No.

HOLDING COMPANY FOR WATER AND WASTEWATER
(HCWW)
SHARKIA POTABLE WATER AND SANITATION COMPANY
(SHAPWASCO)

THE PROJECT
FOR
IMPROVEMENT OF MANAGEMENT CAPACITY
OF
OPERATION AND MAINTENANCE FOR SHAPWASCO
IN THE ARAB REPUBLIC OF EGYPT

PROJECT FINAL REPORT
(MAIN REPORT)

NOVEMBER 2009

JAPAN INTERNATIONAL COOPERATION AGENCY

YACHIYO ENGINEERING CO., LTD.

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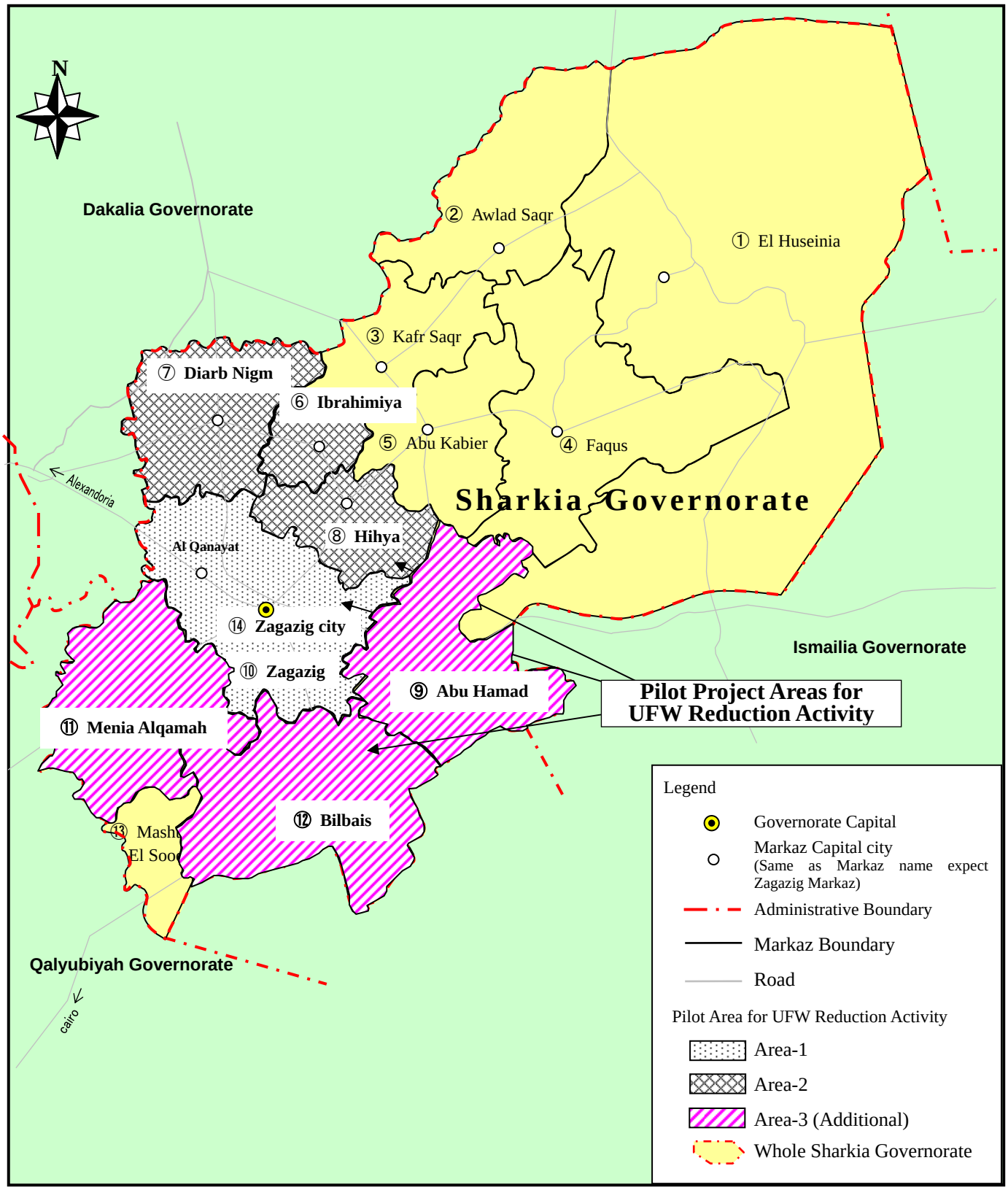
Exchange Rate applied in this Report

As of November 2009

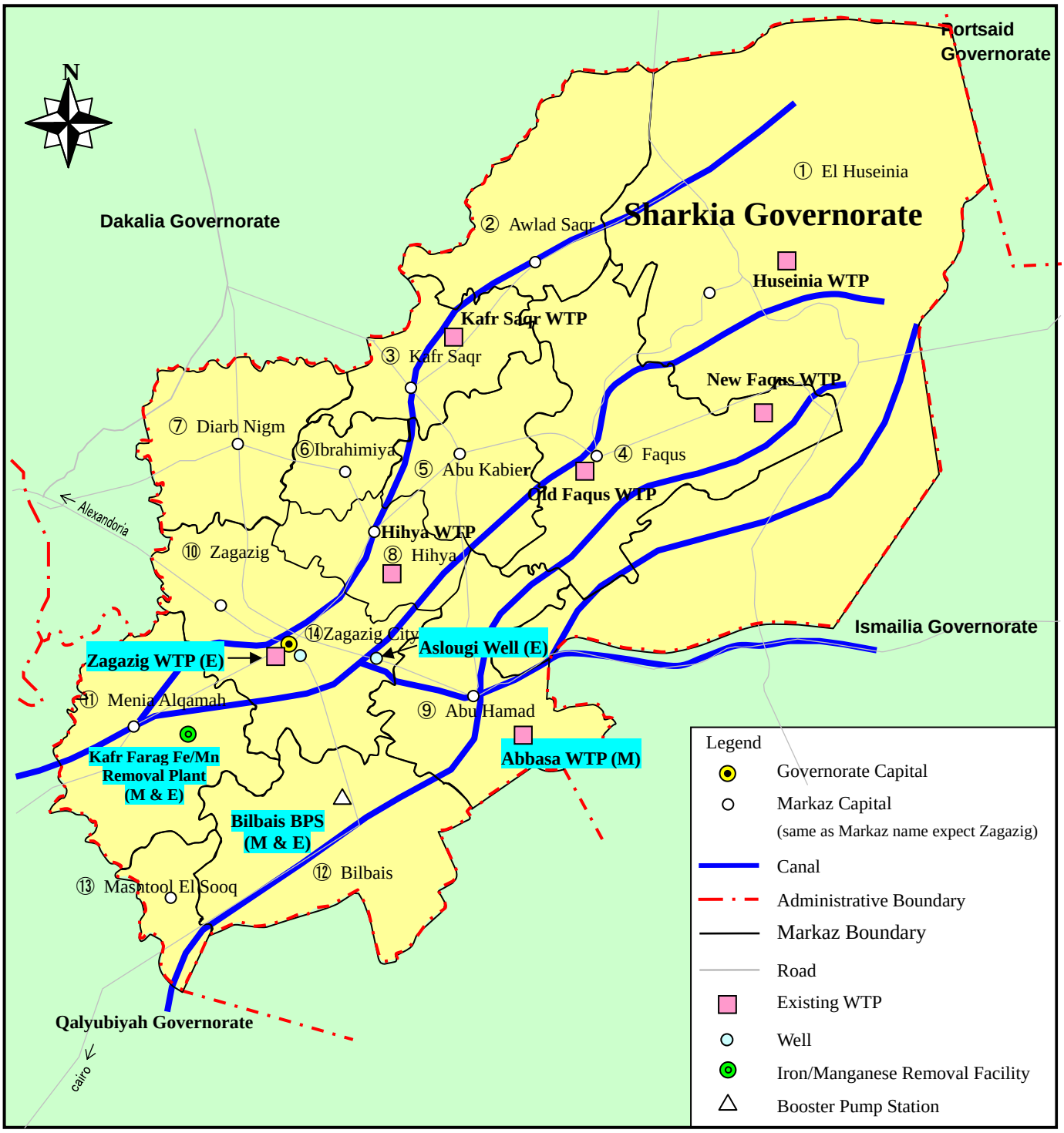
US$ 1.00 = LE 5.43

US$ 1.00 = JY90.87

LE 1.00 = JPY16.723



Pilot Project Area for UFW Reduction Activities



Model Facilities for SOP Activities

M & E : Mechanical & Electrical

M : Mechanical only

E : Electrical only

Open Seminar

Chairman of HWCC and SHAPWASCO make a speech for opening ceremony at Grand Hyatt Hotel in Cairo.(1st Open seminar)
(Date: Jun. 10, 2007)

Chairman of SHAPWASCO facilitates the 1st open seminar. (Date: Jun. 10, 2007)

The head of UFW Reduction Team makes a presentation at 1st Open seminar.
(Date : Jun. 10, 2007)

The head of SOP Team makes a presentation at 1st Open seminar. (Date: Jun. 10, 2007)

The head of UFW reduction team makes a presentation for final achievement and evaluation at 3rd Open seminar.
(Date : Oct. 27, 2009)

The head of SOP team makes a presentation for final achievement at 3rd Open and evaluation seminar. (Date : Oct. 27, 2009)

Open Workshop

Presentation by counter pert at Military club in Zagazig. (1st Open workshop)
(Date: Nov. 25.26, 2007)

Presentation by counter pert at Military club in Zagazig. (1st Open workshop)
(Date: Nov. 25.26, 2007)

The situation of listening to presentation by counterpart. (1st Open workshop)
(Date: Nov. 25.26, 2007)

Discussion with attendance at Military club in Zagazig. (1st Open workshop)
(Date: Nov. 25.26, 2007)

Counterpart makes a presentation of result for water saving campaign at Sharkia Governorate in Zagazig. (2nd Open workshop)
(Date: Dec. 16, 2008)

Attendance asks question of counterpart about UFW reduction activity presentation. (2nd Open workshop) (Date: Dec. 16, 2008)

Internal Workshop for UFW

Explanation of project objectives for UFW reduction activity. (Date: Feb. 24, 2007)

Explanation by Egyptian expert for UFW reduction activity. (Date: Feb. 24, 2007)

Presentation by a counterpart (UFW team member) for UFW reduction activity. (Date: Feb. 24, 2007)

Explanation for water meter reading by specialist of Zagazig City in training room. (Date: Jul. 1, 2007)

Presentation of the investigated result in Zagazig City East by head of Zagazig team. (Date: Sep. 11, 2007)

Counterpart takes Japanese Expert's advice at onsite workshop in Zagazig East City. (Date: Sep. 11, 2007)

Internal Workshop for SOP

Explanation of project objectives for SOP activity. (Date: Feb. 26, 2007)

Explanation by Egyptian expert for SOP activity. (Date: Feb. 26, 2007)

Presentation by a counterpart for SOP activity. (Date: Feb. 27, 2007)

Counterpart explains the importance of coordination between facility operation and water quality control in Abbasa W.T.P. (Date: Jun. 25, 2007)

Presentation for well monitoring by head of well monitoring team in training room. (Date: Jun. 26, 2007)

Presentation for water quality & process control in training room. (Date: Oct. 27, 2007)

Water Conservation Campaign

Expert and counter part team visit to primary school in Hihya Markaz. (Date: Oct. 24, 2007)

Students at primary school in Hihya Markaz visit to Hihya Water Treatment Plant. (Date: Oct. 28, 2007)

Students answer a questionnaire at junior high school in Ibrahimia Markaz. (Date: Nov. 14, 2007)

Students at junior high school in Ibrahimia Markaz visit to Hihya Water Treatment Plant. (Date: Nov. 19, 2007)

Joint Coordination Committee

Discussion with member of 1st Joint Coordination Committee. (Date: July. 10, 2008)

Signing of completion for project at 6th Joint Coordination Committee. (Date : Oct. 27, 2009)

UFW Reduction Activity(1/3)

The situation of training for C/P at Mostorod Training Center. (Action U1).
(Date: May.7, 2007)

Minimum night flow survey in Zagazig City East. (Action U2) (Date: Jun. 7, 2007)

Installation of portable flow meter on MNF survey in Zagazig Markaz. (Action U2).
(Date: Jun. 30, 2007)

Training for GIS operation with Expert at GIS center. (Action U3). (Date: May. 14, 2007)

Exchange of opinions with Jordan UFW Team. (Action U5). (Date: Jul. 14, 2007)

Investigation of meter error in Zagazig City East. (Action U7&8). (Date: Nov. 10, 2007)

UFW Reduction Activity(2/3)

SHAPWASCO replace to new water meter in Zagazig City East. (Action U7&8).
(Date: Nov. 12, 2007)

Counter part makes a search for the leak by water leak detector with Head of Hihya UFW team in Hihya Markaz. (Action U11).
(Date: Nov. 26, 2007)

Counter part makes a search for the leak by acoustic rod in Hihya Markaz. (Action U11)
(Date: Nov. 29, 2007)

Head of Hihya Team and UFW team investigate at midnight in Hihya Markaz. (Action U11)
(Date: Dec. 5, 2007)

Counter part makes a hole at suspected leakage point by drill hummer in Hihya Markaz.
(Action U11). (Date: Dec. 8, 2007)

Counter parts investigate the pipe and cable under the ground by locator in Hihya Markaz.
(Action 11). (Date: Dec. 13, 2007)

UFW Reduction Activity(3/3)

Excavation of leakage point found by counterpart team in Hyhya Markaz. (Action U12) (Date: Dec. 13, 2007)

Leakage point found by counterpart team in Hyhya Markaz. (Action U12). (Date: Dec. 13, 2007)

Repairing leakage point in Ibrahimiya. (Action U12). (Date: Jul. 24, 2008)

Training and evaluation for equipment in Zagazig West . (Date: Jul. 6, 2008)

Training and evaluation for equipment at New Training Yard in Hihya (1) (Date: Feb. 5, 2009)

Training and evaluation for equipment at New Training Yard in Hihya (2) (Date: Feb. 5, 2009)

SOP Activity(1/3)

Investigation for preparation of P&ID and SOP in Abbsa W.T.P (Action S1.2.4).
(Date: May. 31, 2007)

Counter parts prepare the draft P&ID in Abbsa W.T.P (Action S1). (Date: Jun.6, 2007)

Discussion for preparation of P&ID and SOP in Abbsa W.T.P (Action S1.4) (Date: Jun.9, 2007)

Discussion for preparation of P&ID and SOP in Abbsa W.T.P (Action S1.4) (Date: Jun.11, 2007)

Discussion for preparation of P&ID and SOP in Kafr Farag (Action S1.4) (Date: Jun.16, 2007)

Counter parts record the vibration of motor at before maintenance and after maintenance in Abbasa W.T.P. (Action S2.4.6)
(Date: Sep.5, 2007)

SOP Activity(2/3)

Counter parts apply a SOP to pump maintenance in Abbasa W.T.P. (Action S4.6)
(Date: Sep.5, 2007)

Counter part measures and records the water pressure in Zagazig W.T.P. (Action S2.6)
(Date: Feb.20, 2007)

Counter part uses the SOP documents and makes an entry to unified form in Zagazig W.T.P. (Action S2.6) (Date: Feb.20, 2007)

Counter parts learn about the hydraulic analysis from expert in headquarter office. (Action S5-2) (Date: Aug.21, 2007)

Current survey and discussion about water quality control in New Faqus W.T.P. (Action S9)
(Date: May.28, 2007)

Counter part measures the water level by teaching from expert in Abu Kabier Markaz. (Action S10) (Date: May.15, 2007)

SOP Activity(3/3)

Measurement for well production by portable flow meter in Diarb Nigm Markaz. (Action S10) (Date: Jun.24, 2007)

OJT of filter refreshment in Zagazig W.T.P (Action S6). (Date: June. 24, 2008)

OJT of chlorine control in Abbasa W.T.P (Action S6). (Date: July.17, 2008)

Training of installation of data roger, data reading and data transportation in Abbsa W.T.P (Action S3.5). (Date: July.14, 2008)

Preparation of control procedures for residual chlorine.(Action S4.6) (Date: Oct.12, 2008)

OJT of control procedures for residual chlorine by H/Q counterpart in Abbasa W.T.P (Action S6.7) (Date: Oct.28, 2008)

THE PROJECT FOR IMPROVEMENT OF MANAGEMENT CAPACITY OF OPERATION AND MAINTENANCE FOR SHAPWASCO IN THE ARAB REPUBLIC OF EGYPT

Project Final Report (Main Report)

Table of Contents

ATTACHMENT

List of Tables and Figures

Chapter 4

Abbreviations

C/P	Counterpart
DT	Distribution Tank
DAPWASCO	Dakahlia Potable Water and Sanitation Company
FY	Fiscal Year
FDWSC	Fayoum Drinking Water and Sanitation Company
GIS	Geographic Information System
HCWW	Holding Company for Water and Wastewater
HQ	Headquarters
IC/R	Inception Report
IWA	International Water Association
JCC	Joint Coordinating Committee
JICA	Japan International Cooperation Agency
LE	Egyptian Pound
L/s	Liter per second
MCM	Million Cubic Meter
M/M	Minutes of Meeting
MNF	Minimum Night Flow
NOPWASD	National Organization for Potable Water and Sanitary Drainage
NRW	Non Revenue Water
O&M	Operation and Maintenance
PDM	Project Design Matrix
PO	Plan of Operation
PTM	Project Team Meeting
PVC	Polyvinyl Chloride
RW	Revenue Water
SHAPWASCO	Sharkia Potable Water and Sanitation Company
SOP	Standard Operational Procedures
TC	Technical Committed
TPS	Transmission Pump Station
UFW	Unaccounted-for Water
USAID	U.S. Agency for International Development
WTP	Water Treatment Plant

SUMMARY

1. Overall Schedule and Main Activities

The Project Final Report has been prepared for compiling all the activities and the achievements of for the Project. The Project has been implemented in four (4) phases from November 2006 to October 2009. Overall schedule and main activities are described in Figure S-1 below:

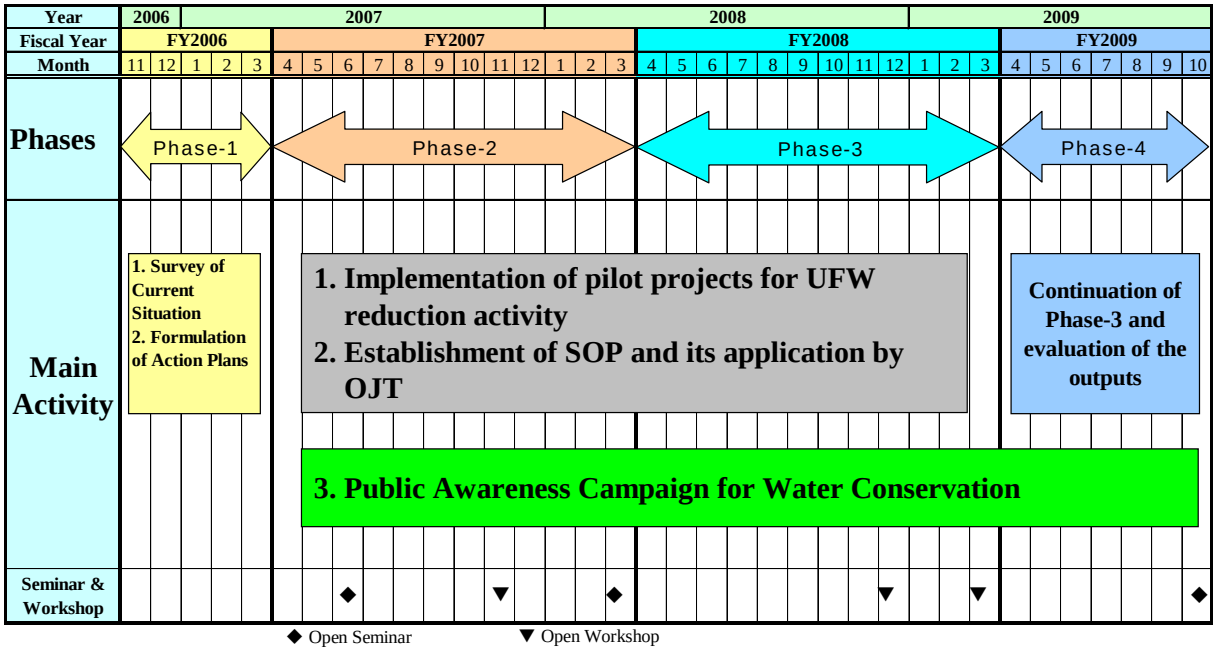


Figure S-1 Overall Schedule and Main Activities

2. Action Plans

The Project consisted of two (2) main activities: UFW reduction activity and SOP (Standard Operational Procedures) activity. Action Plans for these activities were formulated in Phase-1 and approved at Technical Committee (TC) held in March 2007. Contents of actions for each activity are as follows:

UFW Reduction Activity

Action-U1 Conducting training of C/P staff at Mostrod Training Center
Action-U2 Conducting leakage (minimum night flow: MNF) survey for candidate areas
Action-U3 Determining nine (9) pilot project areas
Action-U4 Preparing GIS drawings
Action-U5 Learning experiences of Jordan UFW reduction project
Action-U6 Making field survey of distribution network
Action-U7 Surveying working conditions of water meters and conducting meter readings
Action-U8 Measuring metering error for working meters and water wastage in the house
Action-U9 Conducting MNF survey
Action-U10 Making water balance analysis before repair works
Action-U11 Conducting leakage detection survey
Action-U12 Repairing leaking parts

Action-U13 Conducting MNF survey (including meter readings) after repair works
Action-U14 Making water balance analysis after repair works and its evaluation

SOP Activity

Action-S1 Preparing basic system drawings
Action-S2 Preparing unified forms of O&M records and reports
Action-S3 Measuring intake/production water volume at seven (7) WTPs
Action-S4 Developing SOPs for Model Facilities
Action-S5 Examining water distribution control in the network
S5-1 Pilot project for distribution control in small areas
S5-2 Hydraulic analysis of water supply and distribution network
Action-S6 Applying SOPs in O&M
Action-S7 Developing SOPs for the Remaining Facilities
Action-S8 Formulating O&M Plans
Action-S9 Developing water quality control program
Action-S10 Developing well inventory forms and monitoring wells

3. Milestones of the Activities

The milestones of each activity for the Project are mentioned below:

(1) General

- Dec. 2006 1st JCC was held and the inception report of the Project was approved.
- Mar. 2007 1st TC was held and Action Plans were approved.
- Jun. 2007 2nd JCC was held where PDM1 and PO1 were approved and 1st seminar was held in Cairo.
- Mar. 2008 3rd JCC was held where PDM2 and PO2 were approved and 2nd open seminar was held in Cairo.
- Jul. 2008 4th JCC was held where PDM3 and PO3 were approved.
- Feb. 2009 Terminal evaluation coordination meeting and 5th JCC were held where minutes on joint evaluation report on Japanese technical cooperation for the Project and 5th JCC were signed.
- Oct. 2009 6th JCC was held to confirm the completion of activities in Egypt and submission of the Project Final Report to the Egyptian side in November 2009

(2) UFW Reduction Activity

- Dec. 2006 UFW/HQ team was organized at SHAPWASCO headquarters.
- Jan. 2007 Existing conditions survey of UFW was completed.
- Feb. 2007 UFW teams of the whole governorate were organized and training of UFW/HQ team leader was conducted in Japan.
- Mar. 2007 Action plan for UFW reduction activity was formulated and approved.

- Apr. 2007 Action U1 and U4 started.
- May 2007 Action U2 started.
- Jun. 2007 Action U5 was conducted.
- Jul. 2007 Pilot Project-1 started in Zagazig City-East
- Aug. 2007 Action U11 and U12 of Pilot Project-1 started.
- Sept. 2007 Internal workshop for training leakage detection technique was held.
- Oct. 2007 Water conservation campaigns started for primary school students and junior high school students at Hihya WTP.
- Nov. 2007 1st open workshop for achievements of UFW reduction activity was held in Zagazig.
- Nov. 2008 Five (5) pilot projects at Zagazig City (East), Zagazig City (West), Hihya Markaz, Zagazig Markaz and Ibrahimiya Markaz were completed.
- Dec. 2008 2nd open workshop for achievements of UFW reduction activity was held in Zagazig.
- Jan. 2009 Construction of SHAPAWASCO training yard for leakage survey was completed at Central Well Station in Hihya City.
- Feb. 2009 3rd open workshop for latest achievements of UFW reduction activity was held in Cairo. In this workshop, UFW activity in Jordan was introduced by the representative of Water Authority of Jordan.
- Sept. to Oct. 2009 All the pilot projects were completed and long-term UFW targets as performance indicator were set based on the results of the pilot projects.
- Oct. 2009 3rd open seminar was held and the achievements in UFW reduction activities were presented.

(2) SOP Activity

- Dec. 2006 SOP/HQ team was organized in SHAPWASCO headquarters.
- Jan. 2007 Existing conditions survey for water supply facilities were completed and list of the existing water supply facilities for SHAPWASCO was compiled.
- Feb. 2007 SOP/HQ team leader was trained in Japan.
- Mar. 2007 Action Plan for SOP activity was formulated and approved.
- Apr. 2007 Action S1 started.
- May 2007 Actions S2, S3, S5, S9 and S10 started.
- Aug. 2007 Activity for development of SOP started and internal workshop was conducted.
- Nov. 2007 1st open workshop for SOP activity was held and discussions were done for sample of SOP.

- Feb. 2008 OJT started using SOPs at Abbasa WTP.
- Mar. 2008 Measurement of distribution volume by ultra-sonic flow meter started at Abbasa WTP.
- Jun. 2008 OJT started using SOP at Kafr Farag Fe/Mn removal plant and applying filter refreshment started at Zagazig WTP.
- Nov. 2008 Revision of SOP was started at Abbasa WTP by SHAPWASCO.
- Dec. 2008 OJT started using SOP at Bilbais booster pump station.
- Dec. 2008 2nd open workshop for achievements of SOP activity was held.
- Feb. 2009 3rd open workshop for latest achievements of SOP activity was held in Cairo.
- Mar. to Oct. 2009 Monitoring data of flow rate and consumption of electricity, chlorine and alum was done. Performance indicators for SOP activities were set based on the monitoring results.
- Oct. 2009 3rd open seminar was held and the achievements in SOP activities were presented.

4. Summary of Activities for the Project

4-1. UFW Reduction Activity

UFW reduction activities for the Project are summarized for each action below:

Table S-1 Summary of UFW Reduction Activities for the Project

No.	Pilot Project Site	UFW Ratio		
		Before Repair (%)	After Repair (%)	Reduction (point)
1	Zagazig City-East	40.8	20.8	20.0
2	Hihya Markaz	27.5	16.6	10.9
3	Zagazig City-West	35.4	19.4	16.0
4	Zagazig Markaz-1	39.2	14.1	25.1
5	Ibrahimiya Markaz-1	30.0	14.0	16.0
6	Diarb Nigm Markaz	26.2	18.6	7.6
7	Abu Hamad Markaz	39.2	29.7	9.5
8	Bilbais Markaz	21.3	12.8	8.5
9	Menia Alqamah M.	29.2	23.4	5.8
10	Zagazig Markaz-2 (Expansion)	30.7	23.0	7.7
11	Ibrahimiya Markaz-2 (Expansion)	19.9	12.8	7.1
	Average (Except Area 10,11)	**31.3**	**18.0**	**12.4**
	Average(All eleven Areas)	**31.0**	**18.8**	**12.2**
	Target			***13***

* Average is weighted average considering water distribution volume

4.2 SOP Activity

SOP activities for the Project are summarized for each action below:

Table S-2 Summary of SOP Activities for the Project

Activity		Achievement		Facilities Applied
Preparation of documents for SOP activities	➢ Basic system drawings ➢ SOP ➢ P&ID and others	Capacity Development of preparing/modification document	Capacity Development of O&M	4WTP, 3FMRP, 1BPS and 2WPS
	Unified recording sheet	Capacity Development of preparing/modification document	Capacity Development of O&M	1WTP, 1FMRP, 1BPS and 1WPS
Applying SOP to O&M by OJT	O&M of filter	Reduction of water use for filter washing	➢ Improvement of performance indicator	3WTP and 2FMRP
	Control of chemical consumption	Reduction of chemical consumption	➢ Improvement of water facilities ➢ Improvement of water quality	3WTP and 2FMRP
	Control of operation number of main pumps	Improvement of stability for water supply and reduction of power consumption	Improvement of water supply service	2WTP, 1BPS and 1WPS
Other Activities	Well Monitoring	Development for well inventory, Enhancement of well monitoring		All WPS
	Water Quality Control	To become routine work of auditing system, Development of water quality control program		2 WTP

Note:

WTP: Water Treatment Plant, FMRP: Iron and Manganese Removal Plant
BPS: Booster Pump Station, WPS: Well Pump Station
P&ID: Piping & Instrument Diagram O&M: Operation and Maintenance

CHAPTER 1 GENERAL

1.1 Preface

Egypt has been experiencing sector reform in the water supply and sanitation sector since late 90s.

In the Sharkia Governorate, the third largest governorate with approximately five million people, the public water supply and sewerage corporation (SHEGAWASD) took over the management of all the water supply and sewerage services in the governorate from the local government in 1995 (in 2004, SHEGAWSD renamed itself as SHAPWASCO).

SHAPWASCO, like other public corporations and firms, is in the red because of low incomes arising from low fare receipts; excessive labor cost due to overstaffing; high cost of inefficient operation of the facilities; high unaccounted-for water (UFW) ratio; low ratio of water charge collection; and insufficient management ability due to incapability of obtaining management information (concerning production, water supply management, and customers).

Under such circumstances, in 2003, the Egyptian Government requested the Japanese government to implement a technical cooperation project to assist SHAPWASCO improve its operation and maintenance capacity.

In the Governorate of Sharkia, a new water purification plant was constructed under Japan's grant aid cooperation project in 2007, "the Project for Water Supply Development in Northwest Part of Sharqiya Governorate, so that this project is positioned as a collaborating project for the grant aid cooperation in progress.

Following the request as stated above, JICA discussed the issue with the Egyptian side in May-June 2006, confirmed the relevance and the nature of the request; mutually signed minutes of meeting with the Egyptian side concerning the specific outline of the project; signed Records of Discussions on 20th September 2006; and the JICA expert team commenced their work in Egypt from 29th November 2006.

The 1st Joint Coordinating Committee (JCC) was held on 3rd December 2006. In the 1st JCC, the Inception Report of the Project was explained by the expert team and approved by the members of JCC.

During the Project, PDM (Project Design Matrix) and PO (Plan of Operation) were revised from PDM0 and PO0 to PDM3 and PO3 respectively. In the 2nd to 4th JCC, those revisions of PDM and PO were approved.

The JICA expert team and the counterpart (C/P) team conducted UFW (unaccounted-for water) reduction activities, SOP (standard operational procedures) activities and public campaign for water saving according to PDM and PO and the comments made by the mid-term monitoring study team on 4th March 2008 and the terminal evaluation team on 23rd February 2009.

It was confirmed in the 6th JCC that the activities in Egypt are completed at the end of October 2009 and the final report of the Project will be submitted to the Egyptian side in November 2009.

1.2 Objectives of the Project

The objectives of the Project are summarized as follows:

[Overall Goal] Management capacity of operation and maintenance of water supply facilities is improved in Sharkia Governorate.

[Project Purpose] Management capacity of operation and maintenance of water supply facilities is improved in target areas (Project Area-1 and 2 mentioned in section 1.3 below).

The following outputs are expected to be gained from the Project:

[Outputs]

- Unaccounted-for water (UFW) ratio is reduced in the pilot project areas.
- Operation and maintenance capacity of water supply facilities is strengthened.

Activities in the Project are focused on the following:

[Activities]

- Activity for reduction of unaccounted-for water (UFW)
- Activity for Improvement of operation and maintenance capacity of water supply facilities (SOP : Standard Operational Procedures)

The Project Design Matrix (PDM) and Plan of Operation (PO) were reviewed in Phase-2 (the 2nd Year: from April 2007 to March 2008). During Phase-2, original PDM0 and PO0 have been revised into PDM3 and PO3 by the approval in the JCC meeting.

1.3 Project Area

The Project Sites are categorized according to the activities as follows:

<For UFW Reduction Activity>

- Project Area-1 : Zagazig City and Zagazig Markaz
- Project Area-2 : Hihya Markaz, Diarb Nigm Markaz and Ibrahimiya Markaz
- Project Area-3 : Abu Hamad Markaz, Bilbais Markaz and Menia Alqamah Markaz

<For SOP Activity>

- Water supply facilities (water treatment plant, pumping station, iron/manganese removal plant, well) in the whole Governorate as follows:
  - Water treatment plant
  - Booster pumping station
  - Iron/manganese removal plant
  - Well

1.4 Structure for Project Implementation

The Project was conducted under the following implementation structure:

(1) Formation for Project Implementation

The chairman of Holding Company for Water and Wastewater (HCWW) was assigned to the Project Director and the Chairman of the Joint Coordination Committee (JCC). The Project Manager was played by the chairman of SHAPWASCO. The JCC members included the representative of the NOPWASD, the Governor of Sharkia, Japanese experts and the representatives of JICA Egypt office.

An Unaccounted-For Water reduction team (UFW team) and Standard Operation Procedure for operation and maintenance team (SOP team) was organized at the SHAPWASCO headquarters, both of which performed their activities by closely communicating with personnel in charge in the areas they cover. In addition, since it is essential to cooperate and coordinate with the USAID, the headquarter team constructed a system for regular information exchanges.

Figure 1-1 illustrates the project implementation organization. Since the implementation organization agreed upon in the M/M has a limited frequency of JCC meetings, it was proposed to set up a Technical Committee as a forum for preliminary discussion on technical matters prior to discussion at the JCC that involves the central government. The Technical Committee consisted of SHAPWASCO, HCWW, and UFW and SOP teams from the Sharkia Governorate and JICA-related parties.

The functions of each committee or meeting, in conjunction with the implementation of the Project, are as listed in Table 1-1 below.

Table 1-1 Roles of Committees and Teams for the Project

Project agency	Roles	Frequency
Joint Coordination Committee (JCC)	Approval of the project annual plan, monitoring/evaluation of the project and annual plan, discussion and advice on the main issues of the project, coordination between Egyptian side and Japanese side	1～2 times a year
Technical Committee (TC)	Prior consultation with JCC for the project main issues and report of the progress of the project, as required	As required
Project Team Meeting (PTM)	Committee chaired by SHAPWASCO Chairman consisting of JICA expert team and the counterpart team established in Headquarters of SHAPWASCO for supervising the Project	Weekly in principle

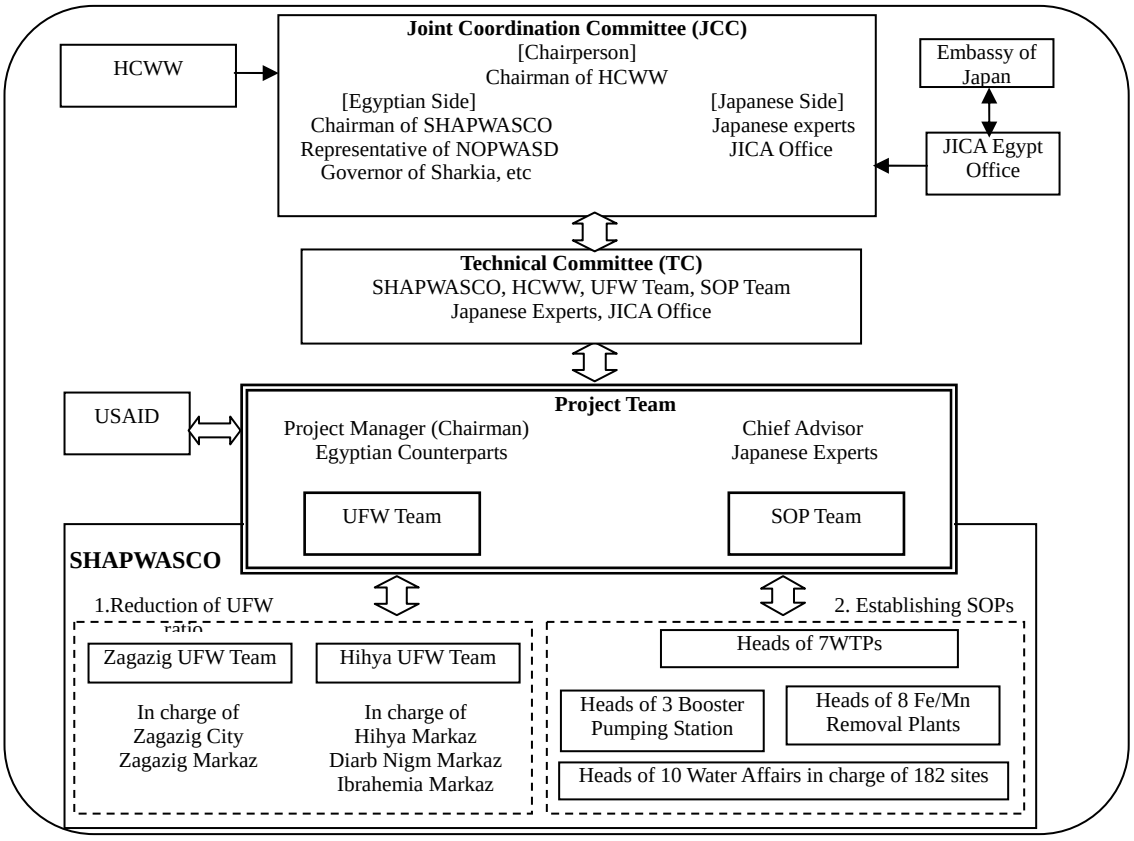


Figure 1-1 Structure for Project Implementation

(2) Joint Coordinating Committee (JCC)

Joint Coordinating Committee (JCC) was formed on 20th September 2006. Chairman of Holding Company for Water and Wastewater (HCWW) has been nominated as the Project Director. The members of JCC are as follows:

Table 1-2 Member of Joint Coordinating Committee (JCC)

Role	Member
- Chairman	➢ Chairman, HCWW
- Members on Egyptian Side	➢ Chairman, SHAPWASCO
	➢ Representative(s), SHAPWASCO
	➢ Representative, NOPWASD
	➢ Representative, Sharkia Governorate
	➢ Others appointed by the Committee
- Members on Japanese side	➢ Chief Advisor
	➢ Experts
	➢ Representatives of JICA Egypt Office
	➢ Other personnel concerned to be dispatched by JICA, if necessary

Note: Official(s) of the Embassy of Japan may attend the Joint Coordinating Committee as observer(s).

(3) Technical Committee (TC)

Establishment of the Technical Committee (TC) was proposed by the expert team in the 1st JCC meeting on 3rd December 2007 and approved by JCC members. TC is supposed to be held prior to JCC to discuss or coordinate technical matters or particularities of project activities.

However, TC was held only once during the Project because all the matters were discussed in detail at the project team meeting and the Project Manager (SHAPWASCO Chairman) explained the results of the discussions in PTM to the committee members at JCC. The members of TC are as follows:

Table 1-3 Member of Technical Committee (TC)

Role	Member
- Chairman	➢ Chairman, SHAPWASCO
- Member	➢ Representative, HCWW
	➢ Representative, NOPWASD
	➢ Head of UFW team at SHAPWASCO headquarters
	➢ Head of UFW team at SHAPWASCO headquarters
	➢ Japanese Experts
	➢ Representative(s) of JICA Egypt Office

(4) Project Team

The Project Team has been organized among C/P team and JICA expert team prior to the commencement of the Project. It consists of the following members:

Table 1-4 Member of Project Team

Role	Member
- Project Manager	➢ Chairman, SHAPWASCO
- Member	➢ UFW/HQ team member
	➢ SOP/HQ team member
	➢ Facilitator
	➢ JICA experts

(5) Counterparts (SHAPWASCO)

In December 2006, UFW team and SOP team at headquarters of SHAPWASCO were organized. In February 2007, UFW teams for Zagazig City-East, Zagazig City-West and each Markaz were organized. For SOP team, task force for Action Plan formulation was organized in February 2007.

[UFW Team]

UFW team except for headquarters of SHAPWASCO consists of one (1) engineer, three (3) supervisors and 2 workers. The members are listed below:

Table 1-5 Member of UFW Teams

UFW Team in City/Markaz	Name
Head of UFW/HQ team	Mr. Alae El Din Mohamed (E) Miss. Wala Mohamed Ali (E) Miss. Wala Hamdi (E) Mr. Alaa Abd El Raheem (S)
Zagazig City - East	Mr. Salama Mahmoud Abd El Aal (E) Mr. Mohamed Mohamed Bakr (S) Mr. Medhat Moneir Mahmoud (S) Mr. Mohamed Hafez Lotfy (S)
Zagazig City - West	Mr. Samir Mahmoud Abd El Hameed (E) Mr. Mahmoud Mohamed El Hariry (S) Mr. Nabil Fathy El Sayed (S) Mr. Gorge Abd El Maseeh (S)
Zagazig Markaz	Mr. Mohamed Mohamed Sabry (S) Mr. Ibrahim Bayoumi Mohamed (S) Mr. Ahmed Younis Metwaly (S) Mr. Esam Afifi (S)
Hihya Markaz	Mr. Mahdy Fathy Ahmed (E) Mr. Gamal Mohamed Hussein (S) Mr. El Hady Ahmed El Taher (S)
Ibrahimiya Markaz	Mr. Ramadan Abd Allah (S) Mr. Khairi Abd El Rahman (S) Mr. Mahmoud Mohamed Asar (S) Mr. Abdu Fatehy Mohaned (S)
Diarb Nigm Markaz	Mr. Mohamed El Sayed El Killany (S) Mr. Mohamed Megahed Abd El Aziz (S) Mr. Khairi Eid Talaat (S) Mr. Hamdi El Sayed Abd El Fatah (S)
Awlad Saqr Markaz	Mr. Emad Ahmed Abd El Kader (E) Mr. Bendary Hassan Bendarhy (S) Mr. Hegazy El Sayed Ali (S) Mr. Saeed Abd El Salam Ahmed (S)
Kafr Saqr Markaz	Mr. Fahmy Mohamed Khalaf Allah (E) Mr. Mohamed Ibrahim Mohamed (S) Mr. Mahmoud Awad Abd Alah (S) Mr. Osman mansour Mohamed (S)
Menia Al Qamah Markaz	Mr. Mohamed Abd El Wahab (E) Mr. Adel Saleh (S) Mr. Ibrahim Fathy El Sadany (S) Mr. El Sayed Abd El Habet Ghamry (S)
Mashtool El Sooq Markaz	Mr. Saeed Abd El Rahman Hefny (E) Mr. Mohamed Ahmed Ali Hozayen (S) Mr. Abd El Baset Mostafa Mohamed (S) Mr. Soliman Hassan Soliman (S)
Bilbais Markaz	Mr. Reda Abd El Hameed Abd Allah (S) Mr. Salah Mohamed Kamel (S) Mr. Mahmoud Salem Ibrahim (S) Mr. Mostafa Ali ElSayed (S)

UFW Team in City/Markaz	Name
Faqus Markaz	Mr. Sebaey Mohamed Rabee (E) Mr. Mostafa Mohamed Sobeeh (S) Mr. El Sayed Abd El Aziz Soliman (S) Mr. Salah El Dien Abbas Farah (S)
Abu Kabier Markaz	Mr. El Saied Abd El Reheem (E) Mr. Abd El Wahab Mohamed Ali (S) Mr. Mahrous Gergis Romees (S) Mr. Mahmoud Mohamed Gebaly (S)
Abu Hamad Markaz	Mr. Taher Mansour Metwalli (E) Mr. Sayed Nasser (S) Mr. Mohamed Mahmoud Radwan (S) Mr. Youssry Abd El Monem Hassan (S)
El Huseinia Markaz	Mr. Salah Abd El Haq (E) Mr. Mohamed Abd El Monem (S) Mr. El Sayed Ibrahim Ali (S) Mr. Mohamed Abd El Aal Mohamed (S)
El Salehia Sector (New Sector Established in January 2008)	Mr. Mohamed Saleem Abd El Salam (E) Mr. Mohamed Mohamed Gomaa (S) Mr. Ibrahim Ali Attia (S) Mr. Abd Alaziz Khalil Mahmoud (S)
GIS center	Mr. Abdel Halim Mahdy Mr. Tarek Yousef Ms. Aliaa El Saeed Ms. Hend Ali Mr. Mohamed Saeed Ms. Nour Abbas Ms. Samar Sameer Ms. Marwa Ahmed Ms. Basma Ibrahim
Water conservation campaign	Ms. Mariam Wageih

[SOP Team]

SOP team at SHAPWASCO headquarters (SOP/HQ team) and the teams at the related water supply facilities for SOP activity are as follows:

Table 1-6 Member of SOP Teams

Activity	Name	Position
SOP Activity	**SOP/HQ team**	
	1- Eng. Abdel Shafi Abdel Aziz	Head of SOP/HQ Team
	2- Eng. Ibrahim Shaheen	Electrical Engineer
	3- Eng. Gamal Abd El Hameed	Geologist – Well Depart.
	4- Mr. Mohamed Ali	Chemist
	5- Ms. Heba Mahmoud Mohamed	Assistant
	6- Mr. Abd Allah Sayed	Assistant
	Members of Task Force of SOP Activity:	
	1- Mr. Abdel Shafi Abdel Aziz	Head of SOP/HQ Team
	2- Mr. Nagi Labib Abd El Sayed	Hihya WTP manager
	3- Mr. Bahaa Abd Allah Badran	Kafr Saqr WTP manager
	4- Mr. Samir Gharieb	Abbasa WTP manager

Activity	Name	Position
	5- Mr. Mohamed Ali	Head Quarter
	6- Mr. Aly El Mosalemy	Water Department Manger
	7- Mr. Emam Abd El Mawgoud	Menia Al Qamah FMR plant
	10- Mr. Gamal Abd El Hameed Morsi	Well Stations Department
	11- Mr. Mohamed El Sayed Abd El Hameed	Bilbais BPs
	12- Ms. Naglaa Fatehy	Data Base- Head Quarter
	SOP team for Abbasa WTP	
	1- Eng. Samir Mohamed Ghareib	Abbasa WTP manager
	2- Tech. Hosni Abd El Rahman Hosni	Abbasa WTP
	3- Tech. Abd El Hakeem Mohamed	Abbasa WTP
	4- Tech. Ashour Ali Ashour	Abbasa WTP
	5- Tech. Ismaiel Abd El Hameed	Abbasa WTP
	6- Labor. Adel Gamal Mohamed	Abbasa WTP
	7- Chemist. Mansour Mohamed Nasaar	Abbasa WTP
	8- Chemist. Fayza Mohmed Ghamri	Abbasa WTP
	Representative from other facilities:	
	1- Eng. Mohamed Faried	Zagazig WTP manager
	SOP team for Zagazig WTP	
	1- Mohamed El Sayed Farid	Zagazig WTP manger
	2- Tech. Abd Allah Mohamed Yousef	Zagazig WTP
	3- Tech. Zakaria Mamoud El Sayed	Zagazig WTP
	4- Tech. Mohamed Hassan Mohamed	Zagazig WTP
	5- Tech. El Sayed Mohamed Hassan	Zagazig WTP
	6- Tech. Hani Zaki Fahmy	Zagazig WTP
	7- Tech. El Sayed Mohamed Abd El Rahman	Zagazig WTP
	8- Chemist: Ahmed Abd El Mohsen	Head of Laboratory
	9- Chemist: Mona Abd Alah Mokhtar	Chemist
	SOP team for New Faqus WTP	
	1- Eng. Ahmed Mohamed El Ghateit	New Faqus WTP manager
	2- Tech. Helal Morsi Mansour	New Faqus WTP
	3- Tech. Ashraf Mohamed Basiouni	New Faqus WTP
	4- Tech. Samir Ahmed Youssef	New Faqus WTP
	5- Chemist. Saad El Dien Abd El Monem	New Faqus WTP
	6- Tech. Youssry Mohamed Abd El Rehim	New Faqus WTP
	Representative from other facilities:	
	1- Eng. Bahaa Ramadan	Sangaha (Kafr Saqr) WTP manager
	2- Eng. Nagi Labib	Hihya WTP manager
	SOP team for Kafr Farag FMRP	
	1- Tech. Imam Abd El Mawgood	Kafr Farag FMRP manager
	2- Tech. Samir El Sayied Hassan	Kafr Farag FMRP
	3- Tech. El Sayied Abd El Fatah El Saied	Kafr Farag FMRP
	4- Chemist. Abd El Hadi Ali Bassiouni	Kafr Farag FMRP
	Representative from other facilities:	
	1- Tech. Adel Abu El Yazid Mohamed	Qenayat FMRP
	2- Tech. Mohamed Fouad Ali Mostafa	Mashtool El Sooq FMRP
	3- Tech. El Saied El Shahat El Menshawi	El Adlia FMRP
	4- Tech. Ahmed Mahmoud Ahmed Nagi	Melamis FMRP in Menia Al Qamah
	6- Tech. Zareif Saber Mohamed El Saied	Abu Metanna in Diarb Nigm
	SOP team for Bilbaise BPS	
	1- Tech. Mohamed El Sayied	Bilbais BPS manager
	2- Tech. Gamal Gaad Ahmed Ibrahim	Bilbais BPS

Activity	Name	Position
	3- Tech. Gamal Salem Mohamed 4- Chemist. Saad El Dien Abd El Monem 5- Abd El Hakeem Nabawi <u>Representative from other facilities</u> 1- Tech. Emad El Dien Abd El Hadi 2- Tech. Abd El Aliem Ahmed Mohamed	Bilbais BPS Bilbais BPS Bilbais BPS Faqus BPS Zagazig BP
	<u>SOP team for Zeraa well station</u> 1- Eng.Ali El Mosalmi 2- Tech. Ibrahim Mohey 3- Tech. Mohamed Abd El Aziz 4- Tech. Attia Bayoumi 5- Tech. Sami Bahi Abd El Gawad 6- Chemist. Gamal Abd El Hameed	 Zeraa well station Zeraa well station Zeraa well station Zeraa well station Zeraa well station Head Quarter
	<u>SOP team for El Aslougi well station</u> 1- Tech. Abd El Aleem Mohamed Ahmed 2- Tech. Salah El Din Afifi Khatab 3- Tech. Abd El Hameed Ibrahim 4- Tech. Ahmed Mohamed Metwaly	 Manger of Water Plants Manger of El Aslougi Station El Aslougi well station El Aslougi well station
	<u>SOP team for Qenayat FMRP (Additional)</u> 1- Tech. Adel Abu El Yazid Mohamed 2- Tech. Saleem Abd Alah 3- Tech. El Sayied Ibrahim 4- Chemist. Attia Goda El Sayed	 Plant Manger of Qenayat FMRP Technician of Qenayat FMRP Technician of Qenayat FMRP Chemist
	<u>SOP team for Abu Metana FMRP (Additional)</u> 1- Tech. Adel Abu El Mohamed Abu Warda 2- Tech. Hosam El Din Mohamed 3- Tech. Alaa Ahmed El Badawi 4- Ahmed Ali Abd El Maksoud 4- Chemist. Adly Abd El Mageed	 Plant Manger of Abu Metana FMRP Technician of Abu Metana FMRP Technician of Abu Metana FMRP Technician of Abu Metana FMRP Chemist
3. Hydraulic Analysis Team	1- Mr. Mahdi Ahmed 2- Ms. Heba Mahmoud	Hihya Branch Head Quarter
4. Well Monitoring	1- Mr. Gamal Abd El Hameed Morsi	Head Quarter
5. Water Quality Control	1- Mr. Mohamed Ali	Head Quarter
6. Auto CAD Operator	1- Ms. Heba Mahmoud 2- Ms. Nour Abbas	Head Quarter

(5) JICA Expert Team

JICA Expert Team consists of the Japanese Team and Egyptian Team as follows:

Table 1-7 JICA Expert Team

Expert	Name
[Japanese Team]	
- Chief Advisor/Water Supply Planning	Mr. Masahiro Takeuchi
- Expert/UFW Reduction	Mr. Masatoshi Seno
- Leak Detection	Mr. Akihiko Okazaki
- Expert/SOP Activity for Water Supply Facilities	Mr. Noboru Saeki
- Expert/SOP Activity for Water Supply Facilities	Mr. Keizo Kimura
- Coordinator/Hydraulic Analysis Network	Mr. Mitsuhito Omori
- Electrical Equipment	Dr. Ashraf Ahamed
- Hydrogeology	Mr. Nobuyuki Iijima
- Water Quality Control	Mr. Takashi Hara
[Egyptian Team]	
- Project Facilitator	Mr. Mohamed Nagi
- Senior Engineer for UFW Reduction Activity	Dr. Mohamed Sobhy
- Senior Engineer for UFW Reduction Activity	Mr. Mostafa Moawed
- Senior Engineer for SOP Activity	Mr. Mahmoud Khalaf
- Senior Engineer for SOP Activity	Mr. Mahmoud Abu El Naga

CHAPTER 2 DEVELOPMENT OF PDM

PDM (Project Design Matrix) and PO (Plan of Operation) had been revised during the Project and approved at JCC. Contents of the revisions of PDM are as shown in Table 2-1.

Table 2-1 Development of PDM and PO

PDM & PO	Version	Revision Date	Approved at	Contents
PDM0 & PO0	Original Version	3rd December 2006	1st JCC	PDM0 and PO0 was confirmed between the Egyptian side and the Japanese side at the record of discussions (R/D) and approved at 1st JCC.
PDM1 & PO1	1st Revision	10th June 2007	2nd JCC	Revisions were made taking into account the action plans for UFW reduction activity and SOP activity
PDM2 & PO2	2nd Revision	4th March 2008	3rd JCC	Revisions were made after the mid-term monitoring survey and by setting targets of UFW and leakage ratios.
PDM3 & PO3	3rd Revision	10th July 2008	4th JCC	Revisions were made for the targets of UFW and leakage ratios taking into account the actual results in UFW reduction activity

PDM0 to PDM3 are shown in Table 2-2 to 2-5 respectively. PO is applied in the implementation plan and shall be referred to Figure 5-1, 5-2 in Chapter 5.

Table 2-2 PDM0 (Original at the time of R/D)

Project Design Matrix (PDM0)

Project Title: The Project for Improvement of Management Capacity of Operation and Maintenance for SHAPWASCO

Target Area : Sharkia Governorate, Egypt **Target Group : Staff of SHAPWASCO** **Duration : FY2006 – FY2009**
Final Beneficiaries : People in Sharkia Governorate **Date : June 13, 2006**

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal			
Management capacity of operation and maintenance of water supply facilities is improved in Sharkia Governorate.	1 Performance indicators in the field of management capacity of operation and maintenance are improved for all branches in the Governorate.	SHAPWASCO quarterly report submitted to HCWW	
Project Purpose			
Management capacity of operation and maintenance of water supply facilities is improved in target areas.(1)	1 Performance indicators in the field of management capacity of operation and maintenance are improved in target areas. (2)	SHAPWASCO quarterly report submitted to HCWW	Sector policy of the Egyptian government will not drastically change on management of water supply services.
	2. Activities on UFW and SOPs are incorporated into the routine work.	Organogram of SHAPWASCO, Questionnaire survey, interviews	
Outputs			
1. Unaccounted-for water (UFW) ratio is reduced in the pilot project areas.	1-1 Volume of unaccounted-for water can be properly measured.	Project records	Any change of development assistant policy by other donors to improve the management of water supply service will not adversely affect the Project implementation.
	1-2 Unaccounted-for water ratio is reduced compared with the baseline data obtained at the beginning of the Project.	Project records	
2. Operation and maintenance capacity of water supply facilities is strengthened.	2-1 Manuals for management of O&M are developed and updated.	Project records	
	2-2 The plan for the management of O&M is developed.	Project records	
	2-3 Level of applying knowledge and skills acquired through OJT	Questionnaire survey, interviews	

Note (1) Target areas for output 1 are the pilot project areas specified by the Project in Zagazig City, Zagazig Markaz, Hihya Markaz, Diarb Nigm Markaz and Ibrahimiya Markaz, respectively.
(2) Specific indicators are selected from those in quarterly report to HCWW, such as the percentage of metered connections, the percentage of working meters, etc.

Activities		Inputs		Important Assumption
		Japanese Side	Egyptian Side	
1	**Unaccounted-for water (UFW) ratio is reduced in the pilot project areas.**	1. Experts • Chief Advisor • UFW reduction specialist • Leakage detection trainer • Water treatment specialist • Hydraulic engineer for network analysis • Electrical engineer • Mechanical engineer • Hydro-geologist • Water quality control specialist	1. Counterparts	Employees who received trainings by the Project will continuously work for SHAPWASCO. Personnel transfer of executive management will not affect the implementation of the Project. Funds from NOPWASD and Sharkia Governorate in related to the Project will be allocated as planned.
1-1	Analyze the current situation on UFW and prepare plan for UFW reduction			
1-2	Select pilot project areas			
1-3	Organize UFW reduction teams			
1-4	Prepare pipe network drawings of the pilot project area			
1-5	Survey actual conditions of UFW, analyze contents of UFW and measure UFW ratio in the pilot project area			
1-6	Conduct on-the-job training for SHAPWASCO staff on leakage detection			
1-7	Implement pipe repairing and commercial loss reduction programs			
1-8	Conduct public awareness campaign for water saving	2. Equipment and materials	2. Office space and facilities for experts	
1-9	Conduct post-evaluation of UFW ratio.			
2	**Operation and maintenance capacity of water supply facilities is strengthened.**			
2-1	Survey current conditions of water supply facilities	3. Trainings	3. Equipment	
2-2	Conduct monitoring of wells			
2-3	Organize standard operational procedures (SOP) team			
2-4	Establish the system for water quality control	4. Local cost	4. Necessary information	
2-5	Establish the system to measure the quality of water production and transmission			
2-6	Study on optimum water distribution main with network hydraulic analysis and plan district-metering-zone (DMZ)		5. Local cost	
2-7	Prepare SOPs for WTP, Fe/Mn removal plants and pumping stations			
2-8	Prepare textbooks for SOPs training			**Pre-Conditions**
2-9	Conduct on-the-job training for SHAPWASCO on SOPs			The Hihya Water Treatment Plant (WTP) is successfully constructed as scheduled.
2-10	Conduct workshop/seminars for SOPs			
2-11	Monitor the performance indicator regarding operation and maintenance and achievement level of staff performance			

Table 2-3 PDM1 (1st Revision)

Project Design Matrix-1 (PDM1)

Project Title: The Project for Improvement of Management Capacity of Operation and Maintenance for SHAPWASCO

Target Area : Sharkia Governorate, Egypt **Target Group : Staff of SHAPWASCO** **Duration : FY2006 – FY2009**
Final Beneficiaries : People in Sharkia Governorate **Date : June 10, 2007**

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
[Overall Goal] Management capacity of operation and maintenance of water supply facilities is improved in Sharkia Governorate.	1. Performance indicators in the field of management capacity of operation and maintenance are improved for all branches in the Governorate.	SHAPWASCO quarterly report submitted to HCWW	
[Project Purpose] Management capacity of operation and maintenance of water supply facilities is improved in target areas.(1)	1. Performance indicators in the field of management capacity of operation and maintenance are improved in target areas. (2)	SHAPWASCO quarterly report submitted to HCWW	Sector policy of the Egyptian government will not drastically change on management of water supply services.
	2. Activities on UFW and SOPs are incorporated into the routine work.	Project Progress Report Questionnaire survey Organization chart	
[Outputs] 1. Unaccounted-for water (UFW) ratio is reduced in the pilot project areas.	1-1 Water balance analysis can be conducted properly for the pilot project areas.	Project Progress Report	
	1-2 UFW ratio is reduced from xx% to xx% in the pilot project areas. (UFW ratio will be set by August 2007)	Project Progress Report	
	1-3 Leakage (real loss) ratio is reduced from xx% to xx% in the pilot project areas. (Leakage ratio will be set by August 2007)	Project Progress Report	
	1-4 At least three (3) members each of UFW team of Zagazig City and Hihya Markaz acquire leakage detection survey technique.	Test by JICA Expert Project Progress Report	
	1-5 At least one (1) member each of UFW team of other Markazes related to the pilot project areas acquires leakage detection survey technique.	Test by JICA Expert Project Progress Report	

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
2. Operation and maintenance capacity of water supply facilities is strengthened.	2-1 Basic system drawings of the facilities are prepared and updated at five (5) model facilities (2 WTPs, 1 FMRP, 1 BPS and 1 well station) which represent the facilities of SHAPWASCO.	Project Progress Report	
	2-2 Manuals for management of O&M are developed and updated as SOPs by the following SOP packages for plant components and for three activity categories, i.e. Operation, Maintenance and Water Quality Control for each model facilities. - Not less than twenty (20) SOP packages at WTP - Not less than five (5) SOP packages at FMRP, BPS and well stations.	Project Progress Report	New Faqus WTP is handed over from NOPWASD to SHAPWASCO in due course.
	2-3 For the application of SOPs to the field operation, class room training and OJT to operators are conducted at all the five (5) model facilities.	Project Progress Report	New Faqus WTP is handed over from NOPWASD to SHAPWASCO in due course.
	2-4 Not less than eighty (80) percent of SOP/HQ and SOP/MF members acquire the ability to apply knowledge and skills of SOP.	Test by JICA Expert Project Progress Report	
	2-5 O&M Plan is developed at not less than one (1) model WTP.	Project Progress Report	
	2-6 Water quality control system applying the new HCWW regulation is prepared.	Project Progress Report	
	2-7 Well inventory is prepared with a standard form and the first round of investigation is conducted for all the SHAPWASCO well stations.	Project Progress Report	
	2-8 Hydraulic analysis is done for not less than two pilot project areas.	Project Progress Report	

Note (1) Target areas for output 1 are the pilot project areas specified by the Project in Zagazig City, Zagazig Markaz, Hihya Markaz, Diarb Nigm Markaz and Ibrahimiya Markaz, respectively.
Target areas for output 2 are all the water supply facilities except compact units.

(2) Following PI has been selected as a specific indicator.
- Percentage of measured water production (%), etc.
Volume of measured production water / total volume of produced water
Volume of measured production water : means total volume of measured produced water in stations equipped with meters working in cubic meter

Activities	Inputs		Important Assumption
	Japanese Side	Egyptian Side	
1 Unaccounted-for water (UFW) ratio is reduced in the pilot project areas.	1. Experts	1. Counterparts	Employees who received trainings by the Project will continuously work for SHAPWASCO.
1-1 General	- Chief Advisor - UFW reduction specialist - Leakage detection trainer - Water treatment specialist - Hydraulic engineer for network analysis - Electrical engineer - Mechanical engineer - Hydro-geologist - Water quality control specialist	- Project director - Project manager - UFW teams - SOP teams	
(1) Analyzing the current situation on UFW			
(2) Selecting candidate areas for pilot project areas			
(3) Organizing UFW reduction teams			
(4) Formulating an action plan for UFW reduction			
(5) Conducting water conservation campaign			Personnel transfer of executive management will not affect the implementation of the Project.
(6) Formulating long-term pipe replacement plan for preventive works			
(7) Holding workshops and seminars			
1-2 Actions			
U1 Conducting training of C/P staff at Mostrod Training Center			Funds from NOPWASD and SHAPWASCO in related to the Project will be allocated as planned.
U2 Conducting leakage (minimum night flow : MNF) survey for candidate areas			
U3 Determining six (6) pilot project areas	2. Equipment and materials	2. Office space and facilities for experts	
U4 Preparing GIS drawings			
U5 Learning experiences of Jordan UFW reduction project	3. Trainings	3. Equipment	
U6 Making field survey of distribution network			
U7 Surveying installation conditions of water meters and conducting meter readings	4. Local cost	4. Necessary information	
U8 Measuring metering error for working meters and water wastage in the house		5. Local cost All the cost for repairing leakage in distribution network of the pilot project areas	
U9 Conducting MNF survey			
U10 Making water balance analysis before repair works			
U11 Conducting leakage detection survey			
U12 Repairing leaking parts			
U13 Conducting MNF survey (including meter readings) after repair works			
U14 Making water balance analysis after repair works and its evaluation			

Activities	Inputs		Important Assumption
	Japanese Side	Egyptian Side	
2 Operation and maintenance capacity of water supply facilities is strengthened		6. Others - Civil works, electrical works and other necessary works for the installation of flow meters - Measurement of flow rate by the flow meters - Monitoring of wells - MNF survey and countermeasure works for other areas than the pilot project areas	
2-1 General			
(1) Surveying current conditions of water supply facilities			
(2) Selecting Model Facilities (MF)			
(3) Organizing SOP/MF teams			
(4) Holding workshops and seminars			
2-2 Actions			
S1 Preparing basic system drawings			
S2 Preparing unified forms of O&M records and reports			
S3 Measuring intake / production water volume at 7 WTPs			
S4 Developing SOPs for model facilities			
S5 Examining water distribution control practice in the network			
S5-1 Pilot project for distribution control in small areas			
S5-2 Hydraulic analysis of water supply and distribution			**Pre-Conditions**
S6 Applying SOPs in O&M			
S7 Developing SOPs for the remaining facilities			
S8 Formulating O&M plans			
S9 Developing water quality control program			
S10 Developing well inventory forms and monitoring well stations			
2-3 Monitoring achievement of SOP			

Abbreviations:

O&M : Maintenance and operation
BPS : Booster pumping station
HCWW : Holding Company for Water and Wastewater
SHAPWASCO : Sharkia Potable Water and Sanitation Company
FMRP : Fe/Mn removal plant
MF : Model facilities
WTP : Water treatment plant
HQ : Headquarters
NOPWASD : National Organization for Potable Water and Sanitary Drainage
OJT : On-the-job training
SOP : Standard Operational Procedure

Table 2-4 PDM2 (2nd Revision)

Project Design Matrix-2 (PDM2)

Project Title: The Project for Improvement of Management Capacity of Operation and Maintenance for SHAPWASCO

Target Area : Sharkia Governorate, Egypt **Target Group : Staff of SHAPWASCO** **Duration : FY2006 – FY2009**
Final Beneficiaries : People in Sharkia Governorate **Date : March 4, 2008**

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
[Overall Goal] Management capacity of operation and maintenance of water supply facilities is improved in Sharkia Governorate.	1. Performance indicators in the field of management capacity of operation and maintenance are improved for all branches in the Governorate.	SHAPWASCO quarterly report submitted to HCWW	
[Project Purpose] Management capacity of operation and maintenance of water supply facilities is improved in target areas.	1. Performance indicators in the field of management capacity of operation and maintenance are improved in target areas. 2. Setting indicators for optimum electricity and chemical consumption and manpower standard working hours is conducted at model facilities for SOP activity. 3. Activities on UFW and SOPs are incorporated into the routine work. - Activities on UFW reduction are expanded to other sites than the pilot project sites. - Activities on SOPs are expanded to other facilities than the model facilities.	SHAPWASCO quarterly report submitted to HCWW Monthly Report for O&M Project Progress Report Monthly Report for O&M Project Progress Report Questionnaire survey Organization chart	Sector policy of the Egyptian government will not drastically change on management of water supply services.
[Outputs] 1. Unaccounted-for water (UFW) ratio is reduced in the pilot project sites.	1-1 Water balance analysis can be conducted properly for the pilot project sites. 1-2 An average UFW ratio (initial) is reduced from 35% to 20% in the pilot project sites. 1-3 An average leakage (real loss) ratio (initial) is reduced from 30% to 15% in the pilot project sites. 1-4 At least three (3) members of each UFW team of Zagazig City and Hihya Markaz acquire leakage detection survey technique. 1-5 At least one (1) member of each UFW team of other Markazes related to the pilot projects acquires leakage detection survey technique.	Project Progress Report Project Progress Report Project Progress Report Test by JICA Expert Project Progress Report Test by JICA Expert Project Progress Report	

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
2. Operation and maintenance capacity of water supply facilities is strengthened.	2-1 Basic system drawings of the facilities are prepared and updated at five (5) model facilities (2 WTPs, 1 FMRP, 1 BPS and 1 well station) which represent the facilities of SHAPWASCO.	Project Progress Report	
	2-2 Manuals for management of O&M are developed and updated as SOPs by the following SOP packages for plant components and for three activity categories, i.e. Operation, Maintenance and Water Quality Control for each model facility. - Not less than twenty (20) SOP packages at WTP - Not less than five (5) SOP packages at FMRP, BPS and well stations.	Project Progress Report	
	2-3 For the application of SOPs to the field operation, class room training and OJT to operators are conducted at all the five (5) model facilities.	Project Progress Report	
	2-4 Not less than eighty (80) percent of SOP/HQ and SOP/MF members acquire the ability to apply knowledge and skills of SOP.	Test by JICA Expert Project Progress Report	
	2-5 O&M Plan is developed at not less than one (1) WTP.	Project Progress Report	
	2-6 Water quality control program applying the new HCWW regulation is prepared.	Project Progress Report	
	2-7 Well inventory is prepared with a standard form and the first round of investigation is conducted for all the SHAPWASCO well stations.	Project Progress Report	
	2-8 Hydraulic analysis is done for not less than two pilot project areas.	Project Progress Report	

Note (1) Following PI has been selected as a specific indicator.
- Percentage of measured water production (%), etc.
Volume of measured production water / total volume of produced water
Volume of measured production water: means total volume of measured produced water in stations equipped with meters working in cubic meter

Activities		Inputs		Important Assumption
		Japanese Side	Egyptian Side	
1	**Unaccounted-for water (UFW) ratio is reduced in the pilot project sites.**	1. Experts	1. Counterparts	Employees who received trainings by the Project will continuously work for SHAPWASCO.
1-1	**General**	- Chief Advisor - UFW reduction specialist - Leakage detection trainer - Water treatment specialist - Hydraulic engineer for network analysis - Electrical engineer - Mechanical engineer - Hydro-geologist - Water quality control specialist	- Project director - Project manager - UFW teams	
(1)	Analyzing the current situation on UFW			
(2)	Organizing UFW reduction teams			
(3)	Selecting candidate areas for pilot project sites			
(4)	Formulating an action plan for UFW reduction activity			
(5)	Conducting water conservation campaign			Personnel transfer of executive management will not affect the implementation of the Project.
(6)	Formulating long-term pipe replacement plan for preventive works			
(7)	Formulating a plan for expanding UFW reduction activity to the other Markazes than the pilot project areas		2. Office space and facilities for experts	
(8)	Holding workshops and seminars		3. Equipment	
1-2	**Actions**	2. Equipment and materials	4. Necessary information	
U1	Conducting training of C/P staff at Mostrod Training Center	3. Trainings	5. Local cost All the cost for repairing leakage in distribution network of the pilot project areas	Funds from NOPWASD and SHAPWASCO in related to the Project will be allocated as planned.
U2	Conducting leakage (minimum night flow : MNF) survey for candidate areas	4. Local cost		
U3	Determining six (6) pilot project sites			
U4	Preparing GIS drawings		6. Others - Civil works, electrical works and other necessary works for the installation of flow meters - Measurement of flow rate by the flow meters - Monitoring of wells - MNF survey and countermeasure works for other areas than the pilot project areas	
U5	Learning experiences of Jordan UFW reduction project			
U6	Making field survey of distribution network			
U7	Surveying working conditions of water meters and conducting meter readings			
U8	Measuring metering error for working meters and water wastage in the house			
U9	Conducting MNF survey			
U10	Making water balance analysis before repair works			
U11	Conducting leakage detection survey			
U12	Repairing leaking parts			
U13	Conducting MNF survey (including meter readings) after repair works			
U14	Making water balance analysis after repair works and its evaluation			

Activities	Inputs		Important Assumption
	Japanese Side	Egyptian Side	
2 Operation and maintenance capacity of water supply facilities is strengthened			
2-1 General			
(1) Surveying current conditions of water supply facilities			
(2) Selecting Model Facilities (MF)			
(3) Organizing SOP/MF teams			
(4) Formulating an action plan for SOP activity			
(5) Holding workshops and seminars			
2-2 Actions			
S1 Preparing basic system drawings			
S2 Preparing unified forms of O&M records and reports			
S3 Measuring intake / production water volume at seven (7) WTPs			
S4 Developing SOPs for model facilities			
S5 Examining water distribution control practice in the network			
S5-1 Pilot project for distribution control in small areas			
S5-2 Hydraulic analysis of water supply and distribution			**Pre-Conditions**
S6 Applying SOPs in O&M			
S7 Developing SOPs for the remaining facilities			
S8 Formulating O&M plans			
S9 Developing water quality control program			
S10 Developing well inventory forms and monitoring wells			
2-3 Monitoring achievement of SOP			

Abbreviations:

O&M : Maintenance and operation
BPS : Booster pumping station
FMRP : Fe/Mn removal plant
MF : Model facilities
WTP : Water treatment plant
HQ : Headquarters
OJT : On-the-job training
SOP : Standard Operational Procedure
HCWW : Holding Company for Water and Wastewater
NOPWASD : National Organization for Potable Water and Sanitary Drainage
SHAPWASCO : Sharkia Potable Water and Sanitation Company

Table 2-5 PDM3 (3rd Revision)

Project Design Matrix-3 (PDM3)

Project Title: The Project for Improvement of Management Capacity of Operation and Maintenance for SHAPWASCO

Target Area : Sharkia Governorate, Egypt **Target Group : Staff of SHAPWASCO** **Duration : FY2006 – FY2009**
Final Beneficiaries : People in Sharkia Governorate **Date : 9th July 2008**

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
[Overall Goal] Management capacity of operation and maintenance of water supply facilities is improved in Sharkia Governorate.	1. Performance indicators in the field of management capacity of operation and maintenance are improved for all branches in the Governorate.	SHAPWASCO quarterly report submitted to HCWW	
[Project Purpose] Management capacity of operation and maintenance of water supply facilities is improved in target areas.	1. Performance indicators in the field of management capacity of operation and maintenance are improved in target areas.	SHAPWASCO quarterly report submitted to HCWW	Sector policy of the Egyptian government will not drastically change on management of water supply services.
	2. Setting indicators for optimum electricity and chemical consumption and manpower standard working hours is conducted at model facilities for SOP activity.	Monthly Report for O&M Project Progress Report	
	3. Activities on UFW and SOPs are incorporated into the routine work. - Activities on UFW reduction are expanded to other sites than the pilot project sites. - Activities on SOPs are expanded to other facilities than the model facilities.	Monthly Report for O&M Project Progress Report Questionnaire survey Organization chart	
[Outputs] 1. Unaccounted-for water (UFW) ratio is reduced in the pilot project sites.	1-1 Water balance analysis can be conducted properly for the pilot project sites.	Project Progress Report	
	1-2 An average UFW ratio (initial) is reduced by 13 points in the pilot project sites.	Project Progress Report	
	1-3 An average leakage (real loss) ratio (initial) is reduced by 13 points in the pilot project sites.	Project Progress Report	
	1-4 At least three (3) members of each UFW team of Zagazig City and Hihya Markaz acquire leakage detection survey technique.	Test by JICA Expert Project Progress Report	
	1-5 At least one (1) member of each UFW team of other Markazes related to the pilot projects acquires leakage detection survey technique.	Test by JICA Expert Project Progress Report	

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
2. Operation and maintenance capacity of water supply facilities is strengthened.	2-1 Basic system drawings of the facilities are prepared and updated at five (5) model facilities (2 WTPs, 1 FMRP, 1 BPS and 1 well station) which represent the facilities of SHAPWASCO.	Project Progress Report	
	2-2 Manuals for management of O&M are developed and updated as SOPs by the following SOP packages for plant components and for three activity categories, i.e. Operation, Maintenance and Water Quality Control for each model facility. - Not less than twenty (20) SOP packages at WTP - Not less than five (5) SOP packages at FMRP, BPS and well stations.	Project Progress Report	
	2-3 For the application of SOPs to the field operation, class room training and OJT to operators are conducted at all the five (5) model facilities.	Project Progress Report	
	2-4 Not less than eighty (80) percent of SOP/HQ and SOP/MF members acquire the ability to apply knowledge and skills of SOP.	Test by JICA Expert Project Progress Report	
	2-5 O&M Plan is developed at not less than one (1) WTP.	Project Progress Report	
	2-6 Water quality control program applying the new HCWW regulation is prepared.	Project Progress Report	
	2-7 Well inventory is prepared with a standard form and the first round of investigation is conducted for all the SHAPWASCO well stations.	Project Progress Report	
	2-8 Hydraulic analysis is done for not less than two pilot project areas.	Project Progress Report	

Note (1) Following PI has been selected as a specific indicator.
- Percentage of measured water production (%), etc.
Volume of measured production water / total volume of produced water
Volume of measured production water: means total volume of measured produced water in stations equipped with meters working in cubic meter

Activities	Inputs		Important Assumption
	Japanese Side	Egyptian Side	
1 Unaccounted-for water (UFW) ratio is reduced in the pilot project sites.	1. Experts	1. Counterparts	Employees who received trainings by the Project will continuously work for SHAPWASCO.
1-1 General	- Chief Advisor - UFW reduction specialist - Leakage detection trainer - Water treatment specialist - Hydraulic engineer for network analysis - Electrical engineer - Mechanical engineer - Hydro-geologist - Water quality control specialist	- Project director - Project manager - UFW teams - SOP teams	
(1) Analyzing the current situation on UFW			
(2) Organizing UFW reduction teams			
(3) Selecting candidate areas for pilot project sites			
(4) Formulating an action plan for UFW reduction activity			
(5) Conducting water conservation campaign			Personnel transfer of executive management will not affect the implementation of the Project.
(6) Formulating long-term pipe replacement plan for preventive works			
(7) Formulating a plan for expanding UFW reduction activity to the other Markazes than the pilot project areas		2. Office space and facilities for experts 3. Equipment	
(8) Holding workshops and seminars			
1-2 Actions	2. Equipment and materials 3. Trainings	4. Necessary information 5. Local cost All the cost for repairing leakage in distribution network of the pilot project areas	Funds from NOPWASD and SHAPWASCO in related to the Project will be allocated as planned.
U1 Conducting training of C/P staff at Mostrod Training Center			
U2 Conducting leakage (minimum night flow : MNF) survey for candidate sites	4. Local cost		
U3 Determining nine (9) pilot project sites			
U4 Preparing GIS drawings		6. Others - Civil works, electrical works and other necessary works for the installation of flow meters - Measurement of flow rate by the flow meters - Monitoring of wells - MNF survey and countermeasure works for other areas than the pilot project areas	
U5 Learning experiences of Jordan UFW reduction project			
U6 Making field survey of distribution network			
U7 Surveying working conditions of water meters and conducting meter readings			
U8 Measuring metering error for working meters and water wastage in the house			
U9 Conducting MNF survey			
U10 Making water balance analysis before repair works			
U11 Conducting leakage detection survey			
U12 Repairing leaking parts			
U13 Conducting MNF survey (including meter readings) after repair works			
U14 Making water balance analysis after repair works and its evaluation			

CHAPTER 3 PROJECT ACHIEVEMENT

3.1 Achievement for Over Goal

The project achievement for the Over Goal for the Project is described in Table 3-1. They are compared with PDM3 as shown in Table 2-5.

3.2 Achievement for Project Purpose

The project achievement for the Project Purpose for the Project is described in Table 3-1. They are compared with PDM3 as shown in Table 2-5.

3.3 Achievement for Outputs

The project achievement for the Outputs for the Project is described in Table 3-1. They are compared with PDM3 as shown in Table 2-5.

Table 3-1 Project Indicators and Achievement Levels

Narrative Summary	Objectively Verifiable Indicators	Achievement
[Overall Goal] Management capacity of operation and maintenance of water supply facilities is improved in Sharkia Governorate.	1. Performance indicators in the field of management capacity of operation and maintenance are improved for all branches in the Governorate.	In this project, following PIs have been set for Overall Goal (refer to section 3.4 for the details): 1) Long-term UFW ratio for the year of 2015 to 2030 2) Power consumption per unit production water volume 3) Chlorine consumption per unit production water volume 4) Alum consumption per unit production water volume 5) Ratio of production water volume to intake water volume
[Project Purpose] Management capacity of operation and maintenance of water supply facilities is improved in target areas.	1. Performance indicators in the field of management capacity of operation and maintenance are improved in target areas.	PI was set at percentage of the measured production to the total estimated production of water treatment plants. PI was improved from 0% to 54% at the end of the Project.
	2. Setting indicators for optimum electricity and chemical consumption and manpower standard working hours is conducted at model facilities for SOP activity	Measurements of water flows and supply have been undertaken and recorded at two model WTPs at Abbasa and Zagazig. As a result, SHAPWASCO was able to obtain sufficient data to set indicators for electricity and chemical consumption. For Zagazig WTP, they were set at 0.28kWh/m3 for electricity, 26.7mg/m3 for aluminum sulfate and 5.37mg/m3 for chlorine respectively. These indicators were then compared to those of the Hihya WTP that was constructed under the Japanese Grant Aid for identification of areas of improvement and setting of optimum indicators. As the indicator related to manpower standard working hours, PI as unit production water volume per person were set. Also, number and category of required staff in each facility was incorporated in SOP document.
	3. Activities on UFW and SOPs are incorporated into the routine work. ➢ Activities on UFW reduction are expanded to other sites than the pilot project sites.	As for UFW reduction activity, in addition to the three (3) pilot project areas in Abu Hamad Markaz, Menia Alqamah Markaz and Bilbais Markaz that were added at the time of mid-term monitoring, two (2) more pilot projects in Zagazig Markaz and Ibrahimiya Markaz have been conducted during the project period. Expansion of UFW activity is being fostered in the following:
		1) Flow meter installation chambers were constructed with concrete in all candidate sites of the pilot project site in one city and seven Markaz and ready for starting activities 2) Data on leakages in all target areas are being collected and have been put into the database which could be used as a tool to develop pipe

Narrative Summary	Objectively Verifiable Indicators		Achievement
			replacement plan 3) All 12 members of core UFW team at HQ, Zagazig East and Hihya Markaz have equipped with sufficient expertise to train other SHAPWASCO staff members 4) Construction of a leakage detection training yard at Hihya Central Station has been initiated by SHAPWASCO and is expected to provide platform of further training not only for all other staff members at target areas but in all over the Governorate.
	- Activities on SOPs are expanded to other facilities than the model facilities.		Incorporation of SOP activities into work routine and their expansion to other facilities have been confirmed by: 1) Filter washing method has already been incorporated into routine work at two model WTPs and has been started its application at another WTP in Kafr Saqr 2) Monitoring on chemical consumption has been undertaken and data is being regularly collected. Based on the collected data, improvement activity for reduction is started. 3) Monitoring on flow data and the data is being regularly collected at all WTPs except WTPs under rehabilitation. 4) OJT on chlorine usage control was conducted and SOPs were then developed at Qenayat Fe/Mn removal plant. Moreover, HCWW has already distributed a draft copy of SOPs to other water companies which are expected to be used as a reference for preparing O&M manual throughout the country.
[Outputs] 1. Unaccounted-for water (UFW) ratio is reduced in the pilot project areas.	1-1	Water balance analysis can be conducted properly for the pilot project sites.	Water balance analysis has been done properly for nine (9) pilot project sites and .two (2) sites for the expansion activity.
	1-2	An average UFW ratio (initial) is reduced by 13 points in the pilot project sites.	UFW ratio is reduced by 12.2 points in average for nine (9) pilot project sites and two (2) sites for the expansion activity.
	1-3	An average leakage (real loss) ratio (initial) is reduced by 13 points in the pilot project sites.	Leakage ratio is reduced by 12.1 points in average for nine (9) pilot project sites and two (2) sites for the expansion activity.
	1-4	At least three (3) members of each UFW team of Zagazig City and Hihya Markaz acquire leakage detection survey technique.	Following members have acquired the technique. - UFW/HQ team: 4 - Zagazig City UFW team: 3 (Zagazig East) - Hihya Markaz: 3
	1-5	At least one (1) member each of UFW team of other Markazes related to the pilot project areas acquires leakage detection survey technique.	Following members have acquired the technique. - Zagazig West: 3 - Zagazig Markaz: 1 - Ibrahimiya Markaz: 2 - Diarb Nigm Markaz: 2

Narrative Summary		Objectively Verifiable Indicators	Achievement
			- Abu Hamad Markaz: 1 - Bilbais Markaz: 1 and Menia Alqamah Markaz: 1
2. Operation and maintenance capacity of water supply facilities is strengthened.	2-1	Basic system drawings of the facilities are prepared and updated at five (5) model facilities (2 WTPs, 1 FMRP, 1 BPS and 1 well station) which represent the facilities of SHAPWASCO.	Basic system drawings of the facilities have been prepared and updated at five (5) model facilities (2 WTPs, 1 FMRP, 1 BPS and 1 well station).
	2-2	Manuals for management of O&M are developed and updated as SOPs by the following SOP packages for plant components and for three activity categories, i.e. Operation, Maintenance and Water Quality Control for each model facilities. - Not less than twenty (20) SOP packages at WTP - Not less than five (5) SOP packages at FMRP, BPS and well stations.	SOPs have been developed in the form of the following SOP packages for plant components and for three activity categories. - Thirty-five (34) SOP packages at WTP - Twelve (20) SOP packages at FMRP - Nine (9) SOP packages at BPS - Eight (8) SOP packages at WPS
	2-3	For the application of SOPs to the field operation, class room training and OJT to operators are conducted at all the five (5) model facilities.	SOPs have been applied as follows: - Abbasa WTP and Zagazig WTP - Kafr Farag and Qenayat Fe/Mn removal plants - Bilbais booster pump station - Aslougi well station
	2-4	Not less than eighty (80) percent of SOP/HQ and SOP/MF members acquire the ability to apply knowledge and skills of SOP.	Out of 3 staff for SOP/HQ team: 3 staff has acquired the ability. Out of 8 staff for SOP/MF team: To be tested in Phase-4
	2-5	O&M Plan is developed at not less than one (1) model WTP.	O&M plan has been prepared in Abbasa WTP.
	2-6	Water quality control system applying the new HCWW regulation is prepared.	Water quality control program has been prepared for Abbasa WTP and Zagazig WTP. Auditing system for laboratory quality control has been prepared and applied to Abbasa WTP and Zagazig WTP.
	2-7	Well inventory is prepared with a standard form and the first round of investigation is conducted for all the SHAPWASCO well stations.	Well inventory has been prepared and second round of well monitoring is being conducted.
	2-8	Hydraulic analysis is done for not less than two pilot project areas.	Hydraulic analysis has been done for the pilot project areas of Hihya Markaz and Zagazig East.

3.4 Setting Performance Indicators for Overall Goal

3.4.1 UFW Reduction Activity

Performance indicator for UFW reduction activity is set as UFW ratio. The UFW ratios for evaluating improvement of O&M capacity of SHAPWACO have been set for the years of 2015, 2020, 2025 and 2030 according to the results of the pilot projects as follows:

Table 3-2 PI for UFW Reduction Activity

Year	UFW Ratio (%)
2015	27.0
2020	23.5
2025	21.0
2030	19.0

Conditions for setting PIs related to UFW reduction activities are as follows:

- It is assumed that 15 branches of SHAPWASCO conduct annually starting from 2012 UFW reduction activity at four districts which have similar house connections to the pilot project of the Project. In other words, UFW teams of SHAPWASCO will conduct activity annually at 60 districts (4 districts x 15 branches). By the activity at this pace, the first round of UFW reduction activity will be completed by the year 2030 in the whole SHAPWASCO service area. The second round will start from 2031.
- Service population at each district is set as 7,200 based on the result of the pilot project.
- Annual population growth is set as 2% which is applied by SHAPWASCO and distributed water volume is also set as 2.0%.
- Distributed water volume to each district is calculated as follows:

  (Distributed water volume in the whole governorate ÷ Population for the whole governorate) x service population in the district
- Initial UFW ratio at each district before conducting UFW reduction activity is set as 31.0%.
- UFW reduction point after UFW reduction activity by each UFW team is set as 12.2 points (or 0.122).
- UFW volume to be reduced is calculated as follows:

  Reduction volume of UFW = [Service Pop. at each district] x [Annual distributed water per capita] x [UFW Reduction point: 0.122]
- UFW ratio for each year is calculated as follows:

  UFW Ratio in each year = [UFW Ratio before activity : 31.0%] − [Total UFW volume up to the year ÷ Total distribution volume for SHAPAWSCO in the year]
- For the targets of UFW ratio from 2015 to 2030, calculated figures are rounded up to 0 or 5 after the decimal fractions.
- Taking into account the recurrence of leakage (increase of leakage after UFW reduction activity), each UFW team is required to review the target figure of UFW every 5 years by checking UFW ratio through minimum night flow survey at the districts (4 districts x 5 years = 20 districts) where leakage survey has been finished.

Table 3-3 shows the UFW ratios from 2009 to 2030 which have been calculated according to the above conditions.

Table 3-3 Long-Term Targets of UFW Ratios for SHAPWASCO

Year	UFW Team	No. of UFW Reduction Activity Site	Service Population in Activity Site	Total Service Population in Activity Site (cumulative)	Total Population in Sharkia Gov.	Total Distributed Water for SHAPWASCO (m3/yr)	Water distributed per person per year (m3/cap./yr)	Distributed Water in Activity Site (m3/yr)	Reduction of UFW by volume (m3/yr)	Accumulation of UFW Reduction (m3/yr)	UFW after Activity (%)	Long Term Target (%)
2009	3	12	86,400	86,400	5,700,000	246,000,000	43.158	3,728,842	454,919	454,919	30.82	
2010	5	20	144,000	230,400	5,814,000	250,920,000	43.158	6,214,737	758,198	1,213,117	30.52	
2011	10	40	288,000	518,400	5,930,280	255,938,400	43.158	12,429,474	1,516,396	2,729,512	29.93	
2012	15	60	432,000	950,400	6,048,886	261,057,168	43.158	18,644,211	2,274,594	5,004,106	29.08	
2013	15	60	432,000	1,382,400	6,169,863	266,278,311	43.158	18,644,211	2,274,594	7,278,700	28.27	
2014	15	60	432,000	1,814,400	6,293,261	271,603,878	43.158	18,644,211	2,274,594	9,553,293	27.48	
2015	15	60	432,000	2,246,400	6,419,126	277,035,955	43.158	18,644,211	2,274,594	11,827,887	26.73	**27.0**
2016	15	60	432,000	2,678,400	6,547,508	282,576,674	43.158	18,644,211	2,274,594	14,102,481	26.01	
2017	15	60	432,000	3,110,400	6,678,458	288,228,208	43.158	18,644,211	2,274,594	16,377,075	25.32	
2018	15	60	432,000	3,542,400	6,812,028	293,992,772	43.158	18,644,211	2,274,594	18,651,668	24.66	
2019	15	60	432,000	3,974,400	6,948,268	299,872,627	43.158	18,644,211	2,274,594	20,926,262	24.02	
2020	15	60	432,000	4,406,400	7,087,234	305,870,080	43.158	18,644,211	2,274,594	23,200,856	23.41	**23.5**
2021	15	60	432,000	4,838,400	7,228,978	311,987,481	43.158	18,644,211	2,274,594	25,475,449	22.83	
2022	15	60	432,000	5,270,400	7,373,558	318,227,231	43.158	18,644,211	2,274,594	27,750,043	22.28	
2023	15	60	432,000	5,702,400	7,521,029	324,591,776	43.158	18,644,211	2,274,594	30,024,637	21.75	
2024	15	60	432,000	6,134,400	7,671,450	331,083,611	43.158	18,644,211	2,274,594	32,299,230	21.24	
2025	15	60	432,000	6,566,400	7,824,879	337,705,283	43.158	18,644,211	2,274,594	34,573,824	20.76	**21.0**
2026	15	60	432,000	6,998,400	7,981,376	344,459,389	43.158	18,644,211	2,274,594	36,848,418	20.30	
2027	15	60	432,000	7,430,400	8,141,004	351,348,577	43.158	18,644,211	2,274,594	39,123,011	19.86	
2028	15	60	432,000	7,862,400	8,303,824	358,375,548	43.158	18,644,211	2,274,594	41,397,605	19.45	
2029	15	60	432,000	8,294,400	8,469,900	365,543,059	43.158	18,644,211	2,274,594	43,672,199	19.05	
2030	15	60	432,000	8,726,400	8,639,298	372,853,921	43.158	18,644,211	2,274,594	45,946,792	18.68	**19.0**
2031	15	60	432,000	9,158,400	8,812,084	380,310,999	43.158	18,644,211	2,274,594	48,221,386	18.32	

3.4.2 SOP Activity

Among the water supply facilities for SHAPWASCO such as water treatment plants (WTP), iron/manganese removal plants, booster pump stations and well stations, the facilities in service at which flow meter is installed and working are as follows:

- Hihya WTP
- Zagazig WTP
- New Faqus WTP
- Kafr Saqr WTP
- Huseinia WTP
- Abbasa WTP

Since the accurate water production volume can be measured only at the above-mentioned WTPs, it is not possible to set performance indicator (PI) for assessment of the whole management of SHAPWASCO to be submitted to HCWW quarterly for the year.

Therefore, in this Project, PIs shall be set for improvement of O&M in 2010 using the monitored data for flow rate, electricity consumption, chlorine consumption and alum consumption. For PIs after the year 2011, monitored data for the previous year shall be applied for setting PIs of the following year for O&M improvement.

PIs have been set for the following:

Table 3-4 PI for SOP Activities

No.	Performance Indicator	Unit
1	Power consumption per unit production water volume (PI-PW)	kWh/m^3
2	Chlorine consumption per unit production water volume (PI-CL)	g/m^3
3	Alum consumption per unit production water volume (PI-AL)	g/m^3
4	Ratio of production water volume to intake water volume (PI-EF)	---

(1) Power Consumption per Unit Production Water Volume (PI-PW)

Annual target of PI as power consumption per unit water production volume was set for each WTP using the data from January to September 2009.

The results of PI at each plant for the period from January to September 2009 are as follows:

Table 3-5 Result of PI for Power Consumption per Unit Water Production Volume in 2009

WTP	PI-PW (kWh/m^3)			Difference from Average	
	Maximum	Minimum	Average	Maximum	Minimum
Hihya	0.327	0.305	0.315	0.012	0.010
Zagazig	0.322	0.287	0.300	0.022	0.013
NewFaqus	0.369	0.247	0.289	0.080	0.042
Kafr Saqr	0.359	0.009	0.246	0.113	0.237
Huseinia	0.533	0.277	0.439	0.094	0.162
Abbasa	0.485	0.295	0.341	0.144	0.046
Average	0.399	0.237	0.322	---	---

Note: Huseinia WTP is operated under special condition on power supplying. Wattmeter is installed at the place near by water intake facility located 25km away from WTP. Power supply loss arises while supplying electric power for WTP.

Electric power is consumed mainly by main pumps, such as intake pumps and transmission pumps, at water treatment plants in SHAPWASCO. Therefore, operation and maintenance activities for main pumps shall be focused on for improvement of PI-PW value.

Action to reduce power consumption at WTP

Operation number of transmission pumps to maintain an adequate water pressure in the network shall be controlled.

Through the above action to reduce the electric power, annual target of PI as power consumption per unit water production volume is set for each WTP as shown in Table 3-6.

Table 3-6 Target of PI for Power Consumption

WTP	Annual Target
Hihya	Not more than 0.30kWh/m^3
Zagazig	Not more than 0.30kWh/m^3
New Faqus	Not more than 0.25kWh/m^3
Kafr Saqr	Not more than 0.25kWh/m^3
Huseinia	Not more than 0.42kWh/m^3
Abbasa	Not more than 0.30kWh/m^3

(2) Chlorine Consumption per Unit Production Water Volume (PI-CL)

Annual target of PI as chlorine consumption per unit water production volume was set for each WTP for the period from January to September 2009. The results of PI at each plant for the period from January to September 2009 are as follows:

Table 3-7 Result of PI for Chlorine Consumption per Unit Water Production Volume in 2009

WTP	PI-CL (g/m^3)			Difference from Average	
	Maximum	Minimum	Average	Maximum	Minimum
Hihya	6.68	4.68	5.43	1.25	0.75
Zagazig	5.01	4.75	4.88	0.13	0.13
New Faqus	8.53	4.35	6.49	2.04	2.14
Kafr Saqr	7.32	5.37	6.16	1.16	0.79
Huseinia	5.07	4.66	5.05	0.02	0.39
Abbasa	5.96	4.08	4.74	1.22	0.66
Average	6.43	4.65	5.46	---	---

Chlorine consumption will be changed depending on raw water quality such as break point. Therefore, target of PI can not be set up as the value common to all the water treatment plant.

Actions to reduce chlorine consumption

- Residual chlorine control procedures shall be continued after completion of this project.
- Periodical monitoring and review for pre and post chlorine dosing rate and free residual chlorine of treated water shall be done at end of the process.
- Adequate dosing flow rate of chlorine shall be maintained based on chlorine dosing rate and raw water flow rate.

Through the above actions, averaged annual target and monthly target of PI as chlorine consumption per unit water production volume is set for each WTP as shown in Table 3-8.

Table 3-8 Target of PI for Chlorine Consumption

WTP	Averaged Annual Target	Monthly Target
Hihya	Not more than 4.5 g/m^3	$4.5g/m^3 \pm 0.5g/m^3$
Zagazig	Not more than 4.5 g/m^3	$4.5g/m^3 \pm 0.5g/m^3$
New Faqus	Not more than 5.0 g/m^3	$5.0g/m^3 \pm 0.5g/m^3$
Kafr Saqr	Not more than 5.0 g/m^3	$5.0g/m^3 \pm 0.5g/m^3$
Huseinia	Not more than 4.5 g/m^3	$4.5g/m^3 \pm 0.5g/m^3$
Abbasa	Not more than 4.5 g/m^3	$4.5g/m^3 \pm 0.5g/m^3$

(3) Alum Consumption per Unit Water Production Volume (PI-AL)

Annual target of PI as alum consumption per unit water production volume was set for each WTP for the period from January to September 2009.

The results of PI at each plant for the period from January to September 2009 are as follows:

Table 3-9 Result of PI for Alum Consumption per Unit Water Production Volume in 2009

WTP	PI-AL(g/m^3)			Difference from Average	
	Maximum	Minimum	Average	Maximum	Minimum
Hihya	26.1	16.2	21.7	4.4	5.5
Zagazig	29.6	22.8	25.1	4.5	2.3
New Faqus	24.6	18.8	22.0	2.6	3.2
Kafr Saqr	22.1	18.9	21.3	0.8	2.4
Huseinia	18.3	12.4	14.4	3.9	2.0
Abbasa	52.2	38.0	41.0	11.2	3.0
	27.8	20.3	21.9	6.0	1.6
Total	24.8	21.9	24.3	---	---

Alum consumption will be changed depending on raw water quality such as turbidity, pH, algae accounts etc. Therefore, target of PI can not be set up as the value common to all the water treatment plant.

Actions to reduce alum consumption

- Alum dosing control procedures shall be continued after completion of this project.
- Periodical monitoring and review for alum dosing rate and turbidity of treated water shall be done at end of the process.
- Adequate dosing flow rate of alum shall be maintained based on alum dosing rate and raw water flow rate.
- Concentration of alum solution shall be adjusted according to adequate procedures for making alum solution.

Through the above actions, averaged annual target and monthly target of PI as alum consumption per unit water production volume is set for each WTP as shown in Table 3-10.

Table 3-10 Target of PI for Alum Consumption

WTP	Average d Annual Target	Monthly Target
Hihya	Not more than $20g/m^3$	$20g/m^3 \pm 2g/m^3$
Zagazig	Not more than $23g/m^3$	$23g/m^3 \pm 2g/m^3$
New Faqus	Not more than $20g/m^3$	$20g/m^3 \pm 2g/m^3$
Kafr Saqr	Not more than $20g/m^3$	$20g/m^3 \pm 2g/m^3$
Huseinia	Not more than $15g/m^3$	$15g/m^3 \pm 2g/m^3$
Abbasa	Not more than $38g/m^3$	$38g/m^3 \pm 2g/m^3$

(4) Ratio of Water Production Volume to Water Intake Volume (PI-EF)

Annual target of PI as efficiency of water production was set for each WTP for the period from

January to September 2009.

The results of PI at each plant for the period from January to September 2009 are as follows:

Table 3-11 Ratio of Water Production Volume and Water Intake Volume in 2009

WTP	PI-EF (-)		Average
	Maximum	Minimum	
Hihya	0.999	0.710	0.951
Zagazig	0.933	0.853	0.898
New Faqus	0.963	0.628	0.846
Kafr Saqr	0.951	0.895	0.918
Huseinia	0.930	0.853	0.913
Abbasa	0.977	0.882	0.940
Total	0.959	0.804	0.911

In view of recycling water from drainage facilities, Hihya WTP differs from other WTPs for SHAPWASCO. Water from drainage facilities retunes to receiving well as recycled water at Hihya WTP.

Therefore, water intake volume can be reduced by the amount of recycled water.

Actions to improve the ratio of water production volume and water intake volume

a) Backwashing regime and filtration time shall be reviewed by making assessment of filter media.
b) Filtering load to the filter shall be reduced as much as possible by setting target of clarified water turbidity and residual chlorine.
c) Periodical inspection of filter media shall be done and filter washing condition and water quality of clarified water shall be monitored.
d) Leakage from concrete structures, pipes and valves of water treatment facilities such as sedimentation basin, filters, etc., shall be checked and repaired.

Through the above actions, averaged annual target of PI as ratio of water production volume to water intake volume is set for each WTP as shown in Table 3-12.

Table 3-12 Target of PI for Efficiency of Water Production

WTP	Averaged Annual Target
Hihya	Not less than 0.98
Zagazig	Not less than 0.93
New Faqus	Not less than 0.93
Kafr Saqr	Not less than 0.93
Huseinia	Not less than 0.93
Abbasa	Not less than 0.95

Activities	Inputs		Important Assumption
	Japanese Side	Egyptian Side	
2 Operation and maintenance capacity of water supply facilities is strengthened			
2-1 General			
(1) Surveying current conditions of water supply facilities			
(2) Selecting Model Facilities (MF)			
(3) Organizing SOP/MF teams			
(4) Formulating an action plan for SOP activity			
(5) Holding workshops and seminars			
2-2 Actions			
S1 Preparing basic system drawings			
S2 Preparing unified forms of O&M records and reports			
S3 Measuring intake / production water volume at seven (7) WTPs			
S4 Developing SOPs for model facilities			
S5 Examining water distribution control practice in the network			
S5-1 Pilot project for distribution control in small areas			
S5-2 Hydraulic analysis of water supply and distribution			**Pre-Conditions**
S6 Applying SOPs in O&M			
S7 Developing SOPs for the remaining facilities			
S8 Formulating O&M plans			
S9 Developing water quality control program			
S10 Developing well inventory forms and monitoring wells			
2-3 Monitoring achievement of SOP			

Abbreviations:

O&M : Maintenance and operation
BPS : Booster pumping station
FMRP : Fe/Mn removal plant
MF : Model facilities
WTP : Water treatment plant
HQ : Headquarters
OJT : On-the-job training
SOP : Standard Operational Procedure
HCWW : Holding Company for Water and Wastewater
NOPWASD : National Organization for Potable Water and Sanitary Drainage
SHAPWASCO : Sharkia Potable Water and Sanitation Company