OPERATIONS REVIEW REPORT	C.M.	03/18/2016



KOLONIA/PALIKIR WATER SUPPLY SYSTEM SCHEMATIC
NTS

POHNPEI UTILITIES CORPORATION
DEPARTMENT OF WATER & SEWER
KOLONIA, POHNPEI
FEDERATED STATES OF MICRONESIA

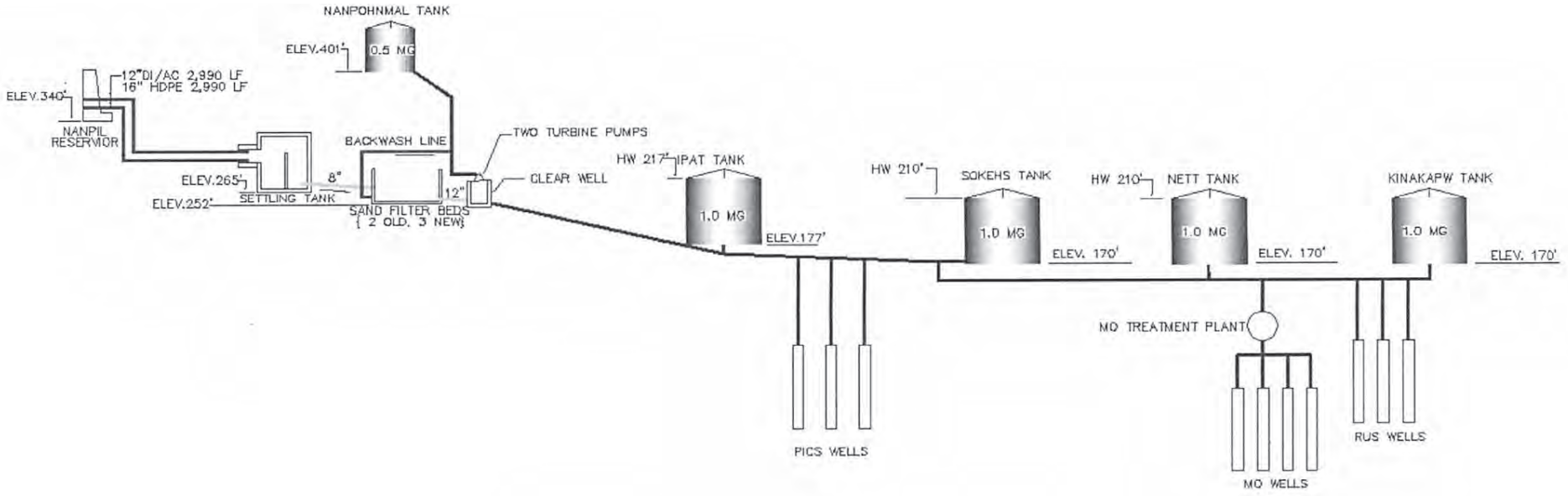
KOLONIA/PALIKIR
WATER SUPPLY SYSTEM SCHEMATIC

SCHEMATIC ELEVATION

P-001

1 OF 1

IMAGE 3



SYSTEMATIC PROFILE OF WATER SYSTEM

Water Supply Administration
For Better Management of Water Supply Services
Course（Ｂ）

MYANMAR

Water Supply Administration for Better Management of Water Supply Services

Mr. Aung Htut Lin
Assistant Engineer
Water Resources And Water Supply Authority
Yangon City Development Committee
Myanmar
11.11.2019.(Monday)

Content

- General Information about Myanmar
- General Information about YCDC
- General Information about Water Resources and Water Supply Authority
- Expectation to Learn in the Program in Japan

General Information

General Information about Yangon City

Yangon city area	794 km2
Population	About 5.2 million
Numbers of District	4
Numbers of Township	33
Average Annual Rainfall(mm)	2700mm
Mean Maxi: Temp: Mean Mini: Temp:	33°C 21°C

General Information about Myanmar

Numbers of State and Region (1 union territory+7regions+7states)	15
Number of Districts	74
Number of Townships & sub-townships	412
Total population	51,486,253
Population in male	24,824,586
Population in female	26,661,667
Percentage of urban population	30%
Area (Km2)	676,577
Population Density (per km2)	76.1
Coastal Line(km)	2832
Neighboring Countries	China, Laos, Thailand, India, Bangladesh

3

Organization Chart of Yangon Region Government

Chief Minister
U Phyo Min Thein

Minister for Security & Border Affairs	Minister for Planning & Finance	Minister for Electricity, Industry & Transport	Minister of Livestocks, Foresty & Energy	Minister for Social Affairs	Minister for Development Affairs (Mayor of Yangon City)	Minister for Kayin Ethnic Affairs	Minister for Rakine Ethnic Affairs	Region Advocate General
Col. Tin Aung Tun	U Myint Thaung	Daw Nilar Kyaw	U Han Tun	U Naing Ngan Lin	U Maung Maung Soe	Daw Nan Thinzar Myo	U Zaw Aye Maung	U Han Tun

Organization Chart of Yangon City Development Committee

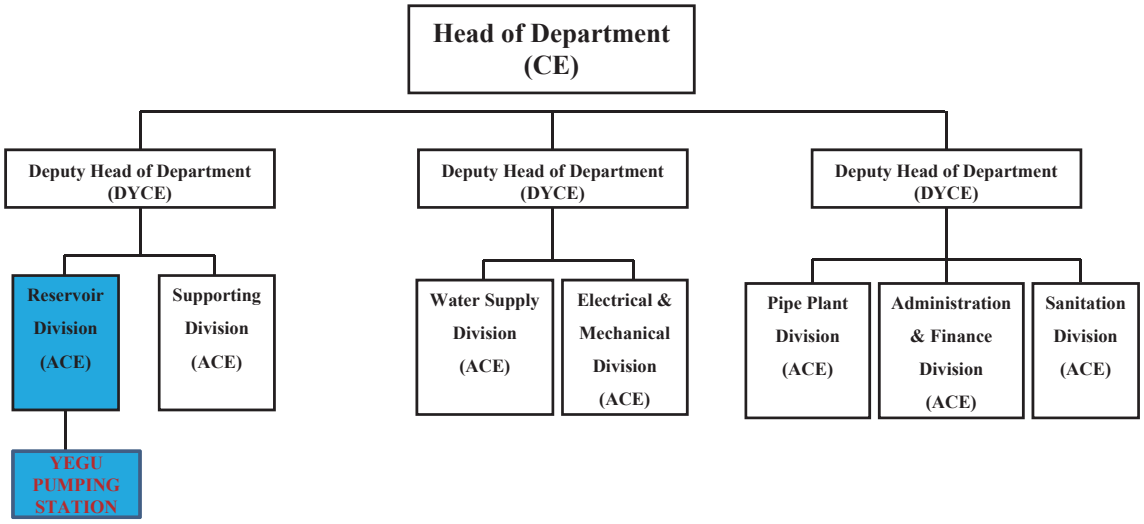
Mayor(Chairman of YCDC)
Deputy Mayor
Secretary
Joint Secretary
Committee Members

Team in Charge of Urban Planning	Buildings Service Coordinator	Bridge Service Coordinator	**Group in Charge of Water Supply and Water Supply Industries**	Water and Wastewater Management Accountability	Public Offer and Accountability
Environmental Management Charge	Management, Public Relations and Information Department	Security and Disciplinary Department		Department of Finance and Accounting	Committee Office

Water Resources And Water Supply Authority

Water Resources And Water Supply Authority is one of the departments under YCDC, which is responsible to supply of clean and potable water to the citizens of Yangon City .

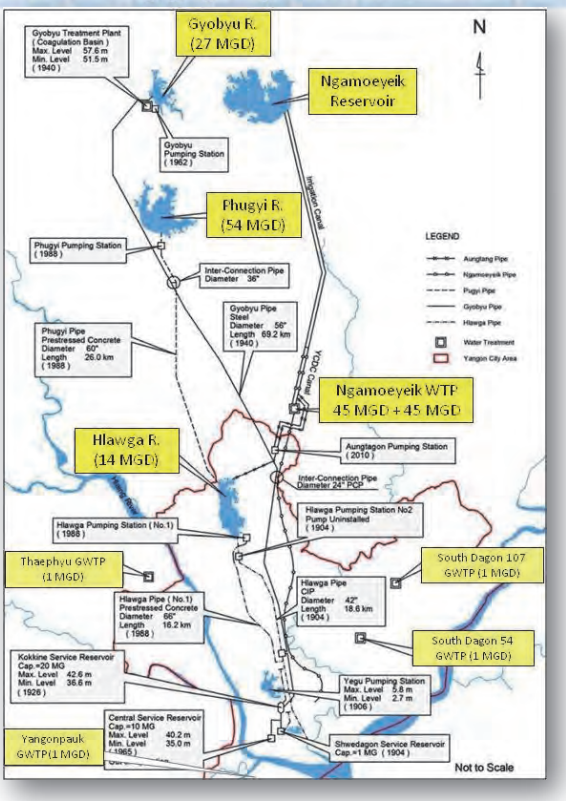
Organization Chart of Water Resources And Water Supply Authority



Status of Water Supply System of Yangon

Facts about Yangon City Water Supply System

Gyobyu Reservoir	27 MGD (122,727 m³/day)
Phugyi Reservoir	54 MGD (245,454 m³/day)
Hlawga Reservoir	14 MGD (63,637 m³/day)
Ngamoeyeik WTP (1st phase)	45 MGD (204,545 m³/day)
Ngamoeyeik WTP (2nd phase)	45 MGD (204,545 m³/day)
YCDC Tube Wells (425 nos.)	16 MGD (72,727 m³/day)
Total Water Supply Capacity	**201 MGD(913,635 m³/day)**
Main Water Sources	**Surface water (92%)** **Groundwater (8%)**
Demand coverage **Non-revenue water**	**approx. 40 %** **approx. 50 %**
Total Population	5,209,541 (2014 Census data)
Served Population	~ 2,000,000 (July 2015 field survey data)



According to Master plan, Leakage Rate in 2018 is 37% and it will be 10% in 2040 and NRW Rate is 51% and it will be 15% in 2040

6

International Cooperation

- ODA Loan Project by JICA
- Grant Aid Project by JICA
- Grass Root Grant Project (Japan)
- Technical Assistant Project by JICA
- Cooperation with Japan Consortium (TSS, Mitsui & Toyo)
- Cooperation with Manila Water And Mitsubishi co., Ltd.
- Cooperation with AFD And Egis (France)
- Cooperation with Danish Water (Denmark)
- Cooperation with ADB

Development Plans and Activities

Future Service Level Targets in Yangon City Water Supply System

Performance Indicators (PIs)	Target Year						
	2013	2018	2020	2025	2030	2035	2040
Non-revenue water (%)	66	51	46	35	26	20	15
Leakage rate (%)	50	37	33	25	18	13	10
Demand coverage (%)	35	45	50	60	65	70	80
Served population (million)	1.8	2.6	3.0	4.1	5.1	6.2	8.0
Water consumption (gpcd)	30	30	30	35	35	35	40
Avg. Supply Pressure (bar)	0.75			> 1.5			
Avg. Supply duration (hour)	8hrs.			24hrs.			
Water quality	Potable	Drinkable					

Water Tariff in Yangon

No.	Metered Category	Water Tariff (MMK/m^3)
1.	Domestic (metered)	88
2.	Commercial (metered)	110
3.	Departments – Residential (metered)	88
4.	Departments – Commercial (metered)	110
5.	YCDC Staff Housing (metered)	88
6.	FE –Residential (metered)	440
7.	FE – Commercial (metered)	880

No.	Flat rate Category	Water Tariff (MMK/month)
1.	Domestic	1800
2.	High Class Residential	3000

Capacity Development

JICA Technical Assistant Project

Outputs

1. Capacity Improvement on Institutional Management of water supply utility
2. Capacity Improvement on Non-Revenue Water Management
3. Capacity improvement on Water Quality Management

Activities for Public Relations

Issues & Problems

- **Aged Transmission Pipe line**
  Frequent Pipe Break, Higher Leakage, Many Branch from Transmission

- **Complex Distribution Without Zoning System**
  Unstable Water Pressure, Intermittence water Supply, Limitation in Pipeline Data, Difficult to control electricity

- **Higher NRW Rate**
  FOC connection , Damaged Meter, Spaghetti Service Pipe, Theft, Billing System

Frequent Pipe Break in Transmission line
Aged Transmission and Distribution Pipe

Aged Transmission Pipes in Yangon City Water Supply System

- **Inefficiency in RSGM**
  Have to build the effective Regulation, Standard, Guidelines and Manual

- **Inspection System**
  Inspection system for pipe construction and distribution network

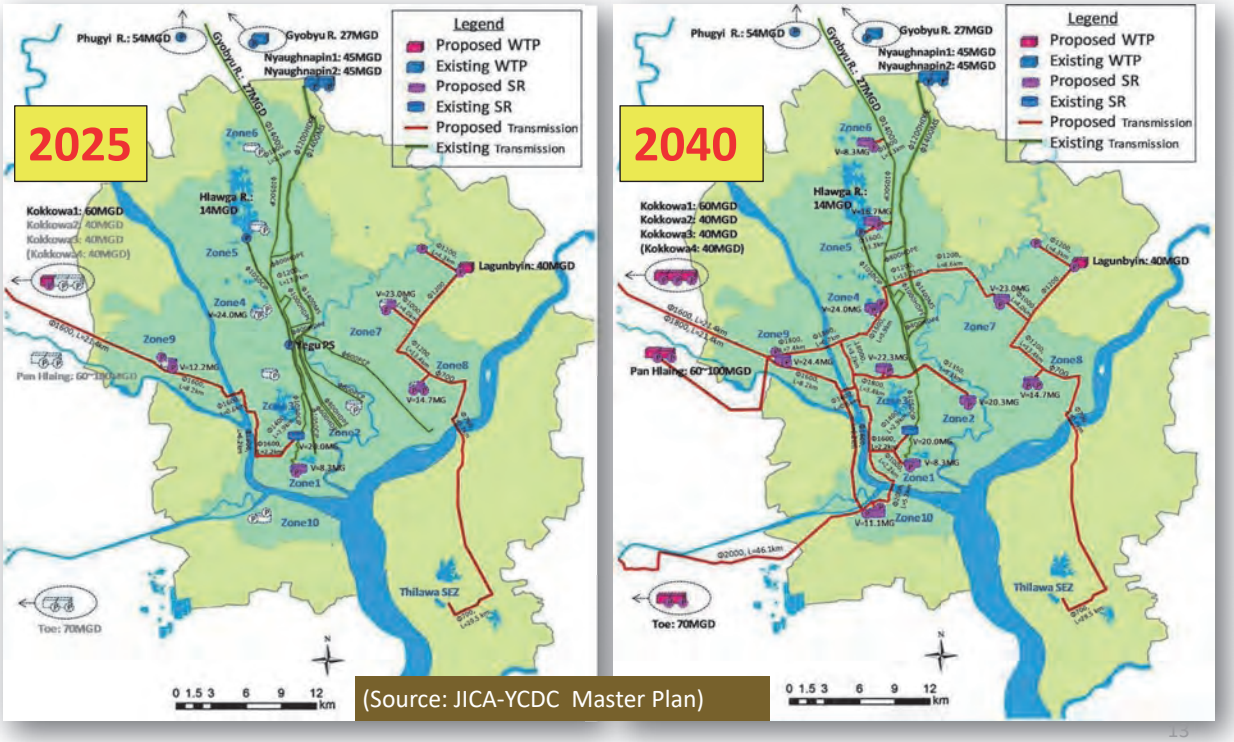
- **Staff Capacity**
  Skill(capacity) of staff is not enough

Start-up year	Pipe material	Diameter	Length	Age
1904	Cast iron	1060 mm	22.85 km	113
1914	Mild steel	1060 mm	8.05 km	103
1940	Mild Steel	1400 mm	69.2 km	77
1989	Pre-stressed concrete	1520 mm	25.75 km	28
1992	Pre-stressed concrete	1650 mm	16.74 km	25

Water Supply Improvement Plan for Yangon City

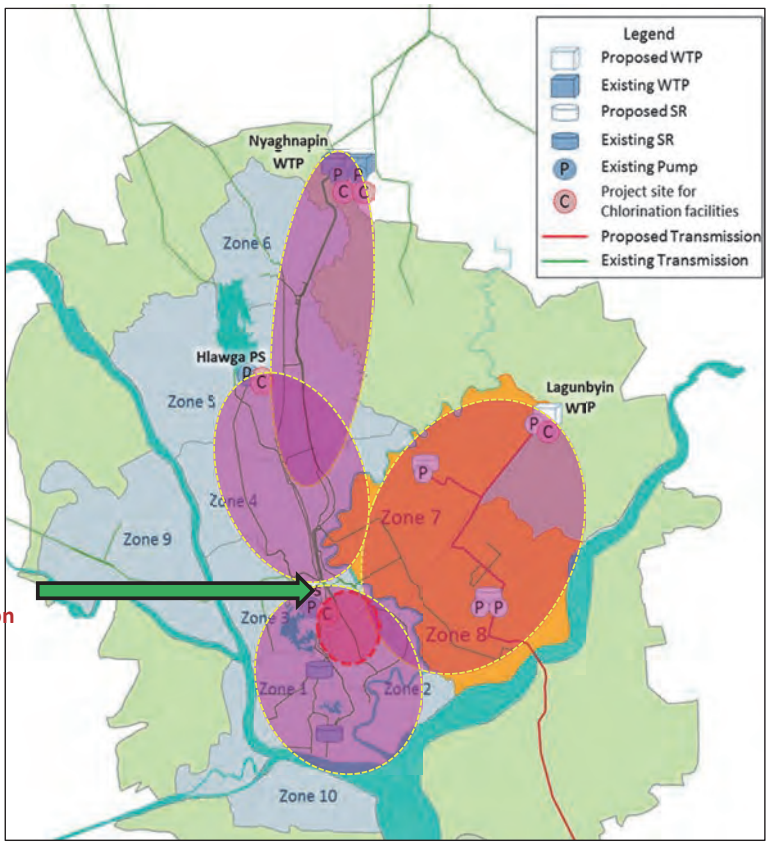
To meet Sustainable Development Goal SDG 6.1

By 2030, achieve universal and equitable access to safe and affordable drinking water for all



(Source: JICA-YCDC Master Plan)

Current Chlorination Injection and Future Plan



current chlorination injection

Started Year - 2018
Targeted Operated Year - 2022

Expectation To Learn in the Program in Japan

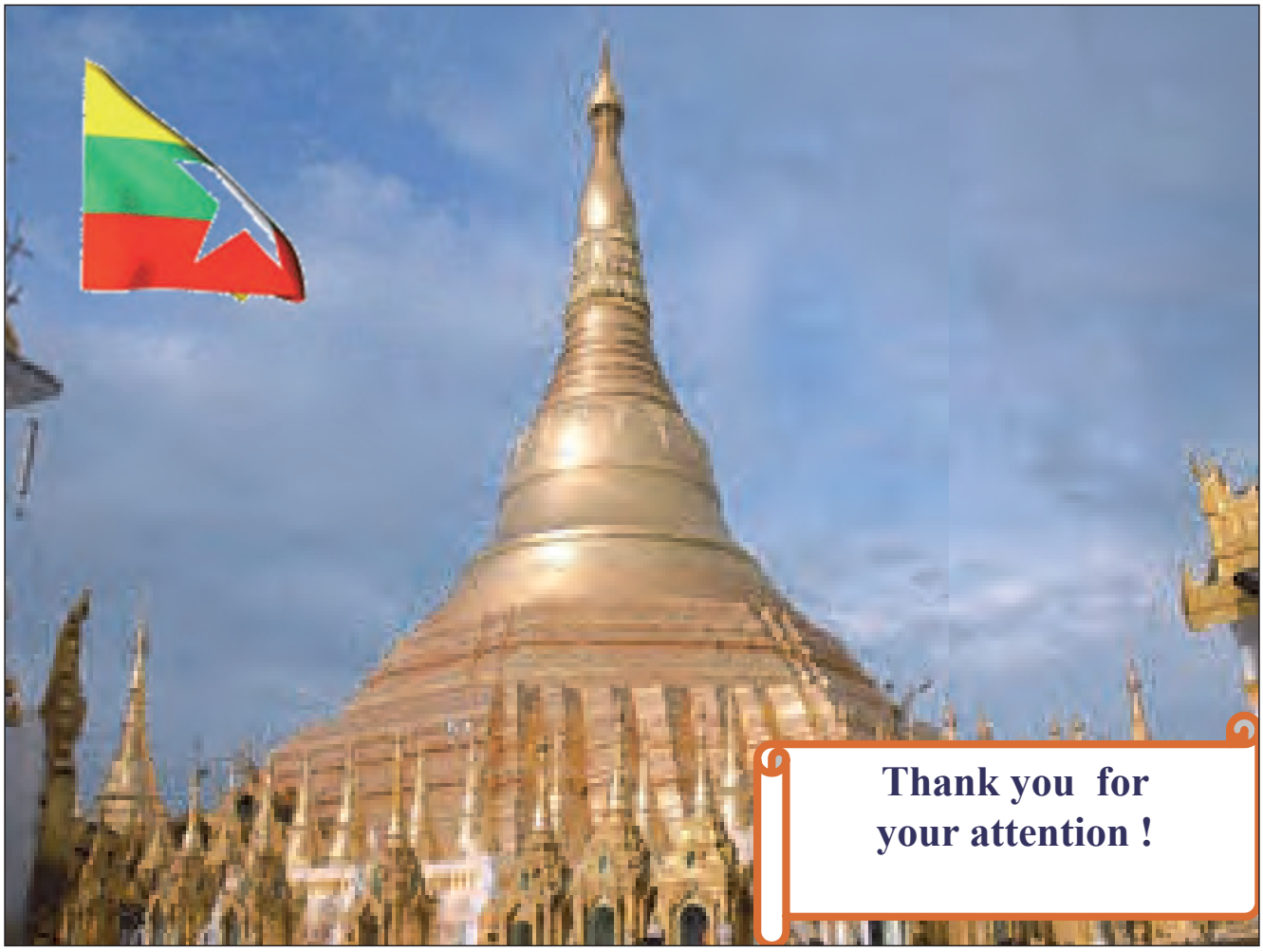
Tasks	Expectation for the Program	Problems
➢ Organization	➢ Training Technique ➢ advanced techniques and know-hows how to improve the water supply facilities in Yangon.	➢ Insufficient local training for all staffs especially engineers , technicians ➢ No incentive to motivate the staffs
➢ Water Resource	➢ About operation and maintenance of reservoirs ➢ Safety Plan and contingency plan ➢ The long, mid and short term plans how to manage to fill the customer's demands and to solve the future problem ➢ The lectures and practice on water distribution and service equipment hands-on training including repairing, tapping and disassembly of water distribution system	➢ Need the advanced maintenance plan ➢ High NRW Rate(high leakage rate) ➢ Will be increased water demands in the future

Expectation to Learn in the Program in Japan

Tasks	Expectation for the Program	Problems
➢ Mechanical and Electrical Facilities	➢ About operation and maintenance of electrical and mechanical facilities such as pumping stations, electrical network	➢ Need the advanced techniques of installation and inspection for pumping station and electrical network
➢ Measuring Equipment	➢ the lecture and observation on the leakage detection on the leakage detection and distribution equipment (water meters) ➢ Proper leakage repair techniques and materials ➢ Leakage survey ➢ The lectures and practice on measuring equipment ➢ To propose optimized transmission flow management in existing system	➢ To estimate NRW ratio need to know flow rate exactly ➢ The challenges after new chlorination facilities ➢ Water quality control

Expectation to Learn in the Program in Japan

Tasks	Expectation for the Program	Problems
➢ Water Treatment Facilities	➢ About operation and maintenance of water purification plant, and comprehensive water treatment processes	➢ Need to upgrade the water treatment facilities
➢ Pipelines	➢ the experiences and knowledge about pipe line networks based on the lectures of operation & maintenance of pipelines piping and branching.	➢ To advance the Pipe line Network ➢ Unsystematic pipeline network installation without having pipe line design simulation before new pipeline construction



Inception Report

Date: 8.8.2019.
Name: MR. AUNG HTUT LIN
Country: THE REPUBLIC OF THE UNION OF MYANMAR
Organization: YANGON CITY DEVELOPMENT COMMITTEE (Y.C.D.C)
Position: ASSISTANT ENGINEER

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1. Outline of Water Supply Services

1-1. Legal Basis of Water Supply Services

Water Supply Services based on the law of Yangon City Development Committee 2018.

1-2. Demarcation of Water Supply Services

Water Resources and Water Supply Authority under Yangon City Development Committee has responsibility for supplying drinking water only to cover for Yangon city area.

1-3. Main Actor of Water Supply Utilities

Water Resources and Water Supply Authority under local government

1-4. Mission/Vision of Water Supply Utilities

- To distribute daily the secure and safe drinking water for Yangon City dwellers
- To collect the water charges completely
- To prevent the water leakage and to reduce the Non-Revenue Water
- To upgrade and manage the water distribution using modern technology

1-5. Your Mission/Vision in your organization

I am working in Yegu Pumping Station as an in charge since 2014.I would like to prepare more better plan for water distribution network to the public from the Yegu Pumping Station.

(1). To distribute daily clean and fresh drinking water to the people who are living in Yangon.

(2). To collect the water tariff fully.

(3). To protect the non-revenue water.

---

2. Water Supply Service Levels

2-1. **Main Performance Indicators (PI)**

Coverage area	576	(km^2)
Population served	2,050,000	people
Collection ratio	45	(%)
Production capacity	931,818	(m^3/day)
Supply duration	8	(hour/day)
Supply pressure	0.75	Bar
Non-Revenue Water	50	(%)
Water quality	Portable	
Staff number	2198	
Number of connections	3725816	(2018)
Staff/1,000 connections	7	(people/1,000 connections)

2-2. **Water Quality Performance Indicators**

Parameter	**Raw water (Average)**	**Tap (Treated) water (Standards of MNDWQS)**
Turbidity (NTU)	12	3
Color (TCU)	50	10
pH	7.46	7.3
Hardness (ppm)	46	44
Iron (ppm)	0.45	0.15
Manganese (ppm)	0.11	0.04
Nitrate Nitrogen (ppm)	0.01	0.01
Others(Please describe: Nephelometric Turbidity Unit (NTU) Parts per million (ppm) True Color Unit (TCU)) Myanmar National Drinking Water Quality Standard (NMDWQS)		

---

3. Management of Water Quality

We have the weakness to build the infrastructures for upgrading of quality control system. Water resources and Water Supply Authority will be needed to set up a good water quality management system of Yangon city. And also to promote the awareness and firm knowledge and techniques of waterworks engineering. We cannot inject Chlorine along the distribution pipes so we cannot supply the disinfected water the whole areas but our future plan of disinfection process will be supplied the disinfected water in 2020.

We measure to some water quality parameters by using portable water quality test kits donated by JICA in water treatment plant and gradually expand to construct the laboratory building in each water treatment plants. Water Resources and Water Supply Authority will be able to improve the quality of water supply system. Water supply system and will supply safe sufficient amount of drinking water in Yangon City. The central laboratory room in the head office manage the water quality. The mini laboratories and water quality monitories rooms in all reservoirs and water treatment plants monitor the raw water pollution. We refer the WHO guidelines and Myanmar National Drinking Water Quality Standard .

---

4. Reduction of Non-Revenue Water

4-1. Current Situation and Major Challenges/Problems

- Aged and frequent damaged pipelines in transmission and distribution system
- High leakage rate
- Low meter installation rate
- Necessary to improve water tariff system

4-2. Current Actions against Those Challenges/Problems

- Demonstrate the customers how they can use in metering system, maintenance of meters, reduction of NRW
- Reduce illegal connections
- Use skilled staffs
- Provide meters for all connection
- Choose pilot area
- Replace the old and inaccurate meters with new ones

4-3. Any Achievements in Reduction on NRW

- Reduced NRW reduction from 60% to 40%

4-4. Constitution of NRW

Authorized consumption	Revenue water	Billed authorized consumption	(m^3 /year) (%)
	Non-Revenue Water (NRW)	Unbilled authorized consumption (ex. fire fighting, cleaning)	(m^3 /year) (%)
Water losses		Apparent losses (Unauthorized consumption (i.e. Illegal use), Customer metering inaccuracies)	(m^3 /year) (%)
		Physical losses (Leakage)	(m^3 /year) (%)

4-4. Situations about Leakage Detection Measures (DMA etc.)

- DMA constructions are already started
- Almost ready to measure the system input volume
- Already organized the NRW Management Section & Laboratory

---

5. Accounting system of Water Supply Service

Water Tariff

No.	Metered Category	Water Tariff (MMK/m^3)
1.	Domestic (metered)	88
2.	Commercial (metered)	110
3.	Departments – Residential (metered)	88
4.	Departments – Commercial (metered)	110
5.	YCDC Staff Housing (metered)	88
6.	FE –Residential (metered)	440
7.	FE – Commercial (metered)	880
No.	**Flat rate Category**	**Water Tariff (MMK/month)**
1.	Domestic	1800
2.	High Class Residential	3000

- Achievement of Cost Recovery and Financial Sustainability (Long-term Policy)
- Promoting Preparation of Tariff Revision (Mid-term Policy)
- Increase water tariff level
- Achieve sound financial conditions

---

6. Major Recent Achievements in Improvement of Water Supply Services/Management

- Distribute the new pipeline networks to unreachable places
- Supply the safe drinking water
- Reduce NRW

---

7. Recent Challenges to Improvement of Water Supply Services

IN OUR CITY, WE HAVE TO BE SOLVED MANY PROBLEMS AND CONSTRAINTS CONCERNING WITH THE WATER MANAGEMENT SYSTEM SUCH AS WATER QUALITY CONTROL AND REDUCTION OF NON-REVENUE WATER , FINANCIAL MANAGEMENT,RESTORATION OF FRESH WATER ENVIRONMENT AND RESOURCES , ETC.FOR DEVELOPING WATER SUPPLY MANAGEMENT,WE NEED TO IMPROVE NOT ONLY IN INSTITUTIONAL MANAGEMENT, BUT ALSO TO IMPROVE TECHNICAL MANAGEMENT.WE HAVE PLAN TO PROMOTE BOTH MANAGEMENT SYSTEM.

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8. Expectations toward Japan

8-1. Expectations toward Japanese Government and JICA

- Grant Aid Projects

8-2. Expectations toward Japanese Water Utilities

- the advanced techniques and know-hows how to improve the water supply facilities in Yangon.

8-3. Expectations toward Japanese Private Companies

- Local On Job Training

---

9. Expectations toward the Program.

THIS TRAINING PROGRAMME IS ONE OF THE BENEFICIARIES TO PROMOTE SAFE AND SATISFIED WATER SUPPLY SYSTEM IN YANGON CITY. FOR SOLVING PROBLEMS ABOUT WATER QUALITY MANAGEMENT SYSTEM IN MY CITY, I EXPECTED TO GET ADVANCED TECHNIQUES, APPROPRIATE METHODS RELATED UNDER THE LAB FIELDS AND WANT TO KNOW ABOUT THE

MAINTENANCE OF WATER RESOURCES .I ALSO WANT TO PAY NECESSARY INSTRUCTION AND TECHNICAL TRANSFER TO MY ORGANIZATION.

Water Supply Administration
For Better Management of Water Supply Services
Course（Ｂ）

PHILIPPINES

Water Supply Administration for Better Management of Water Supply Services

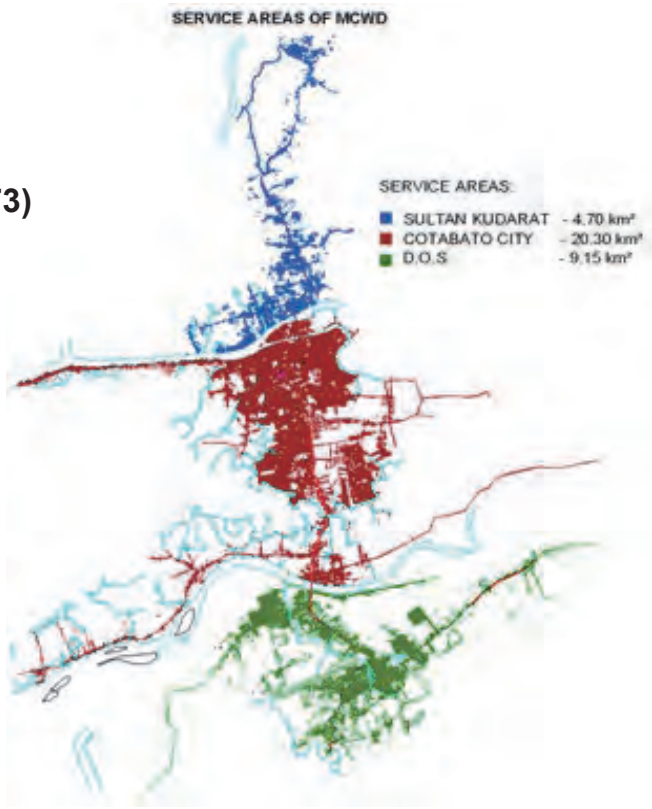
Inception Report Presentation

Name: Mr. SAPAL, Winston (WINS)
Position : DIVISION MANAGER A
Organization: **Metro Cotabato Water District**
(Cotabato City, BARMM)

Outline of Water Supply Services

- Legal Basis of Water Supply Services
  - **a. Presidential Decree No. 198,**
  - **(Provincial Water Utilities Act of 1973)**
  - **b. Cotabato City Resolution No. 035**

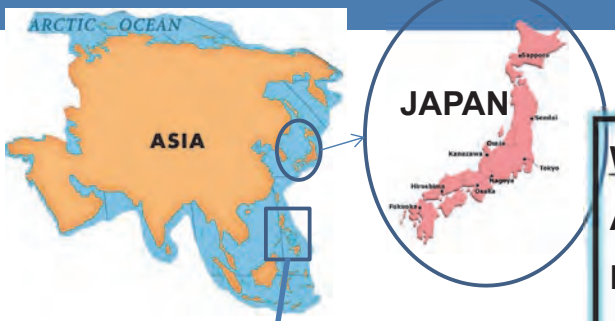
- Demarcation of Water Supply Services
  - **a. Cotabato City:**
  - **36 Barangays,**
  - **b. Sultan Kudarat Municipality**
  - **10 Barangays**
  - **c. Datu Odin Sinsuat Municipality:**
  - **7 Barangays**



Outline of Water Supply Services

- Demarcation of Water Supply Services/ *Authorities*
  - ***d. Local Water Utilities Administration (LWUA)***
  - ***b. National Water Resources Board (NWRB): Water rights***
  - ***c. Department of Health (City Health Office-DOH): Water quality***
- Main Actor of Water Supply Utilities
  LWUA for 584 Water Districts *(691cities & municipalities*)
- Mission/Vision of Water Supply Utilities
  Pursue the national government's goal of universal access to safe and including septage management and sewerage in the countryside
  Adequate and sustainable water and sanitation services in the countryside by CY 2022 through self-reliant water utilities
  - Your Mission/Vision in your organization

To provide adequate, safe and affordable water supply to all our concessionaires, deliver efficient services and responsible in promoting environmental conservation, rehabilitation and sanitation.



Whole Country:

Area : 300,000 km²

Population : 108,116,615

Coverage Water Supply: 50.6% ***piped into dwellings***

(PSA 2017 Annual Poverty Indicator Survey, Fig.8.1)

Water Supply System/City:

Cotabato City, Sultan Kudarat, Datu Odin Sinsuat Municipalities

Service Area : 361 km²

Population Served: 177,080

Cotabato City

5

Water Supply Service Levels

INDICATORS	2000	2018	Goals for 2025
Staff/1,000 connections	7.56	5.3	5.3
Production capacity (m^3/day)	22,882	40500	55, 350
Water quality standards	PNSDW	PNSDW 2017	PNSDW 2017
Coverage area	83.33%	98%	100%
Supply duration (hour/day)	84.21% @ 24hr./day	87.28% @ 24Hr./Day	100% @ 24hr./day
Supply pressure	10psi	10psi	10psi
Number of connections	15,605	35,416	47,110
Population Served	78,025	177,080	235,550
NRW	40.78%	29.70%	20%
Collection ratio	78.53%	77.77%	95%
Staff number	118	189	250

6

Management of Water Quality

- Current Situation and Major Challenges/Problems

  a. Ensuring water quality that passed in the standards

  b. Excessive Scaling of Pipe lines, Pumps and Treatment Facilities

Vertical Turbine Pump

Riser/Column Pipe

Management of Water Quality

7

- Current Actions against Those Challenges/Problems

  1. Maintaining free chlorine residual & Regular laboratory test

  2. Experimental stage to treat scaling problem by *HydroChem Plus*

HydroChem Plus Experiment Facility for Anti-scaling

Management of Water Quality

8

- Water Quality Standards for Drinking Water

  Philippine National Standard for Drinking Water 2017

  Mandatory : 10 Parameters, Primary:56, Secondary: 12 Parameters

- Monitoring System or Plans for Safety of Drinking Water in Your Organization / Regulatory Body / Independent Institution /Others

  Monthly submission of Water Laboratory test report at the Department of Health (DoH) & Local Water Utilities Administration (LWUA)

- Implementation of Water Safety Plans or Similar Efforts

  Risk and vulnerability assessment

Reduction of Non-Revenue Water

System input volume **14,776,660** Cu.m/year	Authorized consumption **10,388,265** Cu.m/year	Revenue water **28,461** cu.m/day	Billed authorized consumption **28,461 cu.m/day**	**10,388,265** m^3 /year (70.30 %)
		Non Revenue Water (NRW) **12,023 cu.m/day**	Unbilled authorized consumption (ex. fire fighting, cleaning) **4 cu.m/day**	**1,460** m^3 /year (0.0098 %)
	Water losses **4,388,395** **Cu.m/year**		**Apparent losses** (Unauthorized consumption (i.e. Illegal use), Customer metering inaccuracies) **1,656 cu.m/day**	**604,440** m^3 /year (4.09%)
			Real losses (Leakage) **10,363 cu.m/day**	**3,782,495** m^3 /year (25.60 %)

- *Data: from Maynilad 2018 Rapid Assessment Report on MCWD Facilities*
- Countermeasures for NRW: **Immediate repair & DMA Program with**

Accounting System of Water Supply Services

- **Water Tariff**

Metro Cotabato Water District
Gov. Gutierrez Avenue, Cotabato City

WATER RATE

Effective January Billings 2006

CATEGORY	SIZE	0-10 CU.M.	11-20 CU.M.	21-30 CU.M.	31-40 CU.M.	ABOVE 40 CU.M.
RESIDENTIAL AND GOVERNMENT	½" ¾" 1"	184.00 294.40 588.80	20.35	23.50	26.70	29.95
SEMI COMMERCIAL TYPE-A	½" ¾" 1"	322.00 515.20 1,030.40	35.60	41.10	46.70	52.40
SEMI COMMERCIAL TYPE-B	½" ¾" 1"	276.00 441.60 883.20	30.50	35.25	40.05	44.90
PURE COMMERCIAL INSTITUTIONAL INDUSTRIAL	½" ¾" 1" 1 ½" 2" 3" 4"	368.00 588.80 1,177.60 2,944.00 7,360.00 13,248.00 26,496.00	40.70	47.00	53.40	59.90
BULK/ WHOLESALE	½" ¾" 1" 1 ½" 2"	552.00 883.20 1,766.40 4,416.00 11,040.00	61.05	70.50	80.10	89.85

*Local Water Utilities Administration Approved Rates.

Accounting System of Water Supply Services

- Balance Sheet of your Organization

Current Assets (Php.)	**247,975,307.36**
Non-Current Assets (Php.)	**414,793,283.23**
TOTAL ASSET	**662,768,590.59**
Current Liabilities	**91,635,184.61**
Non-Current Liabilities	**4,467,566.96**
Equity	**566,665,839.02**
TOTAL LIABILITIES & EQUITY (PHP.)	**662,768,590.59**

- Profit and Loss Statement of your Organization

Gross Income (Php.)	**288,315,077.74**
Personal Services	**(84,431,164.34)**
Maintenance & Operating Expenses	**(117,587,669.73)**
Other Income & Expenses	**2,289,143.07**
Financial Expenses	**(2,525,323.09)**
NET INCOME	**86,060,063.65**

Major Recent Achievement in improvement of water supply services

- Few years back, the gap between our water demand and water supply is wider than the present. This has been narrowed with the following two improvement initiatives.

1. Improvement of Dimapatoy pump station and treatment plant

Previous : 12,000 cu.m per day

Now: 17,000 cu.m per day

2. Bulk Water Supply Scheme

Additional 5,000 cu.m per day without capital investment

MMF tanks, supplied by Kyogojo Engineering Cooperative

Mactan Rock-TGV Corp.-Intake Facility & Treatment Plant

Recent challenges of Water Supply Services

- Body sentences

One of our great challenges is the reduction of Non-Revenue Water (NRW). The Local Water Utilities Administration (LWUA) imposed on all (Provincial) water utilities in the country a maximum limit of 20% but later-on increased into 30% due to attainability. Today we are almost on edge of this threshold of about 29.70% as of September 2019.

There are two obvious sides of these challenge, the technical know-how and the required financial architecture. We are optimistic that this training course will enhance our technical capabilities in the realm of various strategies to effectively reduce NRW.

The establishment of the new political landscape in our region signals a greater water demand in the coming years. Our entire service area is now within the jurisdiction of Bangsamoro Autonomous Region in Muslim Mindanao (BARMM). Its regional seat of government is in the City of Cotabato. Influx of residential, commercial and industrial water demand is believed to be dramatically increased when this new government finally sets its peace and development agenda.

BARMM official seal, http://bangsamoro.gov.ph

Arigatōgozaimashita...

(Thank You)

INCEPTION REPORT

Date: June 28, 2019
Name: WINSTON L. SAPAL
Country: PHILIPPINES
Organization: METRO COTABATO WATER DISTRICT
Position: Division Manager A (Water Resources Division)

1. Outline of Water Supply Services

1-1. Legal Basis of Water Supply Services :

Presidential Decree No. 198, (Provincial Water Utilities Act of 1973) Declaring a national policy favoring local operation and control of Water Systems; Authorizing the formation of local Water Districts and providing for the government and administration of such districts; Chartering a national administration to facilitate improvement of local water utilities; Granting said administration such powers as are necessary to optimize public service from water utility operations and for other purposes.

1-2. Demarcation of Water Supply System:

a. Local Water Utilities Administration (LWUA-DPWH): Water utility administration
b. National Water Resources Board (NWRB-DENR): Water rights (Quantity)
c. Department of Health (City Health Office-DOH): Water quality

1-3. Main Actor of Water Supply Utilities:

a. LWUA for Water Districts
b. Local Government Units for Barangay and Towns water supply system. Projects of DPWH and operated by the LGU's

1-4. Mission/Vision of Water Supply Utilities:

Pursue the national government's goal of universal access to safe and sanitation including septage management and sewerage in the countryside.

Adequate and sustainable water and sanitation services in the countryside by CY 2022 through self-reliant water utilities

1-5. Your Mission/Vision in your organization:

To provide adequate, safe and affordable water supply to all our concessionaires, deliver efficient service and responsible in promoting environmental conservation, rehabilitation and sanitation.

2. Water Supply Service Levels

2-1. Main Performance Indicators (PI)

Coverage Area	361 sq.km
Population Served (March 2019)	177,080
Collection Ratio	68.97%
Production Capacity	40, 484 cu./day
Supply Duration	24/7 at 87.28% (Not 24/7 at 12.72%)
Supply Pressure	10psi & above at 87.28%
Non-Revenue Water	29.70%
Water Quality	PNSDW 2017
Staff Number	189
Number of connections	35,416
Staff/1,000 connections	189/35416 (5.34 staff/1000 connections)

3. Management of Water Quality

3-1. Current Situation and Major Challenges/Problems:

Indeed one of the prime mandates of water provider is to ensure adequate supply of quality water. There are sets of standards being followed in every country in the world to maintain quality. The Philippine National Standard for Drinking Water (PNSDW 2017) is the latest standards for drinking water promulgated by the Department of Health and the Local Water Utilities Administration all over the country. It generally sets limits of allowable water characteristics both physical-chemical and bacteriological parameters for human consumption. To maintain the quality of water that we produced and supply to our concessionaires has no doubt of a great challenges. In the previous years we had often ended into a several failed laboratory results especially on bacteriological laboratory results. These eventualities trigger us to redirect our compasses to resolve this problem.

3-2. Current Actions against Those Challenges/Problems:

A thorough evaluation is required to identify the root causes of the problem. By looking carefully on every process from water treatment & production to water sampling for laboratory, drags our attentions. We found out that the main causes are the erratic residual chlorine in our water and mishandling of water samples. Chlorine is our main chemical used for water treatment before we dispatch water for consumption. The standard allows us to have 0.3 ppm to 1.5 ppm. Previously we only dose 0.3-0.5ppm residual chlorine at the source which somewhat comply with the standards. But this dosage doesn't maintain the residual up to the end points of the water distributions. Now we are maintaining 1-1.5ppm residual chlorine at our water sources that would allow of not less than 0.3ppm at the end points. Together with this measure, we purchase several pocket Colorimeter to really monitor residual chlorine from water sources to end points of the water distributions. Secondly we hired an employees dedicated for water quality monitoring and water

sampling. These personnel strictly follow the procedures on water sampling and regularly monitor chlorine residual and turbidity levels from water sources to concessionaires' taps.

3-3. Any Achievements in Quality Management:

We have a memorandum of agreement with the Department of Health laboratory for bacteriological testing of our water samples. The result can be determined after a week or more because they used conventional methods. To monitor and conduct immediate corrective actions on failed samples, a week of waiting is too much. By the time we were notified on the failed results, water was already consumed by the public. With the advent of the new technologies, we can now have the water testing result within 24 hours. We were able to put our own laboratory for bacteriological testing. We utilize Collilert-18 which gave the result after 18 hours. This progress helps us a lot in water quality management. On-time awareness on the prevailing situation of our water systems provides us effective tools in ensuring quality water.

3-4. Water Quality Standards for Drinking Water:

Philippine National Standard for Drinking Water 2017

3-5. Monitoring System on Plans for Safety of Drinking Water in your Organization/Regulatory Body/ Independent Institutions and Other:

a. Water quality section is composed of Chemist, Medical Technologist and Laboratory Aid. They are responsible for regularly monitoring Physical-Chemical and Bacteriological quality of our water. The plan includes the following,
    1. Daily random residual chlorine test from water sources to concessionaires' taps,
    2. Weekly internal physical-chemical (PhyChem) laboratory of water samples from the water sources,
    3. Semi-annual third party PhyChem water testing,
    4. Weekly bacteriological water testing conducted by our internal laboratory and third party independent laboratory.

b. Submission of monthly report at Department of Health through local City Health and Local Water Utilities Administration

3-6. Implementation of Water Safety Plans or Similar Efforts:

Last year we were able to accomplish the requirements set by LWUA on water safety plan. This paves the way of a greater awareness on risk and hazards related on our water supply. It also helps us asses our vulnerabilities and to plan some projects to mitigate impacts of climate change.

4. Reduction of Non-Revenue Water (NRW)

4-1. Current Situation and Major Challenges/Problems:

One of the key performance indicators (KPI) set by the Local Water Utilities Administration (LWUA) is the maximum limit of NRW at 30%. Along with the other KPI's, LWUA anchors the approval of bonuses to all water districts in the country to NRW. Our NRW ranges from 27% to 30% each year. This level of NRW is already ample to affects our services and crimples our commitment to provide 24/7 or continues supply of water within our franchise service areas. Each year we loss at about 4,388,395 cubic meters of potable water which tantamount to an average of almost One Hundred Fifteen Million Pesos (2.3M USD). Based on the latest water balance evaluation, the huge amount of our NRW was contributed by a Physical Losses at 25%. Dilapidated and very old pipe lines, defective valves and other appurtenances seem to be the main factors of these losses. To trim this NRW level requires a large amount of funding together with professional approach of establishing and implementing a comprehensive NRW reduction strategies. Another problem that we are now facing is the absence of a Team dedicated to gather, analyze, process data regarding factors that contributes our NRW. Those personnel are so important to seriously focus on NRW reduction program.

4-2. Current Actions against Those Challenges/Problems:

Currently we are about to engage a services of private company, expert on NRW reduction programs. The first phase would be the capacitating our personnel through technical sessions and on-site trainings. This would enable our technical people for the next phase to implement a small scale District Metering Area (DMA) together with the purchase of necessary state-of-the-art facilities and equipment. In addition, we are now on the stage of pipe line replacement projects on several identified old dilapidated pipes which are prone on leakages. Our immediate response on the reported leaks and quality workmanship also helps, if not reduce but prevent much greater losses. Active participating on seminars regarding NRW awareness also played vital stage to craft our possible solutions on the problem.

4-3. Any Achievements in Reduction on NRW:

As of this year, we are still on the process or re-evaluating our plans & programs in reducing NRW. A significant and favorable result is expected after the completion of our pipe replacement projects. Our efforts only sustain the NRW below 30%.

4-4. Constitution of NRW:

<table>
<tr><td rowspan="4">System Input Volume

40,484 cu.m/day

14,776,660 cu.m/year</td><td rowspan="2">Authorized Consumption

28,461 cu.m/day

10,388,265 cu.m/year</td><td rowspan="2">Revenue Water

28,461 cu.m/day</td><td>Billed Authorized Consumption

28,461 cu.m/day</td><td>10,388,265 cum/year

70.30%</td></tr>
<tr><td>Unbilled Authorized Consumption
4 cu.m/day</td><td>1,460 cum/year

0.0098%</td></tr>
<tr><td rowspan="2">Water Losses

12,023 cu.m/day

4,388,395 cu.m/day</td><td rowspan="2">Non-Revenue Water

12,023 cu.m/day</td><td>Apparent Losses (Unauthorized Consumption)

1,656 cu.m/day</td><td>604,440 cum/year

4.09%</td></tr>
<tr><td>Physical Losses (Leakages)

10,363 cu.m/day</td><td>3,782,495 cum/year

25.60%</td></tr>
</table>

Data evaluated by Maynilad

4-4. Situation about Leakage Detection Measures (DMA, etc.):

On process DMA Contract with private company- Maynilad

5. Accounting System of Water Supply Service

5-1. Water Tariff in Your Organization:

Metro Cotabato Water District

Gov. Gutierrez Avenue, Cotabato City

WATER RATE

Effective January Billings 2006

CATEGORY	SIZE	0-10 CU.M.	11-20 CU.M.	21-30 CU.M.	31-40 CU.M.	ABOVE 40 CU.M.
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*Local Water Utilities Administration Approved Rates.

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Other Income & Expenses	**2,289,143.07**
Financial Expenses	**(2,525,323.09)**
NET INCOME	**86,060,063.65**

6. Major Recent Achievements in Improvement of Water Supply Services/Management

Increasing population within our service areas denotes increase in water demand. Amidst with this demand is the depleting water sources especially during drought season. The sprout of another great challenge began to grow. This brought us to re-double our effort to extract more water on every possible solution. There are two notable endeavors that showcase our increase in production capacity. First is the upgrading of one of our pump stations and treatment plant. This plant is located at Sitio Lomboy, Awang, DOS, Maguindanao. It extracts raw water from Dimapatoy River. Previously this water system only produces a maximum of twelve thousand cubic-meter per day. We conducted some enhancement on the system, of which is the installation of a new larger dimension raw water pipe line from pump station to treatment plant. Another is the installation of additional filters. Together with the other retrofitting, the plant is now producing Seventeen Thousand cubic-meter per day. The second is another additional supply of potable water of Five Thousand cubic-meter per day. Its source is also surface water coming from Simuay river, located at Municipality of Sultan Kudarat, Maguindanao. We entered into a contract with a private company to supply us potable water. They are responsible from extraction of raw water to treated water. This scheme is well known in our industry as Bulk Water Supply. It allows the water utility company to have additional water supply without capital investment. The Terms of Reference for this scheme needs to be studied carefully in order to comply all legal aspects of the procurement and to have a tight provisions to ensure both quantity and water quality.

7. Recent Challenges to Improvement of Water Supply Services

Challenges are always been a part of every field of water supply services. Among our recent challenges are the reduction of NRW, additional water supply, watershed management and the establishment of sewerage system. The magnitudes of these challenges are even magnified by the inclusion of our entire service areas in the newly installed Political landscape in our region, which is the ratification of the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM). The people of Japan are actively participating in the realization of peace and development in this region through JICA and its membership in the International Monitoring Team (IMT). There are two obvious sides of these challenges, the technical know-how and the required financial architecture. The latter seems to be more difficult to overcome which needs tremendous efforts to showcase our company's financial standing on the investors for them to finance huge projects. To mention one, our loan at LWUA to finance the transmission-pipe replacement project amounting to One Hundred Twenty Million Pesos (2.4M USD) have not been granted and implemented yet. The initial amount of this project was only Ninety Six Million Pesos (96M). But because of the delay, cost of materials and labor were significantly increased in the market. Such improvement in our water supply can't be easily grasp due to financial constrain. Another challenge to us is to extend our services to all barangays of the Cotabato City and the two adjacent towns. Also, many municipalities within our province don't have access to safe and potable water.

Thanks to JICA, due to their endeavor to upgrade our technical know-how by granting us free trainings. Previous years we were able to send one of our technical personnel at Japan to study about Sewerage system. The training helps us in our plan to initially put-up septage treatment facilities. Our company and the local government of the Cotabato City had signed into a joint-collaboration to establish such important project.

8. Expectation towards Japan

8-1. Expectation toward Japanese Government and JICA:

We understand that the Japanese Government and JICA had already plant and cultivate various efforts in helping our country especially in our region, the BARMM. Peace and development became elusive for us for so many years due to arm conflicts. Now we are all witnessing the new dawn of peace and development in our region which Japan is one of the main actors on its realization. It is incumbent for us to expect endless joint-cooperation between Governments of Japan, Philippines and the BARMM in order to pasture and sustain peace and development. The flat-form installed by the Japanese Government through Knowledge Co-Cooperation Program plays a vital role in giving us several inputs for a better service to our concessionaires. We expect that we will always be a part of these programs to grow and develop along with the other countries of the world.

8-2. Expectation towards Japanese Water Utilities:

Acquiring best practices of the Japanese Water Utilities is one of our expectations. Sharing the methodologies and strategies implemented by them would be applicable for us to have better management of water supply service. We also expect to learn more on water quality and NRW reduction programs.

8-3. Expectation towards Japanese Private Companies:

In every developing country, private companies are always been a partner of its government. We expect the Japanese private companies to scout opportunities in our region to expedite some developments especially related on the basic needs of our people. Japanese companies may look into helping our poor communities to have access in potable water. The Metro Cotabato Water District (MCWD) is willing to be a partner of such Japanese private companies to establish water system projects in our region.

9. Expectations toward the Program

I'm optimistic that this program will showcase different solutions on the challenges experienced by the participating countries. A wider horizon on the brilliant approaches in dealing NRW and water quantity and quality issues for better management of water supply services is also expected as well as plant visits that will enrich our endeavors on possible improvement plans for our water system. Besides to all, I would like to experience the hospitality and friendship among participants and the Japanese people.

Water Supply Administration for Better Management of Water Supply Services (B)
Course No.201984473-J002

Water Supply Administration for Better Management of Water Supply Services

Inception Report Presentation

Name: Archival M. Samson
Position : Branch Manager Operations
Organization : Lingayen Water District
Primewater Lingayen

CONTENT OF PRESENTATION

I. Outline of Water Supply Service
II. Water Supply Levels
III. Management of Water Quality
IV. Reduction of Non - Revenue Water
V. Accounting System of Water Supply Services
VI. Major Recent Achievements in Improvement of Water Supply Service
VII. Recent Challenges of Water Supply Service

Outline of Water Supply Services

The legal basis water supply service in the Philippines is based on two type of Presidential Decree.

a. Presidential Decree 1067 or Water Code of the Philippines.
b. Presidential Decree 198 or Creation of Local Water District.

Type demarcation of water supply services are as follows;

a. For Local Water District in Rural and Urban Areas in Provinces, they are govern by the Local Water Utilities Administration or LWUA.
b. For Private Water Service Provider, they are govern by the National Water Resource Board or NWRB.
c. For National Capital Region or Metro Manila, the regulating bodies are Metropolitan Waterworks and Sewerage System or MWSS.

The main actor or operator of water supply utilities are as follows;

a. Local Water District. (e.g. Lingayen Water District)
b. Private Water Service Provider.

Lingayen Mission and Vision.

Mission: The Lingayen Water District is committed to give the best effort we can in ensuring the availability of clean drinkable water for all.

Vision: The Lingayen Water District visions to able to supply potable water serve to all barangays in Lingayen.

My mission and vision

Mission: My mission is to improve the water service supply in Lingayen.

Vision: My vision is to sustained and able to expand Lingayen water services in all of its covered barangay.

Whole Country: **PHILIPPINES**

Area : 300,000 km^2

Population : ~108 Millions

Coverage Water Supply: ~51 %

Selected Water Supply System/City: Lingayen, Pangasinan

Service Area : 62.76 km^2

Population Served: 33,450 thousand

Water Supply Service Levels

INDICATORS	2013	2019	Goals for 2025
Staff/1,000 connections	9.7	3.0	3.1
Production capacity (m^3/day)	4,595	5,101	8,110
Water quality standards	Very Poor	Poor to Good	Very Good
Coverage area	19%	28%	60%
Supply duration (hour/day)	12	20	24
Supply pressure	0-10 psi	5- 15 psi	10-25 psi
Number of connections	3,507	5,953	10,295
Population Served	15,781	26,707	46,237
NRW	63%	32%	20%
Collection ratio	70%	90%	95%
Staff number	34	18	32

Management of Water Quality

Current Situation and Major Challenges/Problems.

a. Poor Water Quality (Yellowish Color)
b. Sandy Water and with “rotten egg smell”.
c. Inadequate water supply due to high salinity.

Current Action against those Challenges/Problems.

a. Poor Water Quality (Yellowish Color) – In addressing the problem, we have installed and integrated a filtration system in order to reduce the organics which contribute to the tanning of water.
b. Sandy and with “rotten egg smell” – In cooperation with JICA, an initiative was made to revive and reuse the existing water treatment facility which has an aeration and rapid sand filter to address this problem.
c. Inadequate water supply – It is our future goal to extend our service in several barangays and plans are initiated to build a surface water facility at “Agno River” which can be a potential long term source for the municipality of Lingayen.

Management of Water Quality




Management of Water Quality

Water Quality Standards for Drinking Water.

Parameters	Philippine National Standard of Drinking Water 2007 Permissible Limits
a. Physical / Chemical	
Color	5 Color Units
Odor	No Objectionable Odor
Turbidity	5 NTU
pH	6.5 – 8.5
Iron	1 mg/L
Manganese	0.4 mg/L
Total Dissolved Solid	600 mg/L
Chloride	250 mg/L
Hardness	300 as CaCo3
Nitrate	50 mg/L
Lead	0.01 mg/L
Cadmium	0.003 mg/L
Arsenic	0.01 mg/L
Sulfate	250 mg/L
Benzene	Absent/NIL
b. Microbiological	
Total Coliform (MTFT)	<1.1 MPN / 100ml
Fecal Coliform (MTFT)	<1.1 MPN / 100ml
Heterophic Plate Count (HPC)	<500 CFU/ml

Monitoring Plans for Safety of Drinking Water involves testing and monitoring of delivered water from the source up to the costumer/consumer's faucet. The following test are conducted in order to secure the water are safe to drink and for human consumption.

a. Daily Chloride Residual Testing (Random House Hold Faucet) is conducted by our water quality officer.

b. One a Month Microbiological Sampling (Random House Hold Faucet and Deep Well Sources) is conducted and tested by an accredited Department of Health (DOH) laboratory and the results are submitted to the Rural Health Unit.

c. Twice a year Physical and Chemical Analysis of Raw Water and Treated Water (Random House Hold Faucet and Water Treatment Plant) is conducted and tested by an accredited Department of Health (DOH) laboratory and the results are submitted to the Rural Health Unit.

Reduction of Non-Revenue Water

System input volume	Authorized consumption	Revenue water	Billed authorized consumption	**1,155,735** m^3 /year (66.96%)
		Non Revenue Water (NRW)	Unbilled authorized consumption (ex. fire fighting, cleaning)	**444** m^3 /year (0.03 %)
	Water losses		**Apparent losses (Unauthorized consumption (i.e. Illegal use), Customer metering inaccuracies)**	**1,614** m^3 /year (0.094 %)
			Real losses (Leakage)	**568,812** m^3 /year (32.96 %)

- Leakage Detection Measures – Walk the Line and Leak Reports.
- Countermeasures for NRW – Monitoring Pressure and Controlling of Productions.

Accounting System of Water Supply Services

Lingayen Water District Water Tariff.

Connection	0-10 Minimum	11-20	21-30	31-40	41- Over
Residential	5.29 $	0.55 $	0.58 $	0.61 $	0.65 $
Commercial	10.58 $	1.10 $	1.16 $	1.22 $	1.30 $

Accounting System of Water Supply Services

Balance Sheet of Lingayen Water District.

Financial	Dec. 2018 ($)	Year to Date ($)
Billing Current	69,830.26	831,406.36
Collections		
Current Collections	54,529.27	739,512.77
Arrears Collections	5,900.89	82,043.69
Total Revenue:	**60,430.16**	**821,556.46**
Expenses		
Power/Electricity Cost	10,167.17	89,144.76
Chemical Cost	3,205.83	46,143.87
Manpower Cost	4,167.87	41,520.57
Repair & Maintenance	1,294.10	48,304.84
Total Direct Cost:	**18,834.97**	**225,114.04**
Loans and Tax	20,087.66	241,051.91
Admin Cost	28,318.84	339,826.14
Total Expenses	**47,153.80**	805,992.09

Accounting System of Water Supply Services

Profit and Loss Statement of Lingayen Water District.

YEAR TO DATE OF 2018 ($)	
Revenue Sales	821,556.46
Total Expenses	(805,992.09)
Net Income/ (Loss)	15,564.37

Major Recent Achievement in improvement of water supply services

The Lingayen Water District has a high non-revenue water and has a poor water quality which the community have been experiencing for a half a century. In 2014, we started to replace the old asbestos pipe and decommissioned it to reduce the non-revenue water by almost 30%. By reducing the non-revenue water, we slowly rehabilitated the existing water treatment plant which was donated by JICA in 2005 and was abandoned the next year because of high operation cost. We also cooperated with JICA on the said rehabilitation and in 2017, the rehabilitation was completed. However, in order to ensure the operation of the said water treatment plant; we managed to install an additional Filter Equipment to remove the organics in the raw water which causes yellowish color. At present, we are operating the water treatment facilities and the community is now enjoying the potable and safe water.

Recent challenges of Water Supply Services

By improving the water quality, the demand of the municipality increases. The supply becomes restricted due to the deterioration of ground water. Almost 20 million litters of water supply is needed in order for us to address the increasing demand and extended our service throughout the other barangays which in need to service water.

THANK YOU SO MUCH!!!!

INCEPTION REPORT

Date: JULY 22, 2019

Name: ARCHIVAL M. SAMSON

Country: PHILIPPINES

Organization: REP. LINGAYEN WATER DISTRICT JV PRIME

Position: BRANCH MANAGER

1. Outline of Water Supply Services

1-1 Legal Basis of Water Supply Services

(What kind of laws and regulations are Water Supply Services based on?)

Water Supply Services are based on two type of Presidential Decree in the Philippines.

a. Presidential Decree 1067 or Water Code of the Philippines.
b. Presidential Decree 198 or Creation of Local Water District.

1-2 Demarcation of Water Supply Services.

(Which ministry is in charge of what kind of field of water?)

a. For Local Water District in Rural and Urban Areas, they are governed by the Local Water Utilities Administration or LWUA.
b. For Private Water Service Providers, they are governed by the National Water Resources Board or NWRB.
c. For Metro Manila, the regulating bodies are Metropolitan Waterworks and Sewerage System.

1-3 Main Actor of Water Supply Utilities.

a. Local Water District (e.g. Lingayen Water District).
b. Private Water Service Provider.

1-4 Mission / Vision of Water Supply Utilities.

Mission: The Lingayen Water District is committed to give the best effort we can in ensuring the availability of clean drinkable water for all.

Vision: The Lingayen Water District visions to able to supply potable water serve to all barangays in Lingayen.

1-5 Your Mission / Vision in your organization

Our Mission is to provide potable, reliable, and sustainable water to Filipino communities.

Our Vision is to be one of the country's premier water utility companies.

2. Water Supply Service Levels.

2-1. Main Performance Indicators (PI)

Coverage Area	62.76 (km²)
Population Served	33,450
Collection Ratio	62%
Production Capacity	4,729 (m³/day)
Supply Duration	22 (hour/day)
Supply Pressure	1.2 (bar)
Non- Revenue Water	33(%)
Water Quality	Color Failed
Staff Number	20
Number of connections	5,575
Staff/1,000 Connections	279

2-2 Any Monitoring by Performance Indicators (PI).

Collection Efficient	90(%)
Power usage	476,086(kHW)
Chlorine usage	108,600 (Liters)

3. Management of Water Quality.

3-1. Current Situation and Major Challenges/Problems.

a. Poor Water Quality (Yellowish Color)
b. Sandy Water and with “rotten egg smell”.
c. Inadequate water supply.

3-2. Current Action against those Challenges/Problems.

a. Poor Water Quality (Yellowish Color) – In addressing the problem, we have installed and integrated a filtration system in order to reduce the organics which contribute to the tanning of water.
b. Sandy and with “rotten egg smell” – In cooperation with JICA, an initiative was made to revive and reuse the existing water treatment facility which has an aeration and rapid sand filter to address this problem.
c. Inadequate water supply – It is our future goal to extend our service in several barangays and plans are initiated to build a surface water facility at “Agno River” which can be a potential long term source for the municipality of Lingayen.

3-3. Any Achievements in Mater Quality Management.

The rehabilitation of the existing JICA Grant Water Treatment Plant and Improving its operation by adding filtration system that remove color and upgrading its control system to Variable Control Driven to be more efficient in distributing water services in the community.

3-4. Water Quality Standard for Drinking Water.

Parameters	**Philippine National Standard of Drinking Water 2007 Permissible Limits**
a. Physical / Chemical	
Color	5 Color Units
Odor	No Objectionable Odor

Turbidity	5 NTU
pH	6.5 – 8.5
Iron	1 mg/L
Manganese	0.4 mg/L
Total Dissolved Solid	600 mg/L
Chloride	250 mg/L
Hardness	300 as CaCo3
Nitrate	50 mg/L
Lead	0.01 mg/L
Cadmium	0.003 mg/L
Arsenic	0.01 mg/L
Sulfate	250 mg/L
Benzene	Absent/NIL
b. Microbiological	
Total Coliform (MTFT)	<1.1 MPN / 100ml
Fecal Coliform (MTFT)	<1.1 MPN / 100ml
Heterophic Plate Count (HPC)	<500 CFU/ml

3-5. Monitoring System or Plans for Safety of Drinking Water in your Organization/Regulatory Body / Independent Institution / Others.

Monitoring Plans for Safety of Drinking Water involves testing and monitoring of delivered water from the source up to the costumer/consumer's faucet. The following test are conducted in order to secure the water are safe to drink and for human consumption.

a. Daily Chloride Residual Testing (Random House Hold Faucet) is conducted by our water quality officer.
b. One a Month Microbiological Sampling (Random House Hold Faucet and Deep Well Sources) is conducted and tested by an accredited

Department of Health (DOH) laboratory and the results are submitted to the Rural Health Unit.

c. Twice a year Physical and Chemical Analysis of Raw Water and Treated Water (Random House Hold Faucet and Water Treatment Plant) is conducted and tested by an accredited Department of Health (DOH) laboratory and the results are submitted to the Rural Health Unit.

3-6. Implementation of Water Safety Plans* or Similar Efforts.

We prepared a water safety plan and disaster risk plan in order for us to maintain and ensure that our water service is available and safe for our consumer.

4. Reduction of Non – Revenue Water.

4-1 Current Situation and Major Challenges/Problems.

a. High Non Revenue Water due to old pipes like Asbestos Pipe and Black Iron Pipe that cause physical leakage.
b. Old and unreadable Water Meter.
c. Lack of District Metering System.

4-2 Current Actions against those Challenges/Problems.

a. High Non Revenue Water due to old pipes like Asbestos Pipe and Black Iron Pipe that cause physical leakage. – We have replaced around 3.5 km of Asbestos Pipe and reduced the leakage loss.
b. Old and unreadable Water Meter. – We invested in the replacement of water meter both Commercial Meter and Production Meter in order to accurately account the water billed from consumer and production of the deep wells.
c. Lack of District Metering System – It is a future plan to efficiently manage the water system and to install district monitoring meter to measure and dissect the area into manageable zoning system.

4-3. Any Achievements in Reduction of NRW.

We have drastically reduced the Non-Revenue Water of Lingayen Water District from 2013 up to present by 33% from 53% by doing pipe replacement and meter replacement.

4-4. Constitution of NRW.

Authorized Consumption	Revenue Water	Billed Authorized Consumption	**1,155,735 (m^3/year) (66.96%)**
	Non – Revenue Water (NRW)	Unbilled Authorized Consumption	**444 (m^3/year) (0.03%)**
Water Losses		Apparent losses (Unauthorized Consumption)	**1,614 (m^3/year) (0.094%)**
		Physical Losses (Leakage)	**568,812 (m^3/year) (32.96%)**

4-4 Situation about Leakage Detection Measures (DMA etc.)

We develop a team for leak detection during night time to measure and execute zero pressure test to locate the area which has high leakage during night time. For DMAs, we are currently installing Isolation Gate Valve to dissect and improve the distribution of water supply in the system.

5. Accounting system of Water Supply Service.

5-1. Water Tariff in your Organization.

Connection	0-10 Minimum	11-20	21-30	31-40	41- Over
Residential	270.00	28.15	29.50	31.10	33.10
Commercial	540.00	56.30	59.00	62.20	66.20

*Philippine Pesos (Php).

**Exclusive of (12% VAT tax).

5-2. Balance Sheet of your Organization.

Financial	**Dec. 2018**	**Year to Date**
Billing Current	3,564,834.57	42,443,294.63
Collection		
Current Collection	2,783,719.36	37,752,126.72
Arrears	301,240.42	4,188,330.53
Total Revenue:	**3,084,959.78**	**41,940,457.25**
Expenses		
Power/Electricity Cost	519,034.04	4,550,840.25
Chemical Cost	163,657.50	2,355,644.50
Manpower Cost	212,769.67	2,119,625.21
Repair & Maintenance	66,064.00	2,465,961.91
Total Direct Cost:	**961,524.71**	**11,492,071.87**
Admin Cost	**1,445,677.02**	**17,348,124.21**
Total Expenses	**2,407,201.73**	**28,840,196.08**

5-3 Profit and Loss Statement of your Organization.

YEAR TO DATE OF 2018	
Revenue Sales	41,940,457.25
Total Expenses	(28,840,196.08)
Net Income/ (Loss)	**13,100,261.17**

6. Major Recent Achievements in Improvement of Water Supply Service/ Management.

The Lingayen Water District has a high non-revenue water and has a poor water quality which the community have been experiencing for a half a century. In 2014, we started to replace the old asbestos pipe and decommissioned it to reduce the non-revenue water by almost 30%. By reducing the non-revenue water, we slowly rehabilitated the existing water treatment plant which was donated by JICA in 2005 and was abandoned the next year because of high operation cost. We also cooperated with JICA on the said rehabilitation and in 2017, the rehabilitation was completed. However, in order to ensure the operation of the said water treatment plant; we managed to install an additional Filter Equipment to remove the organics in the raw water which causes yellowish color. At present, we are operating the water treatment facilities and the community is now enjoying the potable and safe water.

7. Recent Challenges to Improvement of Water Supply Services.

By improving the water quality, the demand of the municipality increases. The supply becomes restricted due to the deterioration of ground water. Almost 20 million litters of water supply is needed in order for us to address the increasing demand and extended our service throughout the other barangays which in need to service water.

8. Expectations toward JAPAN.

8-1. Expectations toward Japanese Government and JICA.

I expect different culture and meaningful visit in Japan and JICA.

8-2. Expectations toward Japanese Water Utilities.

I expect knowledgeable ideas from experts in Japan to address how to manage water supply and equipment necessary to make efficient water service.

8-3. Expectations toward Japanese Private Companies.

I expect to also learn different things and acquire ideas from private companies that can be used in our daily operation.

9. Expectation towards the Program.

(Any comments and request are appreciated.)

I expect to learn additional knowledge in managing water supply system that I can re-echo to my colleagues and improve our services and functions in our industry.

Water Supply Administration
For Better Management of Water Supply Services
Course（Ｂ）

SAINT LUCIA

Water Supply Administration for Better Management of Water Supply Services

Inception Report Presentation

Name: Miguel Montoute
Position : Water Resources Specialist
Organization: Water Resources Management Agency

Outline of Water Supply Services

Whole Country:

Area: 617 km2 (238 sq mi)

Population : 178,015

Coverage Water Supply: 94% in 2013

Service Extent: Approximately 1127 km of distribution pipes

Population Served: 163,267

3

Outline of Water Supply Services

- Legal Basis of Water Supply Services:

  The Water Policy, of 2005 (institutional arrangements not approved)
  The Water and Sewerage Act (Cap.9.03), of 2008
  The National Utilities Regulatory Commission (NURC) Act, of 2016
  The Water and Sewerage Regulations No. 7, of 2009

- Demarcation of Water Supply Services

Water Supply Services fall under the jurisdiction of the Ministry of Agriculture, Fisheries, Physical Planning, Natural Resources and Co-operatives.

4

Outline of Water Supply Services

- Main Actor of Water Supply Utilities

The only water utility has been incorporated (under the Companies Act) but is owned by the state.

WASCO'S Vision:

"We are a self-sufficient environmentally sensitive organization, staffed by knowledge empowered employees, committed to excellence, and customer care in the provision of water and wastewater services."

WASCO's Mission:

- ✓ Promote collaboration, continuous learning and training.
- ✓ Foster teamwork professionalism
- ✓ Emphasize accountability
- ✓ Use appropriate technology and business process
- ✓ Deliver a consistent, safe and reliable water and wastewater service
- ✓ Resulting in excellent customer care and financial viability within a sustainable environment

5

Outline of Water Supply Services

WRMA's Vision Statement:

- ✓ "To manage the water resources of Saint Lucia in an efficient, sustainable and equitable manner that is consistent with the social, economic and environmental needs of current and future generations as well as with the country's regional and international obligations."

WRMA 's Mission Statement:

- ✓ " The Water Resource Management Agency is committed to the management of Saint Lucia's water resources. Adhering strongly to the principles of integrated water resources management, the Agency, which will comprise a cadre of committed and scientifically competent personnel, will utilise the most appropriate technology and engage in participatory approaches and strategic partnerships to enhance collaboration among public and private sector, and civil society interests in promoting the

6

Water Supply Service Levels

- Please fill data of your organization to below table.

	2013
Staff/1,000 connections	5
Production capacity (m^3/day)	57482
Water quality standards	WHO
Coverage area	94%
Supply duration (hour/day)	10 to 24
Supply pressure	Highly pressurized due to steep terrain
Number of connections	61341
Population Served	163,267
NRW	56.2%
Staff number	311

7

Management of Water Quality

- Current Situation and Major Challenges/Problems

Regulating potential water contamination practices by residents near water intakes in Grace (Vieux Fort), Talvan (Babboneau) and Venus Estate (Anse La Raye).

High siltation at intakes and reservoirs due to erosion and sediment transport

8

Management of Water Quality

- Current Actions against Those Challenges/Problems

Non Revenue water initiatives with GIZ and World Bank (DVRP)

Desalination proposals

Modification of intake designs

Desilting of the John Compton Dam

9

Management of Water Quality

- Water Quality Standards for Drinking Water

WHO

National Portable Water Quality Standards (in development)

- Monitoring System or Plans for Safety of Drinking Water in Your Organization / Regulatory Body / Independent Institution /Others

WQMAP (multiple Agencies)

- Implementation of Water Safety Plans or Similar Efforts

Water utility has water safety plans

10

Reduction of Non-Revenue Water

- Leakage Detection Measures

Updated strategy by the utilities seeks to address this through effective metering.

- Countermeasures for NRW

Updated strategy by the utilities seeks to address this through effective metering

11

Accounting System of Water Supply Services

- In 2013:

The unaudited financial statements for the period showed a loss in the amount EC$4,016,497. The tariff increase, which raised billings by EC$1.5 - EC$1.7 million monthly, improved WASCO's cash-flow ability, albeit only marginally, enabling payment of monthly electricity bills that averaged at EC$1.0 million. It also allowed WASCO to commence repayment of the outstanding debt due to LUCELEC for past bills that had remained unpaid. The financial situation continues to be a significant challenge.

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Accounting System of Water Supply Services

- Water Tariff in your Organization

- Domestic
- First 3000 gallons: $12.21 (per 1000 gallons)
- To excess of 3000 gallons $24.92 (per 1000 gallons)
- Minimum charge: 2000 gallons: 24.24
-
- Commercial/Industry
- $33.24 per 1000 gallons
- Minimum charge 2000 gallons: $ 66.46
-
- Hotels:
- $36.55 per 1000 gallons
-
- Government
- $23.26 per 1000 gallons
-
- Ships
- 66.46 per 1000 gallons

- Balance Sheet of your Organization
- Profit and Loss Statement of your Organization

13

Major Recent Achievement in improvement of water supply services

- Water Supply improvement projects in Denney and Vieux Fort
- The de-silting of the John Compton Dam which serves as the primary water reservoir in Saint Lucia.
- The rehabilitation of the Millet Water Intake (in progress).
- Assistance from the World Bank- Disaster Vulnerability Reduction Project (DVRP) to help reduce non-revenue water (in progress).

14

Recent challenges of Water Supply Services

- Regulating potential water contamination practices by residents near water intakes in Grace (Viuex Fort), Talvan (Babboneau) and Venus Estate (Anse La Raye).
- The reduction of non-revenue water. Estimates indicate that non-revenue water is above 50%.
- Siltation of intakes and reservoirs.
- High energy costs.

Inception Report

Date:28/June/2019
Name: Miguel Montoute
Country: Saint Lucia
Organization: Water Resources Management Agency
Position: Water Resources Specialist

---

1. Outline of Water Supply Services

1-1. Legal Basis of Water Supply Services

Water supply Services are based on the following policies, legislation and regulations:

- The Water Policy, of 2005
- The Water and Sewerage Act (Cap.9.03), of 2008
- The National Utilities Regulatory Commission (NURC) Act, of 2016
- Water and Sewerage Regulations No. 7, of 2009

1-2. Demarcation of Water Supply Services

Water Supply Services fall under the jurisdiction of the Ministry of Agriculture, Fisheries, Physical Planning, Natural Resources and Co-operatives.

1-3. Main Actor of Water Supply Utilities

Water supply provision falls under national government although the water utility has been incorporated (under the Companies Act). This is because the Government of Saint Lucia is the sole shareholder.

In accordance with the Water and Sewerage Act (Cap.9.03), of 2008 the water abstraction by the utility is regulated. The water Resources Management Agency (WRMA) is responsible for regulation the natural water resources through the issuance of abstraction licenses to the utility.

Water services provision is also regulated by the National Utilities Regulatory Commission (NURC) through tariff review and endorsement. The National Utilities Regulatory Commission (NURC) issues licenses for water services provision to the

water utility and water trucking establishments.

1-4. Mission/Vision of Water Supply Utilities

Vision of Water Utility:

“We are a self-sufficient environmentally sensitive organization, staffed by knowledge empowered employees, committed to excellence, and customer care in the provision of water and wastewater services.”

Mission Statement of Water Utility:

WASCO will:

- Promote collaboration, continuous learning and training.
- Foster teamwork professionalism
- Emphasize accountability
- Use appropriate technology and business process
- Deliver a consistent, safe and reliable water and wastewater service
- Resulting in excellent customer care and financial viability within a sustainable environment

1-5. Your Mission/Vision in your organization

WRMA’s Vision Statement:

“To manage the water resources of Saint Lucia in an efficient, sustainable and equitable manner that is consistent with the social, economic and environmental needs of current and future generations as well as with the country’s regional and international obligations.”

WRMA ‘s Mission Statement:

“ The Water Resource Management Agency is committed to the management of Saint Lucia’s water resources. Adhering strongly to the principles of integrated water resources management, the Agency, which will comprise a cadre of committed and scientifically competent personnel, will utilise the most appropriate technology and engage in participatory approaches and strategic partnerships to enhance collaboration among public and private sector, and civil society interests in promoting the

sustainability of water resources."

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2. Water Supply Service Levels

Note: Recent information from the water utility was not forthcoming due to the limited time available for this submission. Therefore some fields were left empty.

2-1. Main Performance Indicators (PI)

Coverage area	(km^2)
Population served	The island-wide water coverage ratio stood at 94% in 2013.
Collection ratio	In 2013: WASCO experienced improved collection results, attaining an average of 89% of billings by the end of the year. This is attributed to its sustained effort at encouraging customers to pay their bills on time (%).
Production capacity	(m^3/day)
Supply duration	(hour/day)
Supply pressure	
Non-Revenue Water	In 2013: A total of 2,045,935,768 gallons of water were recorded and billed for the period, representing an estimated 44% of total abstraction (%).The non-revenue-water ratio remained disturbingly high at an estimated 56%. This has been attributed primarily to huge losses in the entire network due to aged and poor quality infrastructure.
Water quality	Portable water quality is in keeping with WHO standards
Staff number	
Number of connections	In 2013 WASCO maintained 45,439 active accounts. In addition, there were 16,633 inactive accounts.
Staff/1,000 connections	(people/1,000 connections)

2-2. Any Monitoring by Performance Indicators (PI)

---

3. Management of Water Quality

Note: Recent information from the water utility was not forthcoming due to the limited time available for this submission. Therefore some fields were left empty.

3-1. Current Situation and Major Challenges/Problems
3-2. Current Actions against Those Challenges/Problems
3-3. Any Achievements in Mater Quality Management
3-4. Water Quality Standards for Drinking Water

WHO water quality standards are used, also The Saint Lucia Bureau of Standards has recently published Draft National Portable Water Quality Standards, which will soon be adopted.

3-5. Monitoring System or Plans for Safety of Drinking Water in Your Organization / Regulatory Body / Independent Institution /Others

Potable water quality is monitored by the Environmental Health Department, through spot checks to validate the Utility's test results.

3-6. Implementation of Water Safety Plans* or Similar Efforts

(* Water Safety Plans: refer to the following URL and review before participating in the Course, the Chapter 4 "Water Safety Plans" of the "Guidelines for drinking-water quality, third edition"
URL: **http://www.who.int/water_sanitation_health/dwq/gdwq3_4.pdf**)

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4. Reduction of Non-Revenue Water

Note: Recent information from the water utility was not forthcoming due to the limited time available for this submission. Therefore some fields were left empty.

4-1. Current Situation and Major Challenges/Problems

Estimates indicate that non-revenue water is above 50%.

4-2. Current Actions against Those Challenges/Problems

- The utility has development a recent strategic plan to tackle the non-revenue water issue.
- The utility has received assistance from the World Bank to purchase meters for assisting with non-revenue water initiatives.

4-3. Any Achievements in Reduction on NRW

4-4. Constitution of NRW (If you have the data, please fill in the table.)

Authorized consumption	Revenue water	Billed authorized consumption	(m^3 /year) (%)
	Non-Revenue Water (NRW)	Unbilled authorized consumption (ex. fire fighting, cleaning)	(m^3 /year) (%)
Water losses		Apparent losses (Unauthorized consumption (i.e. Illegal use), Customer metering inaccuracies)	(m^3 /year) (%)
		Physical losses (Leakage)	(m^3 /year) (%)

4-4. Situations about Leakage Detection Measures (DMA etc.)

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5. Accounting system of Water Supply Service

Note: recent information from the water utility was not forthcoming due to the limited time available for this submission. Therefore some fields were left empty.

5-1. Water Tariff in your Organization (WASCO)

Utility's Water Tariff:

Domestic
First 3000 gallons: $12.21 (per 1000 gallons)
To excess of 3000 gallons $24.92 (per 1000 gallons)
Minimum charge: 2000 gallons: 24.24

Commercial/Industry
$33.24 per 1000 gallons
Minimum charge 2000 gallons: $ 66.46

Hotels:
$36.55 per 1000 gallons

Government
$23.26 per 1000 gallons

Ships
66.46 per 1000 gallons

5-2. Balance Sheet of your Organization

In 2013:

The unaudited financial statements for the period showed a loss in the amount EC$4,016,497. The tariff increase, which raised billings by EC$1.5 - EC$1.7 million monthly, improved WASCO's cash-flow ability, albeit only marginally, enabling payment of monthly electricity bills that averaged at EC$1.0 million. It also allowed WASCO to commence repayment of the outstanding debt due to LUCELEC for past bills that had remained unpaid. The financial situation continues to be a significant challenge.

5-3. Profit and Loss Statement of your Organization
(*[Public Utilities] (1) Profit and Loss Account
(2) Capital Income and Expenditures of your Organization)
(* You can check the case of Tokyo in the chapter 4 ”Financial System and Future Financial Management” of this file.
URL: http://www.waterprofessionals.metro.tokyo.jp/pdf/wst_02.pdf)

---

6. Major Recent Achievements in Improvement of Water Supply Services/Management

- Water Supply improvement projects in Denney and Vieux Fort
- The de-silting of the John Compton Dam which serves as the primary water reservoir in Saint Lucia.
- The rehabilitation of the Millet Water Intake (in progress).
- Assistance from the World Bank- Disaster Vulnerability Reduction Project (DVRP) to help reduce non-revenue water (in progress).

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7. Recent Challenges to Improvement of Water Supply Services

- Regulating potential water contamination practices by residents near water intakes in Grace (Viuex Fort), Talvan (Babboneau) and Venus Estate (Anse La Raye).

- The reduction of non-revenue water. Estimates indicate that non-revenue water is above 50%.

---

8. Expectations toward Japan

8-1. Expectations toward Japanese Government and JICA

I expect hospitality and professionalism from JICA and the Japanese government. I am also very interested in the cultural exchange and getting a good idea of the Japanese government's policy towards the water sector.

8-2. Expectations toward Japanese Water Utilities

I expect that the water utilities have mainstreamed Climate Change as into their strategic planning processes and have implemented best practices regarding maintaining acceptable levels of non-revenue water.

8-3. Expectations toward Japanese Private Companies

I expect that Japanese private companies or utilities have properly priced water service provision to reflect actual production costs and good cost recovery. Hence, allowing them to operate profitably and sustainably.

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9. Expectations toward the Program.

(Any comments and requests are appreciated.)

I expect to benefit from Japanese best practices in the water sector with a focus on sustainability and demand side management (non-revenue water reduction).

(Please add sheets of paper if necessary.)

Water Supply Administration
For Better Management of Water Supply Services
Course（Ｂ）

SAMOA

Inception Country Report

Water Supply Administration for Better Management of Water Supply Services

Japan, 11th November – 22nd November 2019

Tafeamaalii Philip Kerslake
Manager- Technical Project Coordination and Asset Management
Samoa Water Authority

Presentation overview

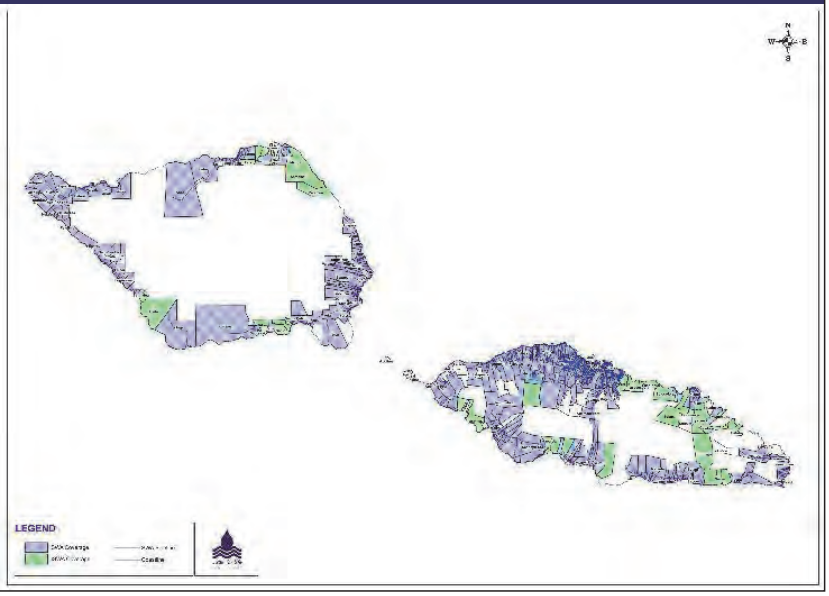
- Introduction- Samoa
- Outline of Water Supply Services
- Water Supply Service Levels
- Management of Water Quality
- Reduction of Non Revenue Water
- Accounting System of Water Supply Systems
- Major Recent Achievements in Improvement of Water Supply systems
- Recent challenges of Water Supply Services

SAMOA

- 2 main islands: Savaii and Upolu (account to 99% of total land area)
- 7 smaller islands
- Total population of 197,582

With small economy

- Total land area = 2,820 sq. km
- Closest countries are Fiji, NZ, Australia
- Customary land = 87%
- Government land = 3%
- Freehold land = 10%

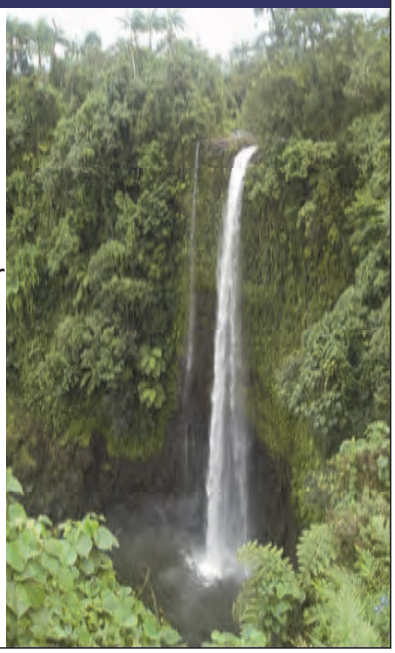


Landscape and Geology structure

- Samoa's topography is rugged and mountainous
- Highest peak is Mt. Silisili reaching 1,848 m high
- Geology is composed mainly of basic volcanic rocks, which experienced volcanic eruptions in 1760, 1902 and 1911
- Younger rocks have no soils and allow rapid infiltration
- Older volcanics are extensively weathered to form clayey soils, result in rapid surface water run-off
- Hence, the distribution of water resources is therefore determined by the country's geology

Water Resources

- Samoa's climate has 2 seasons: Wet (November to April), Dry (May to October)
- Has abundant water resources with average rainfall over 3,000mm/year
- 75% of the precipitation occurring during November-January
- Conventional water resources include surface water and groundwater
- Catchment sizes are small and slope gradients steep, resulting in rapid responses to rainfall events with significant sediment loads
- And low flows during dry periods
- Approx. 65% of our water supply comes from surface water, and 35% groundwater



Climate Unpredictability and development

- The impacts of climate change on the seasonal variation of rainfall patterns and rising sea levels pose a potential threat to water security (especially in isolated small island states like Samoa)
- Prolonged dry conditions water shortages and rationing
- Heavy rains have brought problems of flooding
- Resettlement of communities
- Increased residential and agricultural development in the watershed areas, and the clearance of trees

Outline of Water Supply Services

A) Legal Basis of Water Supply Services

1) Samoa Water Authority Act 2003

2) Public Bodies (Performance and Accountability Act 2001)

B) Demarcation of Water Supply Services

Provision of Water Supply Services is through operation of

- 7 Slow Sand Filtration Plants (Total of 1,400,000 m3/month)
- 7 Rapid Sand Filtration Plants (Total production of 150,00 m3/month)
- 46 Borehole Pump (Total production of 460,000 m3/month)
- 3 Booster pump Spring intakes (Total Production of 107,000m3/month)
- 3 raw water intake systems

c) Main Actors of Water Supply Utilities

SWA is a Government State Owned Enterprise (SOE) responsible for provision of drinking water services to majority of Samoa (81%), other areas are provided by Village Managed Schemes (10%) and remaining areas rely on rainwater harvesting or water carting.

d) Vision for SWA: To promote access to reliable, clean and affordable water services for all people in Samoa within our mandated service area

e) Mission for SWA: To effectively manage the provision of safe, reliable and sustainable water services to our customers.

Water Supply Service Levels

Coverage area	**290 km^2**
Population served	197,582
Collection ratio	107 %
Production capacity	69,151 m^3/day
Supply duration	24 hour/day
Supply pressure	2-4 bar
Non-Revenue Water	50.84 (%)
Water quality	Treated Water Supply with Chlorination Disinfection
Staff number	268

Management of Water Quality

CURRENT SITUATION

1) Treated Water Supply- 100% Bacterial Compliance for Main Treatment Plants- Slow Sand Filtration/ Ecological Purification Systems
2) Chlorinated Borehole Supplies- 80% Bacterial Compliance
3) Un-Chlorinated Boreholes and raw water intakes= 25% Bacterial Compliance
4) High Salinity issues for 2 borehole supply systems

MAJOR CHALLENGES/PROBLEMS

1) Improve compliance of water quality of untreated Borehole supplies
2) Unreliable power supply in some parts of the country
3) Vast distances to travel for monitoring on other island.
4) Upgrade all Borehole supplies to include Chlorination building and units.
5) Future High Salinity risks for other Borehole supply systems.

Management of Water Quality (2)

CURRENT ACTIONS AGAINST THOSE CHALLENGES/PROBLEMS

1) Target specific number of boreholes to be chlorinated per year and prioritise resources and budget
2) Investment Plan Capital Works activities target untreated Water supply systems for upgrade in each year.

ANY ACHIEVEMENTS IN WATER QUALITY MANAGEMENT

1) Consistent 100% Water Quality Compliance for Treated Water Supply for the last 2 Years
2) Increase rate in monitoring by the Water Quality Unit for Savaii Island and all systems for this year for more consistent results ensured for treated water supplies.

WATER QUALITY STANDARDS FOR DRINKING WATER

1) Samoa National Drinking Water Standards- SWA does own testing of systems but SWA systems also independently monitored by Ministry of Health for reporting to Water Sector.

MONITORING SYSTEMS or PLANS FOR SAFETY OF DRINKING WATER IN YOUR ORGANISATION

1) Ministry of Health is the Regulatory Authority for monitoring of SWA water supplies
2) SWA own Water Quality Unit carries out intense and frequent monitoring of all Water Supplies based on Monitoring Plan

IMPLEMENTATION OF WATER SAFETY PLANS or SIMILAR EFFORTS

1) Initial Plan completed in draft form for 2 main Water Treatment Plants, awaiting approval.

Reduction of Non-Revenue Water

Authorized consumption	**Revenue water** **42%**	**Billed authorized consumption**	**2,464,824 (m^3 /year)** **42% (%)**
	Non-Revenue Water (NRW) 58%	Unbilled authorized consumption (ex. fire fighting, cleaning)	924 (m^3 /year) 0.02% (%)
Water losses		Apparent losses (Unauthorized consumption (i.e. Illegal use), Customer metering inaccuracies)	534,048 (m^3 /year) 9.2% (%)
		Physical losses (Leakage)	2,823,144 (m^3 /year) 48.6% (%)

LEAK DETECTION MEASURES- 1) Establish DMAs 2) Monitor and Repair Leakges 3) Install PRVs 4) Pipeline Replacement

COUNTERMEASURES FOR NRW – 1) Replacement of Meters olders than 5 years

Accounting System
SWA Water Tariff

Domestic/household Connections - 3 step Tariff

Rate	Cubic meters per month	WST / m^3
Step 1	less than 15m^3	$0.77
Step 2	15 - 40m^3	$1.67
Step 3	more than 40m^3	$2.17

Non household or Organisations / Commercial Connections - 2 step Tariff

Rate	Cubic meters per month	WST / m^3
Step 1	less than 40m^3	$1.77
Step 2	more than 40m^3	$2.27

SWA Water Tariff

Flat Rates

Type	Rate per month
Domestic	$20.00
Businesses	$32.00

Wastewater Tariff

Type	Cubic meters per month	WST / m^3
Domestic	less than $72m^3$	$3.50
Businesses	greater than $72m^3$	$5.90

SWA Balance Sheet

Samoa Water Authority Statement of Financial Performance For the year ended 30 June 2018

	Notes	2018 $	2017 $
Income			
Customer water services revenue	5	18,096,196	17,079,405
Wastewater revenue		2,050,477	1,697,373
Grants	6	3,877,934	4,744,275
Amortisation	19	1,789,582	1,638,913
Other income		1,094,595	721,760
Total income		26,908,784	25,881,726
Expenses			
Administration and other costs	7	3,062,987	2,816,551
Audit fees		62,100	90,000
Doubtful debts account receivables	15	200,000	-
Depreciation	13	5,198,679	4,921,981
Directors fees and costs	11	106,913	114,060
Personnel costs	10	8,111,842	7,269,135
Operations and maintenance costs	8	9,880,706	9,017,007
Stock write off		3,123	
Total expenses		26,626,350	24,228,734
Net finance costs	9	64,249	4,181
Write back of provision for other debtors			414,733
Net profit		218,185	2,063,544

ASSETS	Notes	2018 $	2017 $
Non current assets			
Property, plant and equipment	13	162,768,531	162,209,253
Current assets			
Cash and cash equivalents	17	18,544,295	15,652,255
Trade receivables	15	4,498,791	3,579,828
Others debtors and prepayments	16	893,138	677,467
Inventory	14	1,656,894	1,448,384
Total current assets		25,593,117	21,357,934
TOTAL ASSETS		188,361,648	183,567,187
EQUITY AND LIABILITIES			
Equity			
Government of Samoa equity	18	84,660,413	84,660,413
Asset revaluation reserve		35,294,097	35,294,097
Accumulated losses		(54,354,511)	(53,540,924)
Total equity		65,599,999	66,413,586
Non current liabilities			
Deferred Income	19	117,463,309	113,204,420
Borrowings	20	235,408	157,420
		117,698,717	113,361,840
Current liabilities			
Trade creditors	21	1,189,048	1,153,483
Other creditors and accruals		724,896	700,436
Provision for dividends		1,031,772	-
Deferred income	19	1,789,582	1,795,835
Current portion of borrowings	20	327,634	142,007
Total current liabilities		5,062,932	3,791,761
TOTAL EQUITY AND LIABILITIES		188,361,648	183,567,187

Major Recent Achievement in Improvement of Water Supply Services

- Improvement in NRW for Urban –Alaoa System; as part of CEPSO project- NRW reduction from 55% to 38% over last 5 years
- Upgrade of untreated water supply systems to Treated Water Systems via JICA project for 3 water supply schemes at Tapatapao, Vailima and Vaivase
- Water Quality Improvement for Treated Water Supplies ensuring consistant 100% Bacterial Compliance for Last 2-3 years
- Increase NRW works to reduce NRW for all Operational areas of Urban Upolu, Rural Upolu and Savaii.

Recent Challenges of Water Supply Services

- Salinity Issue with Borehole pump- increased risk with climate change
- Frequent occurrence of cyclones and natural disasters
- Relocation of villages to higher locations where current water supply are not able to supply, resulting in need to pump water to higher elevation, additional operation cost on top of new infrastructure costs.

SSF and Borehole water supply systems

Occurrence of cyclones

FAAFETAI LAVA

ARIGATO

SOIFUA MA IA MANUIA

Inception Report

Date: 25th July 2019
Name: Philip Kerslake
Country: Samoa
Organization: Samoa Water Authority
Position: Manager-Technical Project Co-ordination and Asset Management Division

---

1. Outline of Water Supply Services

1-1. Legal Basis of Water Supply Services

1) Samoa Water Authority Act 2003
2) Public Bodies (Performance and Accountability) Act 2001

1-2. Demarcation of Water Supply Services

1) Samoa Water Authority is a Government State owned Enterprise that is responsible for provision of drinking water services for majority of Samoa. (Majority of water supply systems undergo Water Treatment either through Slow Sand Filtration Treatment Plants or Rapid Sand Filtration Treatment Plants with disinfection using chlorine.)

1-3. Main Actor of Water Supply Utilities

1) SWA is main water supply provider for Samoa- 81% of population
2) Independent Water Supply schemes account for 10%. (This is made of individual Villages who manage their own water supplies generally from river or spring intakes into piped network water supplies, normally untreated and no disinfection provided)
3) Remaining areas do not have pipe water supply and rely on rainwater harvesting.

(e.g. In Japan, most water utilities are public bureau under local government.)

1-4. Mission/Vision of Water Supply Utilities

Vision- To promote access to reliable, clean and affordable water services for all people in Samoa within our mandated service areas.

Mission- To effectively manage the provision of safe, reliable and sustainable water services to our customers

1-5. Your Mission/Vision in your organization

Same as for 1-4

---

2. Water Supply Service Levels

2-1. Main Performance Indicators (PI)

Coverage area	290 (km^2)
Population served	158,769
Collection ratio	107 (%)
Production capacity	69,151 (m^3/day)
Supply duration	24 (hour/day)
Supply pressure	2-4 bar
Non-Revenue Water	50.84 (%)
Water quality	Treated Water Supply with Chlorination Disinfection
Staff number	268

Number of connections	23,057
Staff/1,000 connections	11.6 (people/1,000 connections)

2-2. Any Monitoring by Performance Indicators (PI)

1) **Performance Indicators- Water Quality Compliance**
2) **Billing efficiency**
3) **Collection efficiency**
4) **NRW per systems- Urban Upolu, Rural Upolu and Savaii (3 Operations Divisions for Water Supply)**

---

3. Management of Water Quality

3-1. Current Situation and Major Challenges/Problems

a) **Majority of Treated Water Supply comply with National Drinking Water Standards- 100% monthly compliance**
b) **Chlorinated Bore Water supply compliance -80%**
c) **Unchlorinated Bore water supply and raw water supply compliance- 25%**

Major Challenges-

1) **Improve compliance of water quality of untreated Borehole supplies, unreliable power supply and vast distances to travel for monitoring on Savaii island.**
2) **Upgrade untreated water supplies from untreated to Treated required significant time and resources**

3-2. Current Actions against Those Challenges/Problems

1) **Target specific number of Boreholes to be chlorinated per year and prioritizing resources and budget**
2) **Investment Plan capital works activities target untreated systems for upgrades in each year.**

3-3. Any Achievements in Water Quality Management

1) **Consistent 100% water quality compliance for Treated Water Supply for the last 2 financial years**
2) **Increase rate in monitoring by the Water Quality Unit for Savaii island and all systems for this financial year results in consistent results ensured for treated water supplies**

3-4. Water Quality Standards for Drinking Water

National Drinking Water Standards for Samoa- set by Ministry of Health

3-5. Monitoring System or Plans for Safety of Drinking Water in Your Organization / Regulatory Body / Independent Institution /Others

Regular Monthly monitoring by in house Water Quality Unit also regulated by Ministry of Health using their own teams for monitoring of SWA water quality end points

3-6. Implementation of Water Safety Plans* or Similar Efforts

Initial plans completed for 2 main Water Treatment Plants in draft form to be approved.

Capacity building required due to loss of key staff implementing these works.

(* Water Safety Plans: refer to the following URL and review before participating in the Course, the Chapter 4 "Water Safety Plans" of the "Guidelines for drinking-water quality, third edition"
URL: http://www.who.int/water_sanitation_health/dwq/gdwq3_4.pdf)

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4. Reduction of Non-Revenue Water

4-1. Current Situation and Major Challenges/Problems

50% NRW

Major Challenge

1) Procurement of required materials for major upgrades

2) Areas with aging pipeline requiring replacement

4-2. Current Actions against Those Challenges/Problems

1) Procurement in progress

2) Targeting high priority areas to maximize impact of works done

3) Reducing pressure in systems to reduce NRW.

4-3. Any Achievements in Reduction on NRW

1) Major achievement with installation of PRVs and reducing pressure

2) Identified submains replaced resulting in large impact with reduction of NRW

4-4. Constitution of NRW (If you have the data, please fill in the table.)

For Alaoa Water Supply System (Main water supply for Town area)

Authorized consumption	Revenue water 42%	Billed authorized consumption	2,464,824 (m^3 /year) 42% (%)
	Non-Revenue Water (NRW) 58%	Unbilled authorized consumption (ex. fire fighting, cleaning)	924 (m^3 /year) 0.02% (%)
Water losses		Apparent losses (Unauthorized consumption (i.e. Illegal use), Customer metering inaccuracies)	534,048 (m^3 /year) 9.2% (%)
		Physical losses (Leakage)	2,823,144 (m^3 /year) 48.6% (%)

4-4. Situations about Leakage Detection Measures (DMA etc.)

12 DMAs have been created for the Alaoa system under the JICA CEPSO project with ongoing monitoring and improvement works to reduce NRW with move to implement for other supply systems of the SWA

---

5. Accounting system of Water Supply Service

5-1. Water Tariff in your Organization- refer to Appendix 1

5-2. Balance Sheet of your Organization- refer to Appendix 2

5-3. Profit and Loss Statement of your Organization- refer to Appendix 2

(*[Public Utilities] (1) Profit and Loss Account

(2) Capital Income and Expenditures of your Organization)

(* You can check the case of Tokyo in the chapter 4 "Financial System and Future Financial Management" of this file.

URL: http://www.waterprofessionals.metro.tokyo.jp/pdf/wst_02.pdf)

---

6. Major Recent Achievements in Improvement of Water Supply Services/Management

1) Improvement in NRW for Urban and Rural areas- Strategic location of PRV to maximize NRW results.

2) Improved capacity of Divisions to implement NRW programs.

3) Water Quality improvement and sustained for Treated water supply areas

4) New major Infrastructure by JICA project for 2 new treatment Plants and new treated supply area via booster pump from existing Treatment Plant resulting in major improvement of water supply to these areas.

---

7. Recent Challenges to Improvement of Water Supply Services

1) Land issues with relocation of pipelines from private properties to Road reserves particularly major trunk lines

2) New systems requiring pumping to new areas at higher locations to allow for water supply for this population, will also increase cost of operation for SWA.

---

8. Expectations toward Japan

8-1. Expectations toward Japanese Government and JICA

Best practices for Water Supply Management

8-2. Expectations toward Japanese Water Utilities

Innovative ideas and technology to existing with operations and capital works projects for SWA

8-3. Expectations toward Japanese Private Companies

New innovations or technology utilized and Work practices and processes utilized to ensure efficient and sustainable operations

---

9. Expectations toward the Program.

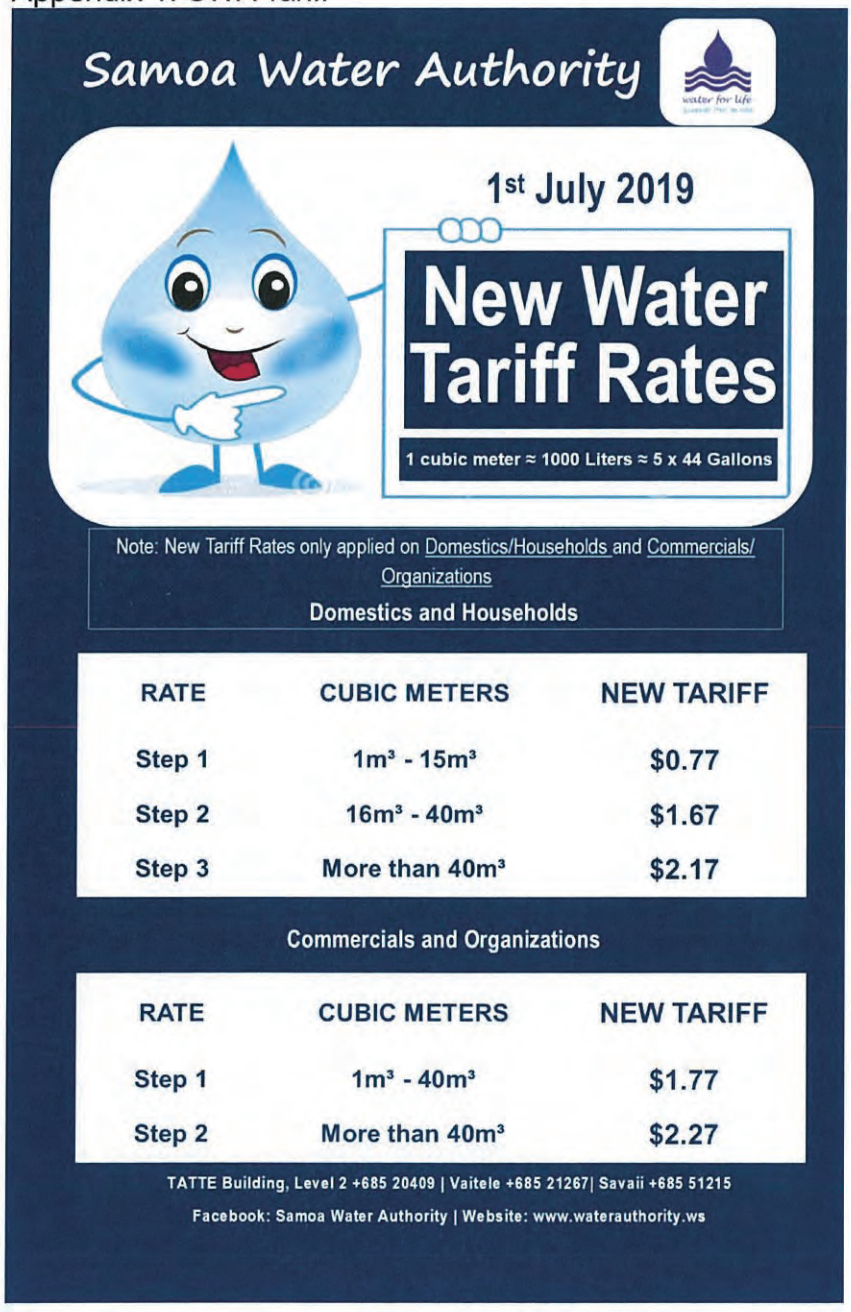
(Any comments and requests are appreciated.)

High expectation for innovative ideas, technology and practices for ensuring efficient and effective management of water supply utility in the Pacific.

Assistance and capacity building with Water Safety plans identified as priority task for SWA.

Attachments for accounting system information.
Appendix 1- Tariff- new (effective July 2019) and old (2009- June 2019)

Appendix 1: SWA Tariff



SWA Water Tariff 2009- June 2019

Domestic Connections- 3 step Tariff

Tariff

	Cubic meters per month	SAT/m3
Step 1	≤ 15m3	$0.50
Step 2	15-40m3	$1.40
Step 3	> 40m3	$1.90

Non- Domestic/Commercial Connections- 2 step Tariff

Tariff

	Cubic meters per month	SAT/m3
Step 1	≤ 40m3	$1.50
Step 2	> 40m3	$2.00

Flat Rate/Fee (for untreated supply only) (current)

		Rate per month
1	Domestic	$20.00
2	Commerial	$32.00

Wastewater Tariff (Current)

Commercial only

Note: 80% of Monthly consumption is used to calculate monthly charges for wastewater

	Cubic meters per month	SAT/m3
Step 1	≤ 72m3	$3.50
Step 2	> 72m3	$5.90

currently approx 100 businesses in the CBD area connected to Wastewater pressure sewerage system

Appendix 2: Finance Statements

Samoa Water Authority
Statement of Financial Performance
For the year ended 30 June 2018

	Notes	2018 $	2017 $
Income			
Customer water services revenue	5	18,096,196	17,079,405
Wastewater revenue		2,050,477	1,697,373
Grants	6	3,877,934	4,744,275
Amortisation	19	1,789,582	1,638,913
Other income		1,094,595	721,760
Total income		**26,908,784**	**25,881,726**
Expenses			
Administration and other costs	7	3,062,987	2,816,551
Audit fees		62,100	90,000
Doubtful debts account receivables	15	200,000	-
Depreciation	13	5,198,679	4,921,981
Directors fees and costs	11	106,913	114,060
Personnel costs	10	8,111,842	7,269,135
Operations and maintenance costs	8	9,880,706	9,017,007
Stock write off		3,123	
Total expenses		**26,626,350**	**24,228,734**
Net finance costs	9	64,249	4,181
Write back of provision for other debtors			414,733
Net profit		**218,185**	**2,063,544**

The accompanying notes form an integral part of the above financial statement

Samoa Water Authority
Statement of Financial Performance
For the year ended 30 June 2018

ASSETS	Notes	2018 $	2017 $
Non current assets			
Property, plant and equipment	13	162,768,531	162,209,253
Current assets			
Cash and cash equivalents	17	18,544,295	15,652,255
Trade receivables	15	4,498,791	3,579,828
Others debtors and prepayments	16	893,138	677,467
Inventory	14	1,656,894	1,448,384
Total current assets		25,593,117	21,357,934
TOTAL ASSETS		**188,361,648**	**183,567,187**
EQUITY AND LIABILITIES			
Equity			
Government of Samoa equity	18	84,660,413	84,660,413
Asset revaluation reserve		35,294,097	35,294,097
Accumulated losses		(54,354,511)	(53,540,924)
Total equity		65,599,999	66,413,586
Non current liabilities			
Deferred Income	19	117,463,309	113,204,420
Borrowings	20	235,408	157,420
		117,698,717	113,361,840
Current liabilities			
Trade creditors	21	1,189,048	1,153,483
Other creditors and accruals		724,896	700,436
Provision for dividends		1,031,772	-
Deferred income	19	1,789,582	1,795,835
Current portion of borrowings	20	327,634	142,007
Total current liabilities		5,062,932	3,791,761
TOTAL EQUITY AND LIABILITIES		**188,361,648**	**183,567,187**

Signed on behalf of the Board:

Chairman of the Board - SWA
30/10/18
Dated

Managing Director
30/10/18
Dated

The accompanying notes form an integral part of the above financial statement

Samoa Water Authority
Statement of Financial Performance
For the year ended 30 June 2018

	Government of Samoa Equity	Asset Revaluation Reserve	Accumulated Losses	Total
Balance as at 1st July 2016	84,660,413	35,294,097	(55,604,468)	64,350,042
Net profit for the period	-	-	2,063,544	2,063,544
Revaluation portion of assets disposals		-	-	-
Balance as at 30th June 2017	**84,660,413**	**35,294,097**	**(53,540,924)**	**66,413,586**
Balance as at 1st July 2017	84,660,413	35,294,097	(53,540,924)	66,413,586
Net profit for the period	-	-	218,185	218,185
Dividends			(1,031,772)	(1,031,772)
Balance as at 30th June 2018	**84,660,413**	**35,294,097**	**(54,354,511)**	**65,599,999**

The accompanying notes form an integral part of the above financial statement

Samoa Water Authority
Cash Flow Statement
For the year ended 30 June 2018

	Notes	2018 $	2017 $
Cash flows from operating activities			
Cash was provided from:			
Receipts from customers		18,859,914	17,900,072
Community service obligation		1,994,521	3,675,432
Grants	6	1,883,410	1,338,711
VAGST refund		926,585	1,354,976
Others		1,356,286	1,503,610
		25,020,716	25,772,801
Cash was disbursed to:			
Payments to employees		(8,771,546)	(7,241,888)
Payments to suppliers and for expenses		(13,595,744)	(11,525,662)
Interest paid		-	(112)
		(22,367,290)	(18,767,662)
Net cash flows from operating activities		2,653,426	7,005,139
Cash flows from investing activities			
Proceeds from sale of fixed assets		55,956	52,566
Interest received		125,673	12,163
Purchase of fixed assets		(6,190,586)	(9,676,898)
Net cash flows for investing activities		(6,008,957)	(9,612,169)
Cash flows from financing activities			
Budget support grant for construction of water supply systems including cyclone affected areas		6,760,633	7,445,711
Finance lease payments		(513,062)	(333,100)
Net cash flows for financing activities		6,247,571	7,112,611
Net increase/(decrease) in cash balances		2,892,040	4,505,581
Cash balances brought forward		15,652,255	11,146,674
Ending cash balances	17	**18,544,295**	**15,652,255**
Represented by:			
Cash on hand		2,730	2,730
Cash at Bank		18,451,605	15,560,826
Short Term Deposits		89,960	88,699
	17	18,544,295	15,652,255

The accompanying notes form an integral part of the above financial statement

出典：2019 年度 JICA 課題別研修カントリーレポート

- 2019 年度 JICA 課題別研修「水道管理行政（A）」
- 2019 年度 JICA 課題別研修「水道管理行政（B）」
- 2019 年度 JICA 課題別研修「薬事行政」

Japan International Corporation of Welfare Services (JICWELS) was established with the sanction of the Minister for Health, Labour and Welfare in July 1983 and implements international technical cooperation programmes with purpose of contributiing to the promotion of health and social welfare activities in the friendly nations.

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公益社団法人国際厚生事業団（JICWELS）は、国際的な保健・福祉分野の国際協力に貢献することを目的として、1983 年（昭和 58 年）7 月 7 日に厚生省（現厚生労働省）から社団法人の認可を受け設立されました。開発途上国の行政官研修や WHO フェローの受入れ、調査企画や研究開発並びに情報の交換及び広報活動など、海外諸国との国際交流活動を推進しています。

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