Ministry of State for Environmental Affairs
The Government of the Syrian Arab Republic

THE PROJECT FOR CAPACITY DEVELOPMENT OF ENVIRONMENTAL MONITORING IN THE SYRIAN ARAB REPUBLIC PHASE 2

PROJECT COMPLETION REPORT

March 2012

JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)
NIPPON KOEI CO., LTD.
NIHON SUIDO CONSULTANTS CO., LTD.

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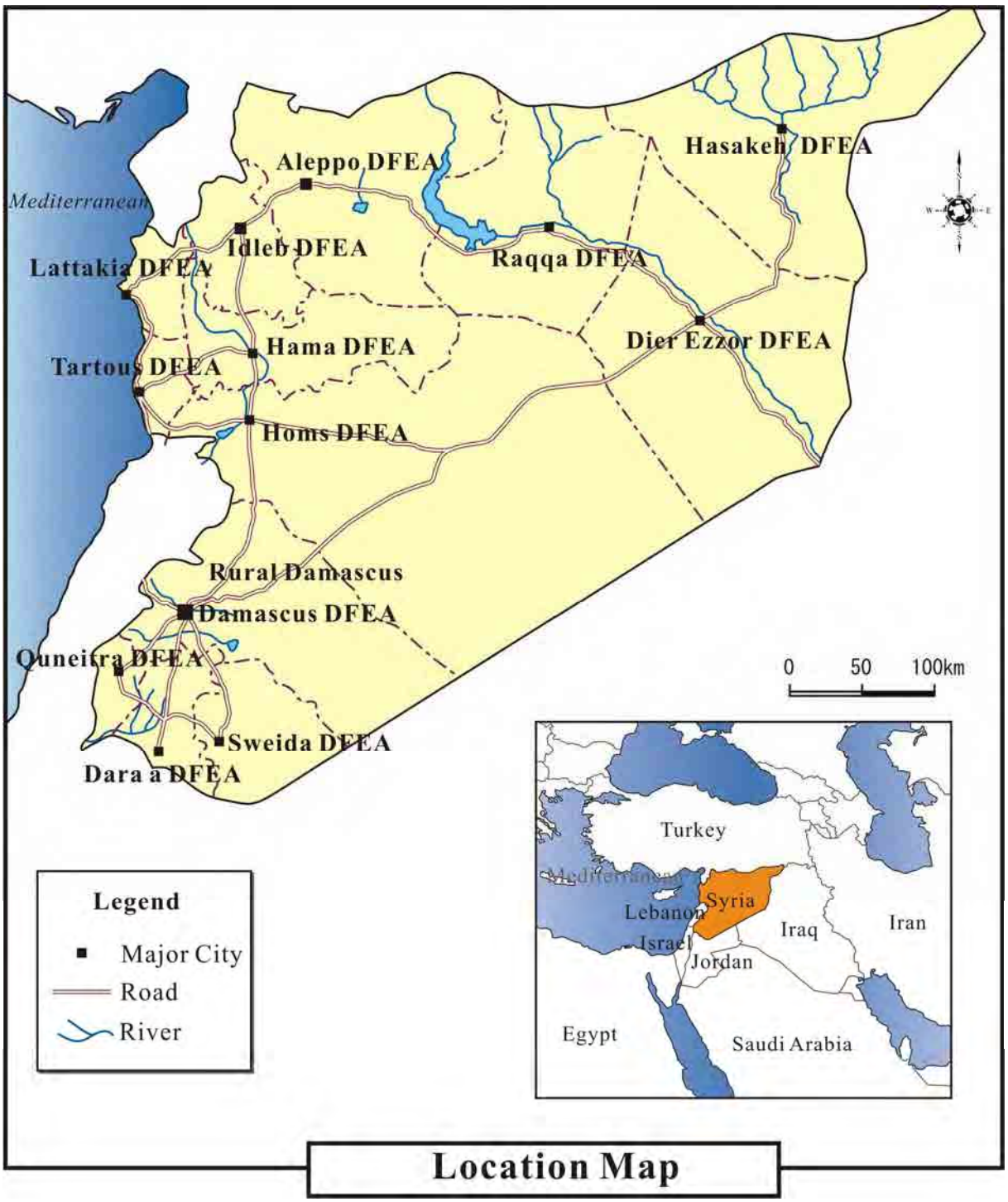

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The Project for Capacity Development of Environmental Monitoring
in the Syrian Arab Republic Phase 2
Project Completion Report

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Abbreviations

AAS	Atomic Absorption Spectrophotometer	MOLAE	Ministry of Local Administration and Environment
AEC	Atomic Energy Commission of Syria	MSEA	Ministry of State for Environmental Affairs
APSI	Air Pollution Source Inventory	NH3	Ammonia
BOD	Biochemical Oxygen Demand	NO	Nitrogen Monoxide
CA	Capacity Assessment	NOx	Nitrogen Oxide
C/P	Counterpart	NO2	Nitrogen Dioxide
CEDARE	The Center for Environment and Development for the Arab Region and Europe	NO3-N	Nitrate Nitrogen
CO	Carbon Monoxide	OJT	On the Job Training
COD	Chemical Oxygen Demand	OM	Operation and Maintenance
CO2	Carbon Dioxide	O2	Oxygen
DFEA	Directorate for Environmental Affaires	O3	Ozone
EDL	Estimated Detection Limit	PC	Personal Computer
EIA	Environmental Impact Assessment	PDM	Project Design Matrix
EU	European Union	PM10	Particulate-Matter 10
GC	Gas Chromatography	PO	Plan of Operation
GCEA	General Commission for Environmental Affaires	PSI	Pollution Source Inventory
GCWR	General Commission for Water Resources	QA/QC	Quality Assurance and Quality Control
GOJ	Government of Japan	R/D	Record of Discussions
GOS	Government of Syria	S/C	Steering Committee
GPS	Global Positioning System	SIC	Standard Industrial Classification
GIZ	German International Cooperation	SOP	Standard Operating Procedure
HFO	Heavy Fuel Oil	SO2	Sulfur Dioxide
ID	Identification	T/C	Technical Committee
JET	JICA Expert Team	TSP	Total Suspended Particulates
JFY	Japanese Fiscal Year	UNDP	United Nations Development Programme
JICA	Japanese International Cooperation Agency	UV/Vis	Ultraviolet Visible
LS	Lump sum	WRIC	Water Resources Information Center
M/M	Minutes of Meeting	WS	Workshop
MOI	Ministry of Irrigation	WTF	Wastewater Treatment Facility

List of DFEAs

Name of DFEA	Abbreviation
Damascus Directorate for Environmental Affaires	DAM DFEA
Rural Damascus Directorate for Environmental Affaires	DAMR DFEA
Aleppo Directorate for Environmental Affaires	ALP DFEA
Homs Directorate for Environmental Affaires	HOM DFEA
Hama Directorate for Environmental Affaires	HAM DFEA
Lattakia Directorate for Environmental Affaires	LTK DFEA
Dier Ezzor Directorate for Environmental Affaires	DRZ DFEA
Idleb Directorate for Environmental Affaires	IDL DFEA
Hasakeh Directorate for Environmental Affaires	HSK DFEA
Raqqa Directorate for Environmental Affaires	RAQ DFEA
Sweida Directorate for Environmental Affaires	SWD DFEA
Dara'a Directorate for Environmental Affaires	DAR DFEA
Tartous Directorate for Environmental Affaires	TAR DFEA
Quneitra Directorate for Environmental Affaires	QNT DFEA

The foreign exchange rate announced by JICA as of March 2012

1 USD = 80.48 Japanese Yen (JPY) = 56.40 Syrian Pound (SYP)

CHAPTER 1 INTRODUCTION

1.1 Background and Objectives of the Project

The Syrian Arab Republic (Syria) is located on the east coast of the Mediterranean Sea. It has a total land area of 185,000 km^2 with a population of about 20,000,000. Its main industry is agriculture. Due to rapid industrialization since the 1980s, environmental pollution caused by uncontrolled discharge of wastewater and gas emissions has come out in and around the large cities. The Government of Syria (GOS) set the Basic Law of Environment and established the Ministry of Environment in 1991. GOS also established the Directorates for Environmental Affairs (DFEAs) in 14 governorates in 2004. However, the DFEAs were barely knowledgeable about environmental monitoring, and were suffering from insufficient number of staff and equipment for analyzing water and air quality. Under this situation, the GOS requested the Government of Japan (GOJ) to implement the technical cooperation project for the capacity development of DFEAs, thus the Project for Capacity Development of Environment Monitoring at Directorates for Environmental Affairs in Governorates (Phase 1) was implemented for three years from January 2005.

The objectives of Phase 1 were: i) for DFEAs to acquire the capability to implement basic water quality monitoring of general parameters by simple analysis methods; and, ii) for DFEAs to acquire the capability to implement the regular monitoring of ambient air on major pollutants around factories, except inspectional monitoring, according to the monitoring plans formulated by the DFEAs themselves. Through the achievements of Phase 1, the staff of DFEAs' laboratories had acquired the basic skills essential for implementing environmental monitoring of air and water quality in each DFEA, including i) water quality analysis of general parameters; ii) air quality analysis of major pollutants; iii) measurement and analysis works according to the standard operation procedures (SOPs); iv) operation of analytical equipment, parts and reagents based on the manual; and, v) development of monitoring plan.

Subsequently, the GOS has requested a new project aiming at:

1) Acquiring higher level of analytical skills, and developing capacity to make monitoring plan and to evaluate current water and air conditions;
2) Implementing an inspection appropriately based on the result of an environmental monitoring; and,
3) Strengthening the administrative capacity of Ministry of State for Environmental Affairs (MSEA)[1] on technical instruction and coordination as a central authority in Syria.

In response to the request, the Japan International Cooperation Agency (JICA) dispatched a preparatory study team in June 2008, and agreed on the Project plan, implementation scheme, and demarcation of duties and undertakings between the Syrian and Japanese sides. Based on this agreement, the Records of Discussion (R/D) and the Minutes of Meeting (M/M) for the Capacity Development of Environmental Monitoring Phase 2 (the Project or Phase 2) were signed by both sides in November 2008.

In accordance with the abovementioned R/D and M/M, the Project aimed at achieving its purpose, i.e., "Capabilities of the DFEAs for implementing inspection and environmental monitoring concerning the water and air pollution sources are strengthened under the management by MSEA", as well as achieving the seven (7) Outputs designed under the Project purpose.

[1] The Ministry of State for Environmental Affairs (MSEA) was re-organized in June 2009 from ex-Ministry of Local Administration and Environment (MOLAE).

1.2 Project Scope and Design

(1) Project Area

The Project area was the whole territory of Syria, covering the following 14 DFEAs. These DFEAs were the target of technical transfer.

Target Organizations of the Project

No	Name
-	Ministry of State for Environmental Affairs (MSEA)
1	Damascus Directorate for Environmental Affairs (DFEA)
2	Rural Damascus DFEA
3	Aleppo DFEA
4	Homs DFEA
5	Hama DFEA
6	Lattakia DFEA
7	Dier Ezzor DFEA
8	Idleb DFEA
9	Hasakeh DFEA
10	Raqqa DFEA
11	Sweida DFEA
12	Dara'a DFEA
13	Tartous DFEA
14	Quneitra DFEA

(2) Project Design

In accordance with R/D and M/M signed on November 23, 2008, the overall goal and the Project purpose were as stated in the table below. The Project started from February 2009 and had been planned to be terminated in December 2012 on the said R/D and M/M.

In the first Steering Committee (S/C) meeting held on April 13, 2009, the Plan of Operation (PO) of the Project was discussed from the viewpoint of reducing the whole project schedule to achieve the Project purpose more effectively. According to the conclusion of the first S/C meeting, the PO as well as JICA Expert Team (JET) schedule was revised, and the Project has been reprogrammed to be terminated on March 2012.

Overall Goal and Project Purpose

Overall Goal Environmental management capabilities are strengthened in each Governorate by enhancement of the capabilities for implementing inspection and pollution sources management of DFEA.
Project Purpose Capabilities of the DFEAs for implementing inspection and environmental monitoring concerning the water and air pollution sources are strengthened under the management by MSEA.

To achieve the overall goal and Project purpose abovementioned, seven outputs and activities were designed as follows:

Outputs and Activities of the Project

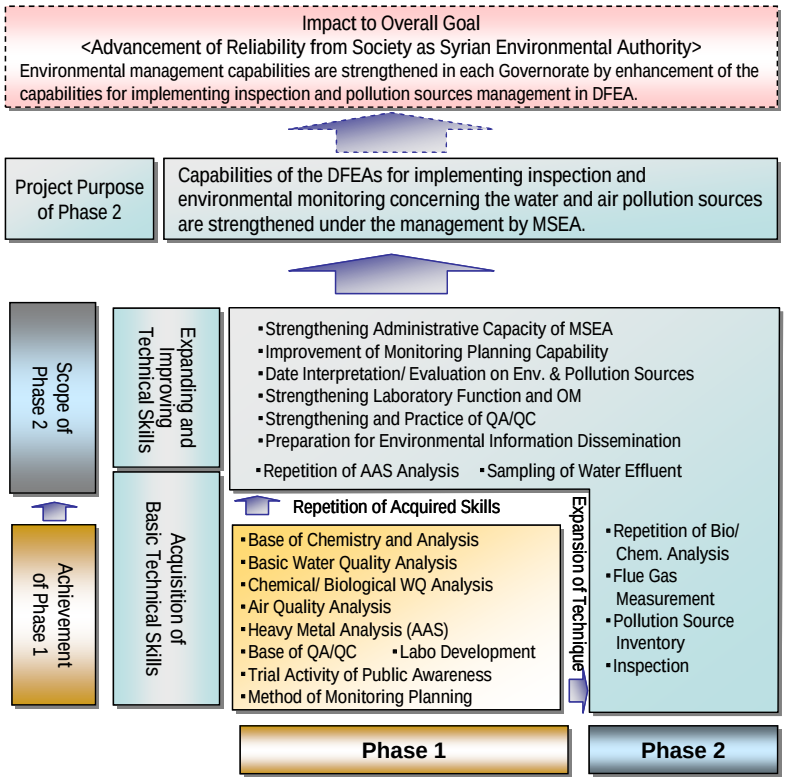
No.	Contents
Output 1	Capabilities for preparing pollution sources inventory are strengthened.
Activity 1-1	MSEA reviews the results of "Pollution Sources Survey" done in the Phase 1, and identifies the necessary information for preparing pollution sources inventory.
Activity 1-2	MSEA identifies the situations to prepare pollution sources inventory and its utilization purposes by each DFEA.
Activity 1-3	MSEA designs specification of the pollution sources inventory.
Activity 1-4	Each DFEA prepares the pollution sources inventory based on the activity1.3.
Output 2	Capabilities for implementing inspection are strengthened.
Activity 2-1	Each DFEA identifies technical and institutional issues of present inspection.
Activity 2-2	MSEA understands the issues of present inspections by DFEAs, and prepares a draft revision of "Industrial Facilities Inspection Guideline".
Activity 2-3	Each DFEA conducts inspection based on a draft revision of "Industrial Facilities Inspection Guideline".
Activity 2-4	Each DFEA identifies the issues of inspection based on a draft revision of "Industrial Facilities Inspection Guideline".
Activity 2-5	MSEA reflects the identified issues of inspections by DFEAs for a draft revision of "Industrial Facilities Inspection Guideline".
Output 3	Necessary sampling skills for inspection for water effluent are strengthened.
Activity 3-1	MSEA prepares water effluent sampling training plan, and manages the implementations.
Activity 3-2	Water effluent sampling trainings for the 14 DFEAs are conducted in 5 selected DFEA for regional training.
Activity 3-3	A sample SOP of water effluent sampling for the 14 DFEAs is prepared in 5 selected DFEA for regional training.
Activity 3-4	Each DFEA prepares a SOP of water effluent sampling.
Activity 3-5	Each DFEA conducts sampling based on a SOP of water effluent sampling.
Output 4	Capabilities concerning water quality analysis for water effluent and surface water are improved.
Activity 4-1	MSEA prepares water quality analyses training plan, and manages the implementations.
Activity 4-2	Analyses trainings, including COD, NO3-N, Oil for the 14 DFEAs are conducted in 5 selected DFEA for regional training.
Activity 4-3	Trainings concerning reliability of analyses data for the 14 DFEAs are conducted in 5 selected DFEAs for regional training.
Activity 4-4	Heavy metals analyses trainings using AAS for the 13 DFEAs (except Damascus DFEA) are conducted in 5 selected DFEAs for regional training.
Activity 4-5	A sample SOP concerning the water quality analyses for the 14 DFEAs is prepared in 5.
Activity 4-6	Each DFEA conducts necessary analyses based on the trainings.
Activity 4-7	Each DFEA prepares SOPs concerning necessary water quality analyses.
Activity 4-8	Each DFEA conducts necessary water quality analyses based on the SOPs.
Output 5	Capabilities concerning measurement of stack emissions (gases and particulate matter) are strengthened.
Activity 5-1	MSEA prepares stack emissions (gases and particulate matter) measurement training plan, and manages the implementations.
Activity 5-2	Stack emissions (gases and particulate matter) measurement trainings using portable stack emissions (gases and particulate matter) measurement equipment for the 14 DFEAs are conducted in 5 for regional training.
Activity 5-3	A SOP concerning the stack emissions (gases and particulate matter) measurement for the 14 DFEAs is prepared in 5 for regional training.
Activity 5-4	Each DFEA conducts necessary stack emissions (gases and particulate matter) measurement based on the SOP.
Output 6	Capabilities concerning evaluation of present conditions of water and air quality in each governorate are strengthened.
Activity 6-1	MSEA prepares a training plan of water quality interpretation / report preparation and interpretation of stationary emission sources of air pollution / report preparation, and manages the implementations.
Activity 6-2	Trainings for water quality interpretation / report preparation for the 14 DFEAs are conducted in 5 for regional training.
Activity 6-3	Each DFEA interprets present water quality situations based on the available water quality

No.	Contents
	data concerning the water quality pollution sources and the public water bodies.
Activity 6-4	Each DFEA prepares a report, which includes water pollution situations and water pollution maps on the governorate level.
Activity 6-5	Trainings for interpretation of stationary emission sources of air pollution/ report preparation for the 14 DFEAs are conducted in 5 for regional training.
Activity 6-6	Each DFEA interprets each stationary emission sources of air pollution.
Activity 6-7	Each DFEA prepares a report using reference data, which includes air pollution situations and air pollution maps on the governorate level.
Activity 6-8	Workshops are held by MSEA to share the present situations of water and air quality for DFEAs and other relevant authorities.
Output 7	Capabilities concerning formulation and implementation of environmental monitoring plan are strengthened.
Activity 7-1	MSEA prepares training plan of data interpretation and revising environmental monitoring plan, and manages the implementations.
Activity 7-2	Each DFEA identifies the technical issues of the present monitoring plan.
Activity 7-3	Trainings of monitoring data interpretation for the 14 DFEAs are conducted in 5 for regional training.
Activity 7-4	Trainings of revising environmental monitoring plan based on the monitoring data interpretation for the 14 DFEAs are conducted in 5 for regional training.
Activity 7-5	Each DFEA revises the present environmental monitoring plan.
Activity 7.6	MSEA evaluates the revised environmental monitoring plans by DFEAs, and provides the technical suggestions.
Activity 7.7	Each DFEA conducts environmental monitoring based on the revised environmental monitoring plan.

1.3 Approach of the Project

(1) Basic Approaches of the Project

The Project (Phase 2) was aimed at enhancing the technical capacity of MSEA and DFEAs for environmental measurement and analysis, of which basic technical skills had been acquired through the Phase 1 project. The concept of the Project was as shown below. By achieving the Project purpose, it is expected that MSEA and DFEAs will step toward the overall goal, meaning that MSEA and DFEAs should function as an environmental authority to command and control the pollution sources.



Concept of the Project (Phase 2) and Subsequence from Phase 1

Along with the implementation of the Project by MSEA and DFEAs, JET provided the technical transfer and instruction according to the following basic approaches:

Basic Approaches of the Project

Approach 1: JET supports MSEA and DFEAs to enhance the technical skills of environmental measurement and analysis by repetition of technique and expansion among DFEAs, such as heavy metal analysis acquired through Phase 1. JET also provides the technical instruction to improve and firm up the skills on chemical and biological analysis of water quality including introduction of authorized methods.

Approach 2: JET supports MSEA and DFEAs to enhance and expand the technology and tools effective for pollution control and environmental management, such as flue gas measurement technique, improvement of pollution source inventory, and strengthening of inspection capability.

Approach 3: JET supports MSEA and DFEAs to strengthen the capacity necessary as an environmental authority including, i) interpretation and evaluation of environmental data, ii) renewal of monitoring plan, iii) improvement of laboratory operation and maintenance (O&M), and iv) readiness for prospective actions of environmental information dissemination.

(2) Approaches to the Project Implementation

Regional Training at the Selected DFEAs

According to PDM and PO, MSEA together with JET provided the technical training for 14 DFEAs at five selected DFEAs regionally. Five DFEAs were selected based on regional zoning, and MSEA called the counterparts (C/Ps) from 14 DFEAs to the five selected DFEAs to provide the technical

training. The following table shows five selected DFEAs as well as target DFEAs zoned into the selected DFEAs, in due consideration of necessary space for training and transportation convenience. Regional trainings at five selected DFEAs were provided to C/Ps in a hands-on manner in laboratories. Field trainings were also provided at the sites or factories in the jurisdictional area of the five selected DFEAs.

Five Selected DFEAs for Regional Training (except Training of Heavy Metal Analysis)

Region	Selected DFEA	Target DFEAs to be Zoned and Called
North	Aleppo	Aleppo, Idleb
North-East	Dier Ezzor	Dier Ezzor, Hasakeh, Raqqa
Coastal	Tartous	Lattakia, Tartous
Central	Homs	Homs, Hama
South	Rural Damascus	Damascus, Rural Damascus, Dara'a, Sweida, Quneitra

On the other hand, MSEA together with JET provided the regional training at six selected DFEAs on heavy metal analysis by using Atomic Absorption Spectrophotometer (AAS), since the operational technique of AAS was rather dependent on the manufacturers and models of equipment. The following table shows the six selected DFEAs as well as the target DFEAs zoned into the selected DFEAs, in due consideration of transportation convenience and models of existing AAS available in DFEAs. However, during the course of the Project, some of the DFEAs installed an AAS which was different from the type of their selected DFEA's. Therefore, MSEA together with JET decided to conduct the training respectively when operation of AAS was required in the training.

Six Selected DFEAs for Regional Training of Heavy Metal Analysis by AAS

Region	Selected DFEA	Target DFEAs to be Zoned and Called	Model of AAS
North	Aleppo	Aleppo, Idleb	Analytik-jena
North-East	Dier Ezzor	Dier Ezzor, Raqqa	Hitachi Z2000
North-East 2	Hasakeh	Hasakeh	Shimadzu AA6800
Coastal	Tartous	Lattakia, Tartous	Shimadzu AA6800
Central	Hama	Hama, Homs	Hitachi Z2000
South	Rural Damascus	Damascus, Rural Damascus, Quneitra, Dara'a, Sweida	Shimadzu AA6800

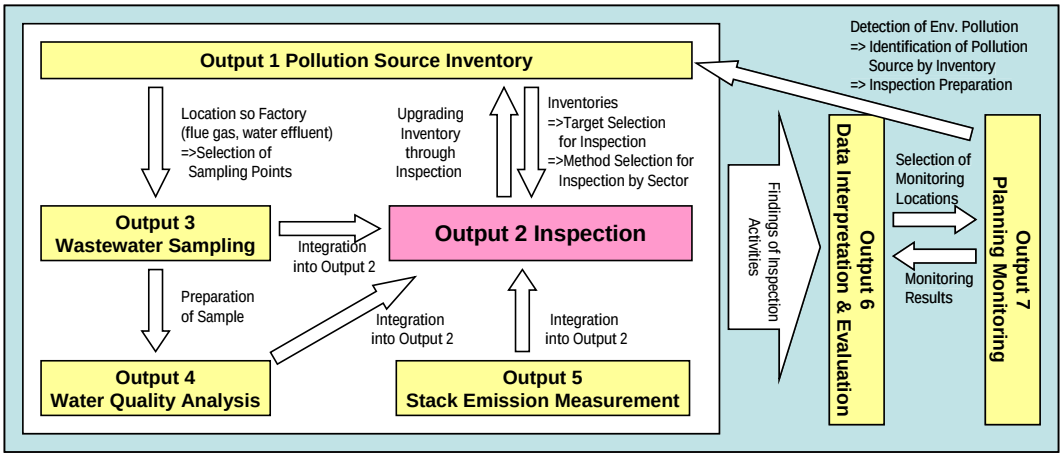
Initiative of MSEA for Enhancing OJT and Self-training Repetition by DFEAs

It was important for counterpart personnel of DFEAs to conduct self-training repetition including on-the-job training (OJT) in order to fix and develop the technical capability obtained through the regional training at the selected DFEAs. In this context, MSEA should have a function of unified administration to DFEAs, and JET supported and assisted MSEA to administrate the OJT and self-training repetition in DFEAs. MSEA monitored the progress and status of DFEAs' activities related to the Project jointly with JET.

Trainings were provided by MSEA and JET on a regional basis at the selected DFEAs as aforementioned, and other DFEAs were visited by MSEA and JET on an ad hoc basis for the purpose of checking the achievement of technical capability and providing the supplemental instruction. However, it was considered to be difficult for every Japanese expert to conduct full instruction training to all 14 DFEAs in its assigned specific technical topic due to the limited time in Syria, which was different from Phase 1. In case that MSEA and/or the representative Japanese expert had an occasion to visit DFEAs, observation and hearing/ discussion with C/Ps were made in order to monitor, i) the progress and status of OJT/ self-training repetition, and ii) extent of technical skills/capability. MSEA and JET provided supplemental instruction and advice necessary for DFEAs and C/Ps through line communication or ad-hoc visit, according to the observation abovementioned whenever possible.

Developing Capacity by Linking Each Output

In order to achieve the Project purpose "Capabilities of the DFEAs for implementing inspection and environmental monitoring concerning the water and air pollution sources are strengthened under the management by MSEA", it was essential for MSEA and DFEAs to conduct the Project activities by linking each of the seven outputs together as shown in the figure below.



Project Activity Concept with Linking of Each Output Together

(3) Approaches to the Project Operation

Sustainability and Self-dependency of the Project Achievements

It was important for MSEA and DFEAs to continue the monitoring and surveillance against the pollution sources sustainably and self-dependently after the Project completion, through expanding the Project achievements by MSEA & DFEAs themselves. Thus, MSEA and DFEAs will realize the overall goal such as pollution abatement and environmental improvement. In this context, MSEA and DFEAs were advised, as follows, in the course of Project activities, for sustainability and self-dependency of the Project achievements on the Syrian side, as preparedness for the post-Project.

- MSEA and DFEAs should foster the Project ownership and spontaneity on Syrian side, through internal public relations among C/Ps, sharing workshops (WS), and regular meetings, such as S/C and Technical Committee (T/C) meetings.
- MSEA and DFEAs should have appropriate maintenance of laboratories in the course of the training and Project activities, in order to contribute toward the sustainability of laboratory operation and function by receiving JET's advice. The instruction from JET included i) advice on inexpensive self-preparation of reagents, in due consideration of less budgetary loads of MSEA and DFEAs; ii) advice on planning the procurement of spare parts and renewal of laboratory equipment; iii) advice on laboratory O&M contributing to quality assurance and quality control (QA/QC); and, iv) advice on systemizing the laboratory O&M.
- MSEA and DFEAs were advised on the appropriate preparation and allocation of budget necessary for maintaining the laboratory function.

In order to sustain the Project achievements in the post-Project period, it was essential for C/Ps to: i) drive the Project activities continuously through conduct of OJT by themselves; and, ii) cultivate the technical skills and know-how obtained in a series of training. Considering the limited stay of JET in Syria, JET provided homework or self-teaching exercises to C/Ps during the period of its absence. In order to achieve the Project purpose and Outputs by the Syrian side, JET expected that: i) C/Ps did the homework and self-teaching exercises on their own initiative during the Japanese absence, and ii) the

top managers of MSEA and DFEAs administered aggressively the integration of the Project activities into the daily duties of C/Ps.

Project Administration by MSEA

It was essential for MSEA to strengthen its capacity as a central authority to administer the nationwide environmental management in Syria, so that DFEAs would reach the overall goal of the Project "enhancement of command & control toward the pollution sources" in the future through strengthening and improving the technical capability obtained in the Projects (Phase 1 and Phase 2). Therefore, MSEA was advised on strengthening its administrative capability, as follows:

- MSEA monitored and operated the progress/achievements of the Project activities jointly with JET. JET provided advices to MSEA whenever necessary for the Project operation, in order to realize the Project administration by MSEA toward DFEAs.
- MSEA had initiative for organizing and holding S/C, T/C and WS. In this context, JET provided the support for the Syrian side to vitalize the daily communication among top managers of MSEA, chief C/Ps of each Output, and JET.
- MSEA coordinated with other donors and projects concerned, while receiving JET's advice.

Promoting the Self-dependent Project Activities by C/Ps

In addition to strengthening the administration of MSEA toward the Project, it was essential for C/Ps of DFEAs to promote the Project activities self-dependently, in order to realize the overall goal of the Project (i.e., "enhancement of command & control toward the pollution sources in governorates") in the future. Thus, DFEAs and C/Ps were advised as follows:

- It was recommended that S/C, T/C and WS be opportunities for presenting the Project's progress and achievements by C/Ps themselves, in order to foster the ownership of the Project. JET supported C/Ps for presentation and explanation, and provided technical advices to the members/ participants of S/C, T/C, and WS.
- The internal public relations were considered to be important among MSEA, DFEAs and C/Ps by applying simple methods such as the frequent distribution of post cards (e.g., three or four times in a year) in order to encourage the Project ownership by the Syrian side. In addition, the capacity assessment was conducted by the top managers of MSEA and DFEAs to monitor the extent of developing the capacity of C/Ps.

For implementing the Project smoothly and obtaining the successful achievements of the Project, JET has shared mutual understanding with the Syrian side that the Project activities should be conducted as joint work with close cooperation between both sides.

1.4 Project Implementation Scheme

(1) Steering Committee (S/C) and Technical Committee (T/C)

In accordance with R/D, the S/C and T/C were established for the effective and successful implementation of the technical cooperation for the Project.

Steering Committee (S/C)

The S/C should have been held at least once a year and whenever necessity arose in order to fulfill the following functions. The chairperson of S/C was the Minister of MSEA. Its members are listed in the following table.

1) To formulate the annual operational work plan of the Project,

2) To review the result of the annual operational work plan and the progress of the Project;
3) To discuss the inter-ministerial matters arising in the course of the Project; and,
4) To review and exchange opinions on major issues that arise during the Project implementation.

List of Members of S/C

No.	Name	Position
Syrian side		
1	Dr Kawkab Dayeh	Minister of State for Environmental Affairs
2	Eng. Imad Hassoun	Deputy Minister of State for Environmental Affairs
3	Eng. Suleman Kalou	General Director of GCEA
4	Dr Wareef Al Yazgy	Director of Laboratories, MSEA
5	Eng. Wasim Fallouh	Representative of Ministry of Housing and Construction
6	Eng. Ali Abdul Malek	Representative of Ministry of Housing and Construction
7	Dr Khaldoun Karraz	Representative of Ministry of Transport
8	Dr Rola Daghestani	Representative of Ministry of Health
9	Chemist Amal Hasan	Representative of Ministry of Industry
10	Eng. Mahmoud Abdouni	Representative of Ministry of Irrigation
11	Eng. Mohammed Allouch	Representative of State Planning Commission
12	Dr Adnan Atfeh	Representative of Chamber of Industry in Damascus and Rural Damascus
Japanese side		
21	Kaoru Iwasaki	Chief Representative, JICA Syria Office
22	JICA Experts	JICA Expert Team (JET)

* Official(s) of the Embassy of Japan may attend the Committee sessions as observer(s).

Technical Committee (T/C)

In principle, T/C should have been held quarterly. The chairman of T/C was the General Director of GCEA (the Project Director), and the role of T/C is as follows. The members of T/C are listed in the following table.

1) To formulate the monthly operational work plan and contents of activities of the Project in line with the annual operational work plan of the Project;
2) To review the progress of the Project as well as the operational work plan;
3) To evaluate the achievement of the objectives; and,
4) To exchange views on issues arising from or in connection with the Project.

List of Members of T/C

No.	Name	Position
Syrian side		
1	Eng. Suleman Kalou	General Director, GCEA, MSEA
2	Dr Wareef Al Yazgy	Director of Laboratory, MSEA
3	Dr Maher Bouzo	Director, Damascus DFEA
4	Eng. Thaer Al-Daif	Director, Rural Damascus DFEA
5	Eng. Mohammad Said Naffous	Director, Aleppo DFEA
6	Eng. Adnan Al-Natour	Director, Homs DFEA
7	Chem. Ali Al-Jouaied	Director, Hama DFEA
8	Eng. Lama Ahmad	Director, Lattakia DFEA
9	Eng. Mohammad Amin Ramadan	Director, Dier Ezzor DFEA
10	Eng. Jomanah Hassan	Director, Idleb DFEA
11	Eng. Ra'eeifah Esber	Director, Hasakeh DFEA
12	Eng. Shamseh Al-Jassem	Director, Raqqa DFEA
13	Dr Mo'tasem Al-Abed	Director, Sweida DFEA
14	Eng. Ahmad Kablawi	Director, Dara'a DFEA
15	Eng. Hassan Morjan	Director, Tartous DFEA
16	Mr Hamza Suliman	Director, Quneitra DFEA
17	Dr Nader Ghazi	Director of Public Awareness, MSEA

No.	Name	Position
18	Eng. Haitham Nashawati	Director of Atmosphere Safety, MSEA
19	Eng. Reem Abed Rabboh	Director of Water Safety, MSEA
20	Eng. Manal Sakka	Director of EIA, MSEA
Japanese side		
21	Chief Representative, JICA Syria Office	
22	JICA Expert Team (JET)	

(2) Counterpart Personnel of the Syrian Side

C/Ps of the Syrian side were the MSEA and DFEAs of governorates. The names and positions of the C/Ps are listed below and in Attachment-2. Also, the laboratory staff of DFEA worked as C/P. The number of laboratory staff for each DFEA is also listed in the following table.

List of Members of the Counterpart Personnel

No.	Name	Position	Project Responsibility
GCEA, MSEA			
1	Mr Suleman Kalou	General Director	Project Director
2	Dr Wareef Al Yazgy	Director of Laboratory	Project Manager
3	Ms Samah Rislan	EIA Department	Chief counterpart for Output 1
4	Mr Bashar Daie’	EIA Department	Chief counterpart for Output 2
5	Ms Samar Al-Chami	Water Safety Department	Chief counterpart for Output 3
6	Ms Heba Salim Ms Amal Al Sahammas	Laboratory Department	Chief counterpart for Output 4
7	Ms Hakima Hawash	Air Quality Department	Chief counterpart for Output 5
8	Ms Safaa Naffaa	EIA Department	Chief counterpart for Output 6
9	Mr Ali Salameh	Laboratory Department	Chief counterpart for Output 7
DFEAs			
1	Dr Maher Bouzo	Director, Damascus DFEA	
2	Ms Reem Sadreddeen	Laboratory Chief, Damascus DFEA	
3	Mr Thaer Al-Deif	Director, Rural Damascus DFEA	
4	Ms Mona Al-Jomaa	Laboratory Chief, Rural Damascus DFEA	
5	Mr Mohammad Said Naffous	Director, Aleppo DFEA	
6	Mr Zakarya Al-Eisa	Laboratory Chief, Aleppo DFEA	
7	Mr Adnan Al-Natour	Director, Homs DFEA	
8	Ms Sana Mansour	Laboratory Chief, Homs DFEA	
9	Mr Ali Al-Jouaied	Director Hama DFEA	
10	Mr Samer Al-Maghoot	Laboratory Chief, Hama DFEA	
11	Ms Lama Ahmad	Director, Lattakia DFEA	
12	Mr Yamen Suleiman	Laboratory Chief, Lattakia DFEA	
13	Mr Mohammad Amin Ramadan	Director, Deir Ezzor DFEA	
14	Mr Saher Abdollaha	Laboratory Chief, Deir Ezzor DFEA	
15	Mr Jomanah Hassan	Director, Idleb DFEA	
16	Mr Mahmoud Tamer	Laboratory Chief, Idleb DFEA	
17	Ms Ra'eefah Esber	Director, Hasakeh DFEA	
18	Mr Nawaf Othman	Laboratory Chief, Hasakeh DFEA	
19	Ms Shamseh Al-Jassem	Director, Raqqa DFEA	
20	Mr Hassan Okla	Laboratory Chief, Raqqa DFEA	
21	Mr Mo’tasem Al-Abed	Director, Sweida DFEA	
22	Ms Omayma Al-Sha’ar	Laboratory Chief, Sweida DFEA	
23	Mr Ahmad Kablawi	Director, Dara’a DFEA	
24	Mr Mohammad Al-Hariri	Laboratory Chief, Dara’a DFEA	
25	Mr Hassan Morjan	Director, Tartous DFEA	
26	Ms Rodayna Al-Ali	Laboratory Chief, Tartous DFEA	
27	Mr Hmza Suleiman	Director, Quneitra DFEA	
28	Ms Thanaa Al-Mnizel	Laboratory Chief, Quneitra DFEA	

Number of Laboratory Staff in DFEAs

No.	DFEA	Number of staff
1	Damascus	15
2	Rural Damascus	8
3	Aleppo	15
4	Homs	15
5	Hama	11
6	Lattakia	10
7	Dier Ezzor	6
8	Idleb	15
9	Hasakah	3
10	Raqqa	4
11	Sweida	11
12	Dara'a	6
13	Tartous	10
14	Quneitra	2

(3) JICA Expert Team (JET)

The JET consists of seven members with eight positions as listed below. The assignment schedule for JET is shown in the following figure.

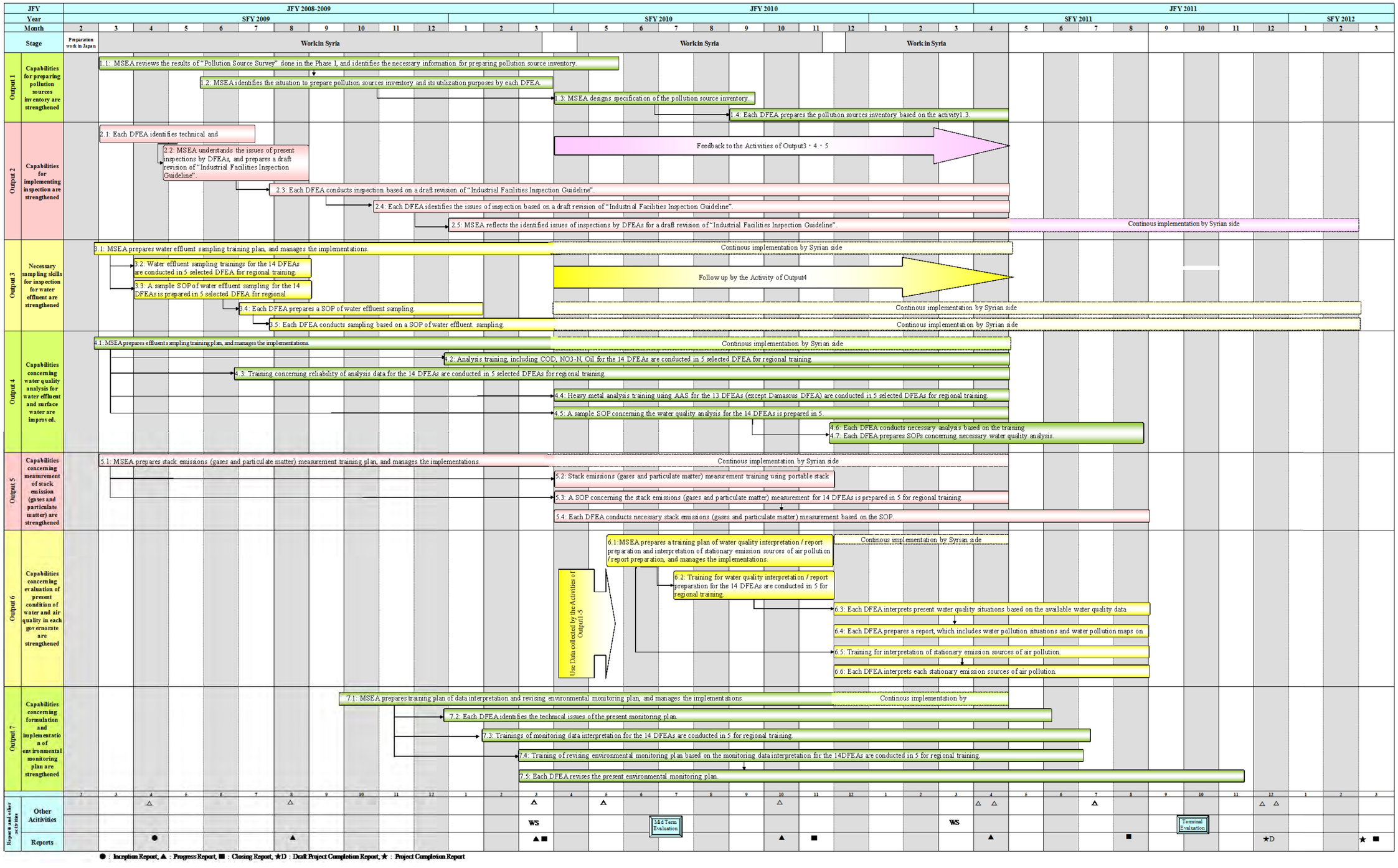
Japanese Expert Team

No.	Name	Position
1	Norihiko INOUE	Chief Advisor/ Environmental Analysis and Management
2	Keiichi TAKAHASHI	Deputy Chief Advisor / Inspection-1/ Pollution Inventory-1/ Data Interpretation-1
3	Ryunan MATSUE	Deputy Chief Advisor / Inspection-2
4	Shinsuke SATO	Pollution Inventory-2/ Monitoring
5	Kouji KIMURA	Water Analysis-1 (AAS)
6	Yoshiki YAMAMOTO	Water Analysis-2/ Data Interpretation-2/ Equipment/ Coordinator
7	Minoru HIRAO	Stack Emission Measurement

1.5 Overall Workflow of the Project

The Project was composed of seven main Outputs. In addition, the Project activities included procurement of machinery and equipment, training programs, workshops, and report preparation. The duration of the Project was three years and two months, which started in February 2009 and was terminated in March 2012. The overall work flow of the Project is shown in the following graph.

Noting that the Ministry of Foreign Affairs of Japan announced the advice of evacuation from Syria in April 2011 due to unexpected situation in its country from the beginning of 2011, the dispatch of JET to Syria was suspended from May 2011, and the suspension has been continued till the time of the Project completion in March 2012. Such situation brought about the condition of the Project implementation without JET members in Syria from May 2011 to March 2012, thus the activities originally planned in PDM and PO were not accomplished at the Project completion time. As described in Chapter 2 in detail, some of indicators among seven Outputs set in PDM were not achieved either.



Work Flow of the Project

CHAPTER 2 PROJECT ACHIEVEMENTS AND ACTIVITY RECORDS

2.1 Output 1: Strengthen Capabilities for Preparing Pollution Sources Inventory

2.1.1 Background Information

The word "inventory" is commonly defined in the field of environmental management and protection as "a list of itemized environmental issues that provides data and information to manage and control the environmental problems". There are diverse types of inventories according to end use, such as water pollution source inventory (PSI), air emission inventory, greenhouse gas inventory, etc. Among these, the Project takes up the inventory for water and air pollution sources. PSI is a kind of database focusing on pollution source where related data and information are compiled. It serves as one of the support tools for managing and controlling environmental problems. The objectives of PSI as a regulatory mechanism are:

1) To grasp basic information on pollution sources such as factories, which are objects of the regulation;
2) To conduct pollution source inspection more efficiently;
3) To identify the polluter when emergency level pollution occurs or an event of complaint arises; and
4) To conduct pollutant load analysis of water bodies for water quality management and to simulate air quality using the dispersion model for air quality management in the future.

2.1.2 Outline of Output 1

The PDM defines Output 1 to be attained, as follows:

Output 1: Capabilities for preparing pollution sources inventory are strengthened.

The capacity development defined in Output 1 was designed with four sequential activities. The following tables show the i) Revised Plan of Operation (PO) for Output 1, including the progress or expected schedule of each activity, and ii) details of activities.

Plan of Operation for Output 1

Joint implementation of JET and Syrian C/P | Continuous implementation by Syrian side | Canceled activities

Output 1: Pollution Sources Inventory			JFY 2008/2009 (SFY 2009: 3 4 5 6 7 8 9 10 11 12)	JFY 2010 (SFY 2010: 1 2 3 4 5 6 7 8 9 10 11 12)	JFY 2011 (SFY 2011: 1 2 3 4 5 6 7 8 9 10 11 12)	SFY 2012: 1 2 3	JICA Expert in Charge
1.1	MSEA reviews the results of "Pollution Source Survey" done in the Phase I, and identifies the necessary information for preparing pollution source inventory.	Plan					Takahashi Sato
		Actual & Expected					
1.2	MSEA identifies the situation to prepare pollution sources inventory and its utilization purposes by each DFEA.	Plan					Takahashi Sato
		Actual & Expected					
1.3	MSEA designs specification of the pollution source inventory.	Plan					Takahashi Sato
		Actual & Expected					
1.4	Each DFEA prepares the pollution sources inventory based on the activity1.3.	Plan					Takahashi Sato
		Actual & Expected					
Main	Takahashi (Air)						
Main	Sato (Water)						

As of December 2011

Details of Activities under Output 1

Activities of C/P Side	Technical Supports to be Provided by the JET	Target C/P
MSEA reviews the results of "Pollution Sources Survey" done in the Phase1.	(2009) - Joint work with MSEA for reviewing the results of "Pollution Sources Survey" done in Phase1. - Joint work with MSEA for identifying information of major air/water pollution sources from "Pollution Sources Survey". - JET assigned a homework for each DFEA to arrange data of pollution sources after the first lecture training	MSEA
MSEA identifies the necessary information for preparing pollution sources inventory.	(2009) - Supporting MSEA in collecting pollution source information from the Ministry of Industry, Ministry of Irrigation and Chambers of Industry. - JET conducted lecture trainings twice up to March 2010 for the development of PSI of water	MSEA 14 DFEAs
MSEA identifies the situations to prepare pollution sources inventory and its utilization purposes by each MSEA	(2009) - Joint work with MSEA for studying existing pollution source inventory and its utilization purposes by each DFEA - Joint visit to each DFEA if at all possible, because the first research is important. - JET made indications to all DFEAs in May 2010 to implement the tasks required for the development of PSI of water after the second lecture training	MSEA Survey target: 14 DFEAs
MSEA designs specification of the pollution sources inventory.	(2010) - Supporting MSEA in designing specification on air/water pollution sources inventory, referring to DFEAs opinions.	MSEA
Each DFEA prepares the pollution sources inventory, based on specification abovementioned.	(2010) - Supporting DFEAs in the preparation of pollution sources inventory, based on specification designed above. - Preparing training plan for effective support. - Training for preparation of pollution source inventory based on training plan. (2011 to 2012) - Training on how to plot Global Positioning System (GPS) information on the map and compilation of pollution source inventory.	Regional training in 5 selected DFEAs (Deir Ezzor, Aleppo, Tartous, Homs, Rural Damascus) for 14 DFEAs

2.1.3 Activity Achievement

(1) Activity 1-1: MSEA reviews the results of "Pollution Sources Survey" done in Phase 1, and identifies the necessary information for preparing PSI.

The chief C/P in MSEA, together with the JET, reviewed the results of "Pollution Sources Survey" done in Phase 1, and found that there were no information about air pollution sources.

During the review on water pollution sources conducted in Phase 1, it was found that the results of the survey contained some useful data and information such as type and locations of pollution sources, which could be utilized for the development of PSI related to water pollution sources. These data and information included in the "Pollution Sources Survey" were reviewed in detail considering the current situations of pollution sources for the development of pollution source inventory.

(2) Activity 1-2: MSEA identifies the situations to prepare pollution sources inventory and its utilization purposes by each DFEA.

The chief C/P, together with the JET, had checked the situations of pollution sources inventory on air pollution at each DFEA. Consequently, they found that there was no pollution sources inventory on air pollution, and that some data related to water pollution sources could be integrated to water pollution sources inventory in each DFEA.

(3) Activity 1-3: MSEA designs specification of the pollution sources inventory.

Almost half of Activity 1-3 was achieved through lecture training and OJT mentioned below.

In parallel with these two sequence of activities, JET explained "what pollution source inventory is" and the "necessity of preparation of questionnaires for site survey". JET also introduced the

"spreadsheet format" including the benefits of preparing pollution source inventory, because it was the first time for participants to gain knowlege on inventory. The lecture training and OJT under Output 1 were conducted separately for water and air pollution. Details of the trainings are as follows:

(I) Pollution Source Inventory for Water Pollution

According to the PO mentioned above, lecture trainings were implemented five times from October 2009 to April 2011. All materials used for the trainings are attached in Annex. Contents of activities are shown below:

1) First Training (October – November, 2009)

a) Outline of the training activities

Lecture trainings on "water pollution source inventory" had been implemented by the JICA expert. The lecture mainly focused on the explanation of concept of the pollution source inventory of water, so as to make the attendants understand the concepts of PSI. The following summarizes the contents and the schedule of the trainings.

Summary of First Lecture Training for PSI on Water

Date	DFEAs Targeted	Venue	Contents	Number of Attendees
Oct. 27, '09 (Tue)	DAMR DAM DAR SWD QNT	DAM DFEA	Introduction of the concept of pollution source inventory (PSI) Outline of process and procedures for development of PSI Meaning and significance of collection of data/information for development of PSI Strategies and methods of collection of data/information for development of PSI Necessity of preparation of questionnaires for site survey Spreadsheet format and entering of data/information on the spreadsheet Handling and processing of the spreadsheet Necessity of implementation of QC Leaving a homework for each DFEA for next training (Classification and sorting of monitoring data accumulated up to present, Listing up of pollution sources, Classification and prioritization of pollution sources, etc.)(Note 1) On-the-spot observation of laboratories	DAMR: 2 DAM: 6 DAR: absent SWD: 3 QNT: absent
Oct. 29, '09 (Thu)	HOM HAM	HOM DFEA	(Ditto)	HOM: 7 HAM: 9
Nov. 2, '09 (Mon)	DRZ HSK RAK	DRZ DFEA	(Ditto)	DRZ: 14 HSK: 4 RAK 2
Nov. 3, '09 (Tue)	ALP IDL	ALP DFEA	(Ditto)	ALP: 10 IDL: 3
Nov. 5, '09 (Thu)	TAR LTK	TAR DFEA	(Ditto)	TAR: 12 LTK: 2
Nov. 9, '09 ((Mon)	DAR	DAR DFEA	(Ditto)	DAR: 6 (Supplementary training)
Nov. 9, '09 (Mon)	QNT	QNT DFEA	(Ditto)	QNT: 2 (Supplementary training)

b) Homework

In order to secure sustainability of the training, as well as to strengthen its effectiveness, and for the convenience of conducting the second training from February to March 2010, homework was assigned to all DFEAs. Contents of the homework are shown in the table below:

Contents of Homework for the Second Training

● **Objectives of the homework**
Objectives of the homework are to review the monitoring data accumulated up to present at each DFEA, and to list up, classify, and prioritize the pollution sources for the development of a pollution source inventory in the next step. Therefore, the results of the homework will be utilized as the basis of development of the pollution source inventory.
● **Tasks to be implemented in the homework**
Following tasks should be implemented in each DFEA for the homework: 1. Review and confirmation of current states of monitoring data, 2. Listing up of pollution sources, 3. Classification of pollution sources by industrial sector, scale, number of worker, area, etc. 4. Prioritization of pollution sources by importance/impact on the environment, and 5. Selection of pollution sources to be targeted for development of a pollution source inventory.
● **Duration of the homework**
From the end of October 2009 or the beginning of November 2009 to the middle of February 2010. (After the lecture training conducted at the 5 central training DFEAs until the next arrival of JICA expert)
● **Report to MSEA**
Progress and the results of the homework should be reported to the person in charge of Output 1 in MSEA at appropriate timing.

2) Second Training (February – March, 2010)

a) Review of the results of homework

Prior to the beginning of the second lecture training, the results of the homework submitted to MSEA were reviewed. Among 14 DFEAs, seven[1] have submitted their homework to the MSEA by the end of February 2010. Said DFEAs listed up and summarized the main sources of water pollution in their areas. Results of the submitted homework were utilized in the second training.

b) Outline of the training activities

The lecture trainings on PSI on water were followed by second lecture trainings. After the review of concepts of PSI, the procedure and process of developing the PSI, especially tasks required for the preparatory work for the development of the PSI, were explained by JET. Table below summarizes the contents and schedule of the trainings.

[1] DFEA of ALP, DRA, DRZ, HAM, HSK, IDL, LTK

Summary of Second Lecture Training for PSI on Water

Date	DFEAs Targeted	Venue	Contents	Number of Attendees
Feb. 28, '10 (Sun)	DRZ HSK RAQ	DRZ DFEA	Review of concepts of PSI Definition of PSI Meaning and significance of PSI Function and role of PSI for water quality management/control Process and procedure of developing PSI Format of the spreadsheet Definition of the scope of PSI Review of the homework	DRZ: 7 HSK: 2 RAQ: 1
Mar. 01, '10 (Mon)	ALP IDL	ALP DFEA	(Ditto)	ALP: 5 IDL: 2
Mar. 03, '10 (Wed)	TAR LTK	TAR DFEA	(Ditto)	TAR: 10 LTK: 3
Mar. 04, '10 (Thu)	HOM HAM	HOM DFEA	(Ditto)	HOM: 10 HAM: 4
Mar. 10, '10 (Wed)	RDAM DAM DAR SWD QNT	Governorate Office of DAMR	(Ditto)	RDAM: 5 DAM: 4 DAR: 1 SWD: 4 QNT: 1

The second lecture trainings conducted during the above period focused on the preparatory work for preparing and developing the PSI. The main tasks of the preparatory work contained the definition of scope of PSI, finalization of the format of spreadsheet, and so on. In order to conduct the preparatory work continuously based on the lecture, the following subjects were given to all DFEAs by the JICA expert as information for the next training:

- Finalization of the format of spreadsheet,
- Definition of the scope of PSI including clarification of the end use of PSI,
- Codification of industrial-sector using Standard Industrial Classification (SIC),
- Making of naming rule of area classification and codification of areas.

3) Third Training (May 2010)

Concerning Output 1, the third lecture trainings had been conducted in MSEA and in five regional DFEAs. The lecture mainly focused on how to develop or prepare the PSI concretely based on the previous second trainings. The following summarizes the contents and schedule of the trainings:

Summary of Third Lecture Training for PSI on Water

Date	DFEAs Targeted	Venue	Contents	Number of Attendees
May 10 and 11, '10 (Mon, Tue)	DAM DAMR, SWD, DAR, QNT	DAM DFEA	Review of concepts of PSI Relationship between PSI and water quality monitoring Finalization of format of PSI Clarification of scope of PSI Confirmation of data/info sources Listing up of discharge sources Codification/digitization of information Data/info entry into PSI Confirmation of insufficient data/info Required works to complete the PSI	DAM: 8 DAMR: 4 SWD: 2 DAR: 4 QNT: 1
May 12 '10 (Wed)	HOM HAM	HOM DFEA	(Ditto)	HOM: 8 HAM: 10
May 13, '10 (Thu)	MSEA	MSEA	(Ditto)	MSEA: 7
May 16, '10 (Sun)	DRZ HSK RAQ	DRZ DFEA	(Ditto)	DRZ: 4 HSK: 1 RAQ: 1
May 17, '10 (Mon)	ALP IDR	ALP DFEA	(Ditto)	ALP: 5 IDL: 4
May 19, '10 (Wed)	TAR LTK	TAR DFEA	(Ditto)	TAR: 16 LTK: 3

As mentioned above, the third lecture trainings conducted during said period focused mainly on how to develop the PSI concretely. Followed by the review of the concept of PSI explained in the previous training, the spreadsheed format of PSI had been finalized. Using the finalized PSI format, procedures and/or methods on how to develop the PSI were explained such as the scope of PSI, data elements to be inventoried, significance and necessity of data digitization, etc. In order to complete the format in the next stage based on the lecture, the following subjects were given by JET to all DFEAs as homework for the next training:

- Definition of the scope of PSI,
- Completion of the pollution source list, and
- Data/information entry to the spreadsheet.

4) Fourth Training (October - November, 2010)

Based on the results of the homework given to the DFEAs by JET in the third training, development of PSI had been continuously conducted. The training mainly focused on how to complete the scope of PSI and the list of pollution sources, and how to enter data and information on the PSI spreadsheet. The table below summarizes the contents and schedule of the trainings.

Summary of Fourth Lecture Training for PSI on Water

Date	DFEAs Targeted	Venue	Contents	Number of Attendees
Oct. 25, '10 (Mon)	DAM DAR SWD	DAM DFEA	• Confirmation and review of the homework given at the 3rd training • How to complete the scope of PSI • How to complete the list of pollution sources • How to enter data and information on the PSI spreadsheet • Necessity of review of number of the current monitoring stations • Confirmation of the scheme of current national environmental monitoring • Monitoring cycle • Relationship between environmental monitoring, factory inspection and PSI • Purposes of water quality monitoring • Monitoring objectives • Items to be studied for preparation of environmental monitoring plan • Types of monitoring • Function of monitoring • Results of monitoring • Items to be studied for planning monitoring plan • Homework to be done by next training	DAM: 7 DAR: 3 SWD: 7
Oct. 26, '10 (Tue)	DAMR QNT DAM	DAM DFEA	(Ditto)	DAMR: 4 QNT:1
Oct. 27, '10 (Tue)	HOM HAM	HOM DFEA	(Ditto)	HOM: 6 HAM: 13
Nov. 01, '10 (Mon)	DRZ HSK RAQ	DRZ DFEA	(Ditto)	DRZ: 9 HSK: 1 RAQ: 0
Nov. 02, '10 (Tue)	ALP IDL	ALP DFEA	(Ditto)	ALP: 10 IDL: 2
Nov. 04, '10 (Thu)	TAR LTK	TAR DFEA	(Ditto)	TAR: 12 LTK: 3

In order to commence entry of data and information on the PSI in the next stage, some subjects concerning the development of PSI were given to the DFEAs by the JICA expert as homework for the next training:

- Completion of the format of scope of PSI,
- Development of the pollution source list,
- Commencement of data/information entry to the spreadsheet, and
- Definition of the scheme of monitoring.

5) Fifth Training (January 2011)

The fifth training had been conducted based on the results of the homework given to the DFEAs by the JICA expert in the previous fourth training. Review of the homework results revealed that knowledge was not attainted sufficiently with respect to encoding data and information on PSI. Reflecting these situations, trainings shown in the table below had been conducted to prepare the PSI.

Summary of Fifth Lecture Training for PSI on Water

Date	DFEAs Targeted	Venue	Contents	Number of Attendees
Jan. 11, '11 (Tue)	HOM HAM	HOM DFEA	• Confirmation and review of the homework given at the 4th training • Explanation and guidance on how to complete the pollution source list in line with the results of the homework • Meaning and significance of the linkage between PSI, the factory inspection and the environmental monitoring • Review and guidance on the scheme of the environmental monitoring • Necessity of clear definition of jurisdictional arrangement for the environment-related activities among the concerned organization/agencies • Number of monitoring stations by the type of monitoring activities • Tasks to be done by each DFEA until the next training	HOM: 4 HAM: 11
Jan. 12, '11 (Wed)	DAMR QNT	DAM DFEA	(Ditto)	DAMR: 3 QNT: 1
Jan. 13, '11 (Thu)	DAM DAR SWD	DAM DFEA	(Ditto)	DAM: 4 DAR: 3 SWD: 6
Jan. 16, '11 (Sun)	DRZ RAQ	DRZ DFEA	(Ditto)	DRZ: 14 RAQ: 3
Jan. 17, '11 (Mon)	HSK	HSK DFEA	(Ditto)	HSK: 6
Jan. 18, '11 (Tue)	ALP IDL	ALP DFEA	(Ditto)	ALP: 4 IDL: 2
Jan. 19, '11 (Wed)	TAR LTK	TAR DFEA	(Ditto)	TAR: 15 LTK: 5
Jan. 23, '11	MSEA	MSEA	• Progress of the training for Output 1 & 7 • Significance of understanding of the linkage between PSI, FIP and EMP • Meanings of preparation of the pollution source list in the procedures of development of PSI • Demarcation of role and responsibility for the monitoring related activities • Actions to be taken by MSEA for the preparation of environmental monitoring plan	MSEA: 5

6) Sixth Training (March - April, 2011)

Prior to the finalization of the PSI spreadsheet, arrangement and provision of data and information to be entered were required. In order to carry out these tasks, trainings on how to complete the pollution source tables, which contained the name of pollution sources, type and classification of industry, location of pollution sources, etc, clear definition of the objectives of PSI and so on, were conducted during the previous trainings. Based on the results of prior trainings, sixth training session was conducted. The trainings focused on how to develop PSIs concretely in connection with the objectives of PSI defined and the pollution source tables prepared in the previous trainings. The table below summarizes the trainings carried out in this term.

Summary of Sixth Training for PSI on Water

Date	DFEAs Targeted	Venue	Contents	Number of Attendees
Mar. 30, '11 (Wed) and Apr. 07, '11	DAM	DAM DFEA	• Confirmation of the current monitoring activities conducted in the DFEA (stationary monitoring station and public area water pollution monitoring) • Review of the progress of preparation of pollution source list • Explanation of the relationship between the PSI, the factory inspection, and environmental monitoring • Instructions to finalize the pollution source list including prioritization of pollution sources listed up • Review of the scheme of environmental monitoring • Instruction to finalize the scheme of environmental monitoring	DAM: 5 (Mar. 30) DAM: 5 (Apr. 07)
Mar. 31, '11 (Thu)	SWD	SWD DFEA	(Ditto)	SWD: 3
Apr. 05, '11 (Tue) and Apr. 07, '11 (Thu)	DAMR	DAMR DFEA	(Ditto)	DAMR: 5 (Apr. 05) DAMR: 5 (Apr. 07)
Apr. 11, '11 (Mon)	TAR	TAR DFEA	(Ditto)	TAR: 12
Apr. 12, '11 (Tue)	HAM	HAM DFEA	(Ditto)	HAM: 13
Apr. 13, '11 (Wed)	IDL	IDL DFEA	(Ditto)	IDL: 4
Apr., 14, '11 (Thu)	ALP	ALP DFEA	(Ditto)	ALP: 11

(3) PSI on Air Pollution

The lecture trainings and OJTs were conducted six times from November 2009 to March 2011. Contents of activities are shown below:

1) First Training (November 2009)

Lecture training on "air pollution source inventory" was conducted in November 2009. It mainly focused on the explanation of introduction to air PSI, which showed types of source such as point source (stack in the factory), area source (residential heating), and mobile source (vehicle), and "how to calculate SO_2 emission amounts from fuel consumption and sulfur content".

Summary of First Lecture Training for Air PSI (November 2009)

Date	DFEAs Targeted	Venue	Contents	Number of Attendees
Nov. 1, '09 (Sun)	DRZ HSK RAQ	DRZ DFEA	- Definition of pollution source inventory - Type of inventories - Preparation of inventory - Emission inventory by type of sources (Point sources, Area sources, Mobile sources) - Scope of emission inventory -Approach (Flue gas measurement, Material balance, Emission factor, Surveys and questionnaires) - Example of emission inventory	DRZ: 11 HSK: 2 RAQ: absent
Nov. 2 '09 (Mon)	RDAM DAM DAR SWD QNT	DAM DFEA	(Ditto)	RDAM: absent DAM: 5 DAR: absent SWD: 3 QNT: absent
Nov. 3, '09 (Tue)	HOM HAM	HOM DFEA	(Ditto)	HOM: 11 HAM: 4
Nov. 4, '09 (Wed)	TAR LTK	TAR DFEA	(Ditto)	TAR: 12 LTK: absent
Nov. , '09 (Thu)	ALP IDL	ALP DFEA	(Ditto)	ALP: 16 IDL: 1

2) Second Training (February 2010)

Lecture and OJT on "how to use GPS for air PSI" was conducted in February 2010. It mainly focused on the introduction of GPS device and its usage with Google Earth. Each trainee used one GPS and marked a position outside the lecture room with JET's instruction. After returning to the lecture room, everyone connected the GPS to the laptop computer and imported the position data of latitude and longitude to Google Earth to see marked position on the satellite map. GPS usage in inventory shall apply not only to air pollution inventory but also water pollution inventory.

"How to use GPS" feild training

Summary of Second Lecture and OJT on Using GPS for Air PSI (February 2010)

Date	DFEAs Targeted	Venue	Contents	Number of Attendees
Feb. 18, '10 (Thu)	ALP IDL	ALP DFEA	- GPS for inventory/field inspection - How to use GPS for inventory/field inspection. - (1. Import "Waypoints" to Google Earth. 2. Start "Google Earth", 3.Connect GPS to PC by USB, 4.Tool→ GPS on "Google Earth") - GPS points on an industrial facility - Example of emission inventory (Air)	ALP: 11 IDL: absent
Feb. 21, '10 (Sun)	DRZ HSK RAQ	DRZ DFEA	(Ditto)	DRZ: 4 HSK: 2 RAQ: 1
Feb.22, '10 (Mon)	RDAM DAM DAR SWD QNT	Rural Damascus Govnorate Build.	(Ditto)	RDAM: 6 DAM: absent DAR: absent SWD: 3 QNT: 1 JICA: 1
Feb. 23, '10 (Tue)	HOM	HOM DFEA	(Ditto)	HOM: 15
Feb. 23, '10 (Tue)	HAM	HAM DFEA	(Ditto)	HAM: 14 MSEA: 1
Feb. 24, '10 (Wed)	TAR LTK	TAR DFEA	(Ditto)	TAR: 17 LTK: 3 MSEA:1

3) Third Training (July 2010)

Lecture training on air PSI was conducted in July 2010. It mainly focused on the specifications for air pollution inventory, namely: basic information about factory and facility, sector of the factory, fuel information and consumption, GPS latitude, longitude information, stack information, concentration of pollutants, importance of O_2 concentration and its measurement, and operation pattern. One of the most important matters is the target sector of the industry. Five industrial sectors were selected as the main target, namely: cement, power plant, steel, refinery and fertilizer. Additionally, examples of air PSI in excel format and the list of target factories were presented during the lecture. The contents and schedule of the trainings are summarized below.

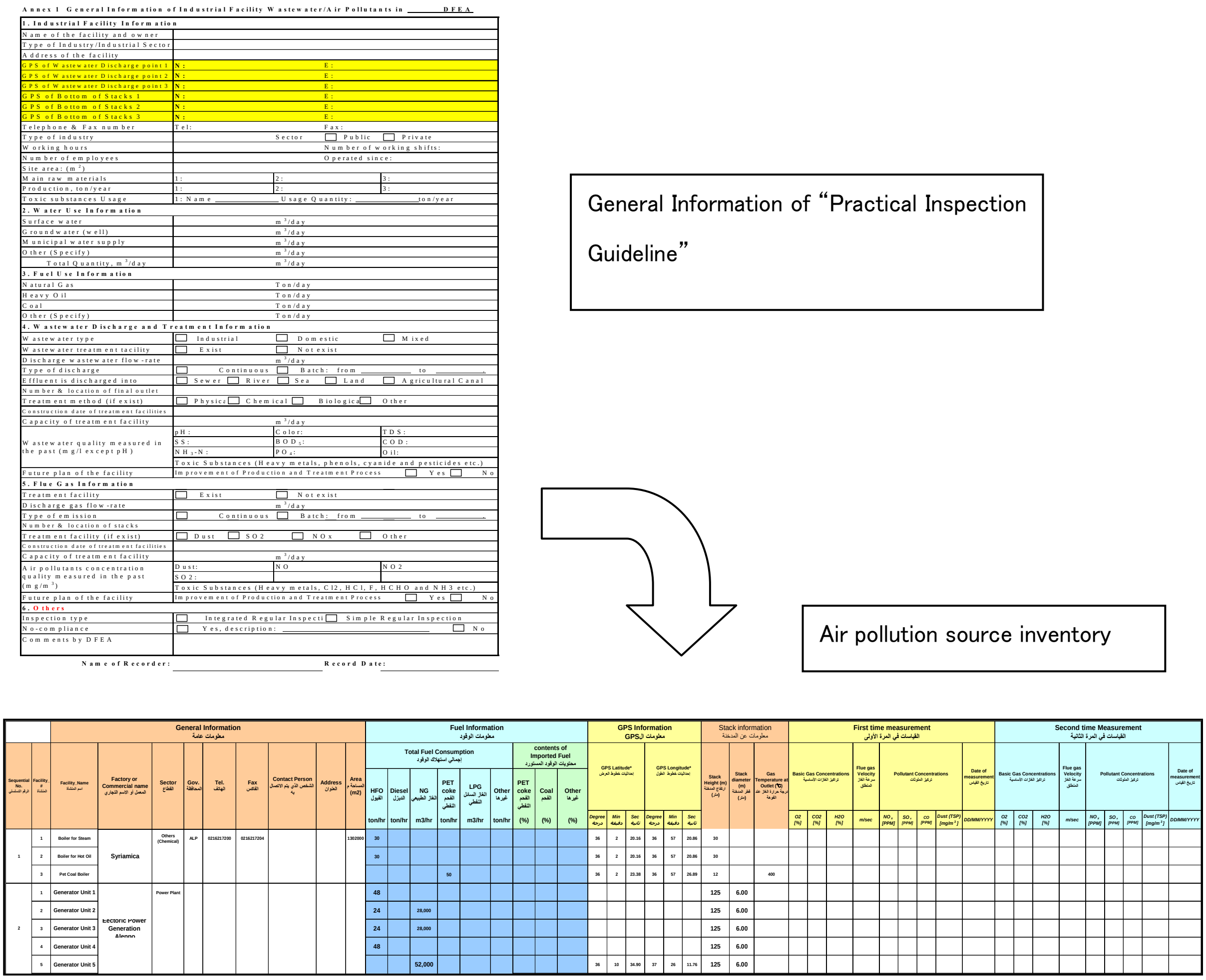
Summary of Third Lecture Training for Air PSI (July 2010)

Date	DFEAs Targeted	Venue	Contents	Number of Attendees
Jul.11, '10 (Sun)	DRZ HSK RAQ	DRZ DFEA	-Specification of air pollution source inventory - Basic information of factory and facility - Sector of factory - Fuel information (Consumption) - GPS latitude, longitude information - Stack information -Concentration of pollutants from measurement - Importance of O_2 concentration and measurement - Operation pattern - Comment - Example of air pollution source inventory - List of target factories	DRZ: 5 HSK: absent RAQ: absent
Jul.12 '10 (Mon)	RDAM DAM DAR SWD QNT	DAM DFEA	(Ditto)	RDAM: 3 DAM: 9 DAR: absent SWD: 3 QNT: 1
Jul.13, '10 (Tue)	HOM HAM	HOM DFEA	(Ditto)	HOM: 6 HAM: 7
Jul.14, '10 (Wed)	TAR LTK	TAR DFEA	(Ditto)	TAR: 17 LTK: 2
Jul.15, '10 (Thu)	ALP IDL	ALP DFEA	(Ditto)	ALP: 9 IDL: 1

4) Fourth Training (September and October, 2010)

OJT on filling in general information sheet for air PSI and on how to measure the height of stack was conducted at factories in each DFEA, from September to October 2010. It mainly focused on filling in general information sheet (Practical Guideline Annex 1).

Additionally, method of measuring the height of stack using crynometer was introduced to participants. Furthermore, practical use of GPS was demonstrated during the OJT. C/Ps and JET visited factories together and conducted interviews with persons in charge of environmental matters in order to fill up the sheet.



Procedure for Collecting General Information for Air PSI

Summary of OJT on How to Fill in General Information Sheet of Air PSI (September and October, 2010)

Date	DFEAs Targeted	Venue	Contents	Number of Attendees
Sep.23, '10 (Thu)	QNT	Factories in QNT and QNT DFEA	- Industrial facility information - Water use information - Fuel use information - Fuel information (Consumption) -Wastewater discharge and treatment information - Flue gas information - Stack information - Others - How to measure the height of stack - Actual use of GPS to input stack position to the memory - Review of lecture in July	QNT: 4
Sep.26, '10 (Sun)	DAR	Factories in DAR and DAR DFEA	(Ditto)	DAR: 2
Sep.27, '10 (Mon)	HAM	Factories in HAM and HAM DFEA	(Ditto)	HAM: 6
Sep.28, '10 (Tue)	TAR	Factories in TAR	(Ditto)	TAR: 10
Sep.29, '10 (Wed)	LTK	Factories in LTK	(Ditto)	LTK: 3
Sep.30, '10 (Thu)	IDL	Factories in IDL	(Ditto)	IDL: 4
Oct.03, '10 (Sun)	HOM	Factories in HOM	(Ditto)	HOM: 5
Oct.04, '10 (Sun)	DAM	Factories in DAM	(Ditto)	DAM: 4
Oct.05, '10 (Sun)	DAMR	Factories in DAMR	(Ditto)	DAMR: 6
Oct.07, '10 (Sun)	SWD	Factories in SWD	(Ditto)	SWD: 6
Oct.10, '10 (Sun)	DRZ	Factories in DRZ	(Ditto)	DRZ: 5
Oct.11, '10 (Sun)	HSK	Factories in HSK	(Ditto) -How to calculate SO_2 concentration from gas velocity and sulfur contents theoretically.	HSK: 4
Oct.12, '10 (Sun)	RAQ	Factories in RAQ	(Ditto)	RAQ: 2
Oct.13, '10 (Sun)	ALP	Factories in ALP	(Ditto)	ALP: 4

5) Fifth Training (December 2010)

In December 2010, JET carried out lectures and OJT on filling up general information on air PSI using actual data collected during the OJT in October and November 2010. At first, JET and C/Ps reviewed the recorded actual information sheet/general information of DFEAs and, together with the attendees, inputted these to the final version of the air PSI in excel sheets. Then, JET pointed out the input data to be corrected, and modify them accordingly as demonstrated on the projector screen. JET showed the list of sulfur content by type of fuel available in Syria, and emphasized the importance of collecting data on fuel type and consumption.

Summary of Fifth Lecture Training and OJT on Air PSI (December 2010)

Date	DFEAs Targeted	Venue	Contents	Number of Attendees
Dec.14, '10 (Tue)	TAR LTK	TAR DFEA	- Reviewing recorded actual information sheet (general information) of each attending DFEA with C/Ps. - Instruction of inputting information to air PSI correctly. - Correcting data on air PSI together with C/Ps on the projector screen. - Confirmation of sulfur contents by type of fuel in Syria.	TAR: 10 LTK: 5
Dec.15, '10 (Wed)	ALP IDL	ALP DFEA	(Ditto)	ALP: 8 IDL: 2
Dec.16, '10 (Thu)	HOM HAM	HOM DFEA	(Ditto)	HOM: 5 HAM: 10
Dec.20, '10 (Mon)	DRZ HSK RAQ	DRZ DFEA	(Ditto)	DRZ: 6 HSK: 1 RAQ: 1
Dec.21 '10 (Tue)	QNT DAR SWD	MSEA	(Ditto)	QNT: 2 DAR: 4 SWD: 1
Dec.22, '10 (Thu)	DAM DAMR	MSEA	(Ditto)	DAM: 2 DAMR: 9

6) Sixth Training (March 2011)

In March 2011, JET carried out lecture training on "specification for air pollution sources inventory (APSI Specification Book)". This handbook covered air PSI review and wrap-up trainings since November 2009, including the following contents: 1) target factory/sector of air PSI, 2) method of data collection, 3) emission standard of air pollutants (conversion of temperature to 0^{o}C), 4) contents/specification of air PSI sheet, 5) advantage of GPS device, 6) measurement of stack height, and 7) calculation of SO_2 concentration from general information. The most updated version of air PSI, which contained the results of Output 5 (stack emission measurement), was explained and distributed to all DFEAs. Each DFEA started updating the air PSI. The training schedule and contents are summarized in the following table, and the list of attendees are compiled in Annex.

Summary of Sixth Lecture Training and OJT on Air PSI (March 2011)

Date	DFEAs Targeted	Venue	Contents	Number of Attendees
Mar. 1, '11 (Tue)	HAM	HAM DFEA	- Target factory/sector of air PSI - Method of data collection - Emission standard of air pollutants (conversion of temperature to 0^{o}C) - Contents/specification of air PSI sheet - Advantage of GPS device - Measurement of stack height - Calculation of SO_2 concentration from general information - Most updated version of air PSI	HAM: 13
Mar. 2, '11 (Wed)	ALP IDL	ALP DFEA	(Ditto)	ALP: 8 IDL: 3
Mar. 3, '11 (Thu)	HOM	HOM DFEA	(Ditto)	HOM: 8
Mar. 7, '11 (Mon)	DAR QNT	MSEA	(Ditto)	DAR: 6 QNT: 2
Mar. 9 '11 (Wed)	DAM DAMR SWD MSEA	MSEA	(Ditto)	DAM: 2 DAMR: 9 SWD: 8 MSEA: 2
Mar. 10, '10 (Thu)	TAR LTK	MSEA	(Ditto)	TAR: 20 LTK: 7
Mar. 13, '11 (Sun)	DRZ RAQ HSK	DRZ DFEA	(Ditto)	DRZ: 12 RAQ: 2 HSK: 2

(4) Activity 1.4: Each DFEA prepares the pollution sources inventory, based on the Activity 1.3.

1) Wastewater Pollution PSI

As a result of Activity 1.3, the format of PSI was finalized as mentioned. In order to develop the PSI smoothly and effectively, JET assigned homeworks to all DFEAs at the end of May 2010. Contents of the homework are shown in the previous section for Activity 1.3. After reviewing the results of the homework, development of the PSI started at the end of October 2010.

2) Air Pollution PSI

In Activity 1.3, specification on air pollution inventory was finalized in July 2010, and air PSI specification book was distributed in March 2011. Each DFEA commenced preparation of the air PSI and continued updating the data since July 2010. In spite of the difficult situations of Syria, some DFEAs visited factories, which were considered as big polluters, and updated the air PSI up to July 2011.

This activity was planned to be implemented continuously until the end of the the Project.

2.1.4 Products of Activities

The products of activities related to Output 1 are summarized in the table below. The details of products of activities are attached in the Annex.

List of Products ofActivities

No.	Products of Activities	Remarks
1	Specifications for design of inventory of water pollution sources (first version)	Prepared by JET and MSEA
2	Specification for air pollution sources inventory	Prepared by JET and MSEA
3	Water pollution sources inventory in each DFEA	Prepared by each DFEA and JET
4	Air pollution sources inventory in each DFEA	Prepared by each DFEA and JET
5	General information of industrial facility wastewater/air pollutants	Prepared by each DFEA

2.1.5 Achievements of Output 1

(1) Achievements with PDM Indicators

1) Evaluation of Output 1

Output 1 has been evaluated based on one indicator set in PDM.

<Indicator 1-1> The proper pollution sources inventory is prepared.

Evaluation

The specification of the PSI has been developed, but its preparation has not been completed.

The lecture training on concepts, process, and procedures for developing water PSI have been conducted five times, together with the review and rearrangement of existing data/information. The form of spreadsheet was then finalized. The key terms of the PSI are i) standardization, ii) classification, and iii) coding. Trainings on these subjects were carried out up to March 2011.

After the finalization of the specifications on PSI, appropriate data and information were planned to be included in the PSI form. After the completion of the pollution source list, the pollution sources to be inventoried in the PSI were planned to be selected. Since these activities could not be implemented, the output indicator was not completely achieved.

As for air pollution, five industrial sectors were selected as main target, namely: cement, power plant, steel, refinery and fertilizer. Consequently, 31 factories were listed up as the first priority. Each DFEA started air PSI using the general information from industrial facility inspection guideline to obtain data from the factories. C/Ps from 14 DFEAs visited 27 factories, which had stack, and interviewed the persons in charge of environmental matter to collect information on air PSI from said factories in September and October 2010. JET distributed to all DFEAs the most updated version of air PSI, which contained the results of Output 5 (stack emission measurement). Each DFEA commenced updating the air PSI using the measurement data since October 2010.

As of June 2011, among the 31 factories in the first priority, 18 were recorded on the air PSI. This is equivalent to 58% of the total achievement. However, due to constraints from the Output 5 activity, concentrations of air pollutants were measured in eight factories among the 18. The ideal air PSI must require data/information sheets with the following: 1) general information, 2) fuel information, 3) GPS information, 4) stack information, 5) concentration of air pollutants by measurement. Six factories meet this requirement. In total, 40 factories are recorded in the air PSI of 14 DFEAs.

Targets and Progress of Air PSI as of June 2011

DFEA	Factory Type **Cement**	Type of Fuel	**Power plant**	Type of Fuel	**Steel**	Type of Fuel	**Refinery**	Type of Fuel	**Fertilizer**	Type of Fuel	**Others**		Type of Fuel
Damascus	NA		NA		NA		NA		NA		Al Khumasie (UCIC)		HFO
											Spinnin & Weaving Co.		HFO
Rural Damascus	Adra Cement Factory	Natural Gas HFO	Deir Ali Power Plant	Natural Gas	NA		NA		NA		Al-Ansari Mineral oil refining		
	Badieh Cement Factory (Under construction)		Tishreen Power Plant	Natural Gas							Annnama detergent (MODHICH)		Diesel
	3 other: under construction		Jiroud Power Plant	Natural Gas							Asphalt Mixer (15)	Al Masri Asphalt Mixer	HFO
											Syrian Finland Dairy Factory		Diesel
											Alminum(MADAR Machinery)		HFO
Aleppo	Shiekh Saied Cement Company-Shahba Factory	HFO	Aleppo Power Plant	HFO Natural Gas	More than 10, but small		NA		NA		Syriamica 1 for HFO, 2 for Pet Coak		HFO
	Shiekh Saied Cement Company-Arabia Factory	HFO	(2 for HFO,2 for mix, 1 for gas)	5,000 ton/day	Al-Shamal Factory for Aluminum and Steel	HFO							Pet Coak
	Meslmieh Cement Company-Shiekh Saied Factory	HFO	Natural Gas/Siemens		Jibreen Steel Factory	HFO					Lead melting/smelter		
					Sarkis Tufenkji & Co	HFO					Sugar Factory (1)		
	Laverge Cement Factory (since Mar.2009), French Company	Coal									Asphalt Mixer (15-20)	Al Mottahidhe Compny	HFO/Diesel
Homs	Al-Rastan Cement Factory	HFO	Jandar power Plant (JBIC)	HFO	NA		Homs Refinery Company	HFO	General Company for Fertilizers	HFO Natural Gas	National Company for Sugar		
											Homs Sugar Company		HFO
											Asphalt Mixer (18)		
Hama	Genera Company for Cement Factory No.1	HFO	Al-Zara Power Plant (JBIC)	NG HFO	General Company for Iron and steel	HFO Coal	NA		NA		Asphalt Mixer (11): 3 Public, 8 Private	Ahed Rasid Asphal Mixer	HFO
	Genera Company for Cement Factory No.2	HFO	Mhardeh Power Plant	NG HFO							Sugar Factory (1)		
	Genera Company for Cement Factory No.3	HFO									Beireen (1)		
Lattakia	NA		NA		Ayman Jaber Steel Factory		NA		NA		Asphalt Mixer (10)	Al Sanawber Asphalt Mixer	HFO/Diesel
					Joud Steel Factory						Mineral Oil Refinery		Diesel
					HIMISO Steel Factory	HFO					Bireen Factory		HFO
Deir Ezzor	NA		NA		NA		Under Preparation		NA		Paper Factory (1)		Desel
											Sugar Factory (1)	Deir Ezzor Sugar Company	HFO
											Asphalt Mixer (10)	Technical Service DRZ	HFO
Idleb	NA		Zeizoun Power Plant	Natural Gas	NA		NA		NA		Oil plant (5)	Barakaat and Kabbani Conpany	HFO
													HFO
											Olive extracting mills (63)		Bireen/Diesel
											Sugar Factory (1)		HFO
											Bireen factory (5)		HFO
											Food (3)		HFO
											Asphalt Mixer (14)	General Company for Road and Brige	HFO
Hasakeh	NA		NA		NA		NA		NA		Sugar Factory		
											Asphalt Mixer (7 inside City)	Asphalt Mixer for Aquatic Project	HFO?Diesel
											Asphalt Mixer (3 outside city)	Technical Service HSK	HFO/Diesel
Rakka	Guresh Cement Factory (since Sep. 2009) Turkish Company	Electricity	NA		NA		NA		Under Licensing		Sugar Factory (1)		
											Asphalt Mixer (6) Concrete Mixer	Hakem Abdullah Al-Ahmad Asphalt Mixer	HFO
Sweida	NA		NA		NA		NA		NA		Asphalt Mixer (10)		HFO
											Gypsum Factory (1)	Decolation Company	
Dara	NA		NA		NA		NA		NA		Asphalt Mixer(6)		HFO/Diesel
											Ba'albaki Co.,		HFO
											Ekbal (Canned Food)		HFO/Diesel
Tartus	Tartus Cement Factory (with φ10mm Hole)	HFO	Banias thermal Power Plant	4 for HFO 1 for NG , temporally for Diesel	Al Wahieb (with φ10mm Hole)	HFO	Banias Refinery Company	HFO LPG	NA		Asphalt Mixer (9) Bireen Factory Salt factory (1) Plastic factory (3) Fat factory Vegetable factory		HFO/Diesel
Quneitra	NA		NA		NA		NA		NA		Asphalt Mixer Technical Service Directorate under Governorate of Quneitra		Diesel
											Al Halas Asphalt Mixer General Conpany for Road and Brige Quneitra Branch		HFO/(Diesel)

NA: Not available

: Factory recorded in Air pollution source inventory

: Factory which concentrations of flue gases was measured through Output 5

: Factory recorded with sufficient information

(2) Challenges for Further Capacity Improvement

By participating theoretical training and OJTs, C/Ps in charge of pollution source inventory have commenced Water PSI and Air PSI in parallel. However, following challenges for further capacity improvement are considered:

1) To get internet communication at each DFEA for reporting, namely position data on the map.

2) To get used to using Excel for inputting data to inventory instead of paper.

3) To increase the opportunity to use GPS on every field visit by staff.

4) To increase skill in effective communication with representatives of industrial facilities

5) To understand basic chemical and scientific knowledge such as conversion of temperature of flue gas to 0 ^{o}C and difference between (mg/m3) and ppm.

6) To understand the necessity of the standard oxygen concentration as a part of emission standard in order to avoid escape penalty by dilution.

2.2 Output 2: Strengthen Capabilities for Implementing Inspection

2.2.1 Background Information

The environmental protection law (No. 50) was issued in 2002. The law mentions that owners of factories, workshops and activities that release environmental polluting emissions shall have to install treatment facilities to prevent spread of these emissions. Under Article 23 of the law, MSEA, in agreement with the Ministry of Justice, has the authority to assign environmental inspectors to inspect the violations to the law, standards, regulations and other environmental requirements.

In 2006, "Industrial Facilities Inspections Guideline" was prepared by GCEA/MSEA based on the "Egyptian Guideline for Environmental Inspection" and other guidelines prepared by international organizations. Since then, inspection activities have been conducted in some DFEAs. The inspection situation at each DFEA at the beginning of the Project is summarized in the following table.

Situations of Inspection as of March 2009

NO.	DFEA	Inspectors' Number in 2008[1)]	Regular Inspection[1)]	Specific Inspection[1)]	No. of Inspection (2008)
1	Damascus	4	√	√	0
2	Rural Damascus	8	√	×	120
3	Aleppo	4	√	√	75
4	Homs	19	√	√	40
5	Hama	12	√	√	40
6	Lattakia	10	√	√	15
7	Deir Ezzor	2	√	×	0
8	Idleb	8	×	√	13
9	Hasakeh	5	√	×	19
10	Raqqa	0	√	√	0
11	Sweida	4	×	√	22
12	Dara'a	10	√	√	0
13	Tartous	14	√	√	30
14	Quneitra	5	√	×	0
Total		**105**			**374**

(): Number of authorized inspectors
1): Hearing results of JET from each DFEA
2): Records of GCEA

However, in some DFEAs, inspection activities were mixed with environmental monitoring of industrial pollution sources, and different records were used. Considering the fact that industrial facilities inspection activity in each DFEA was still in the beginning stage, Output 2 aimed to strengthen capabilities for implementing inspection in each DFEA. In order to meet this purpose, revision of "Industrial Facilities Inspection Guideline" was required. Although the draft version of said guideline was prepared by MSEA in collaboration with JET, further trainings for implementing inspection are necessary (such as preparation of annual inspection plan, field inspection and sampling,

actions on no-compliance cases, documentation of inspection records, and preparation of inspection report, etc.)

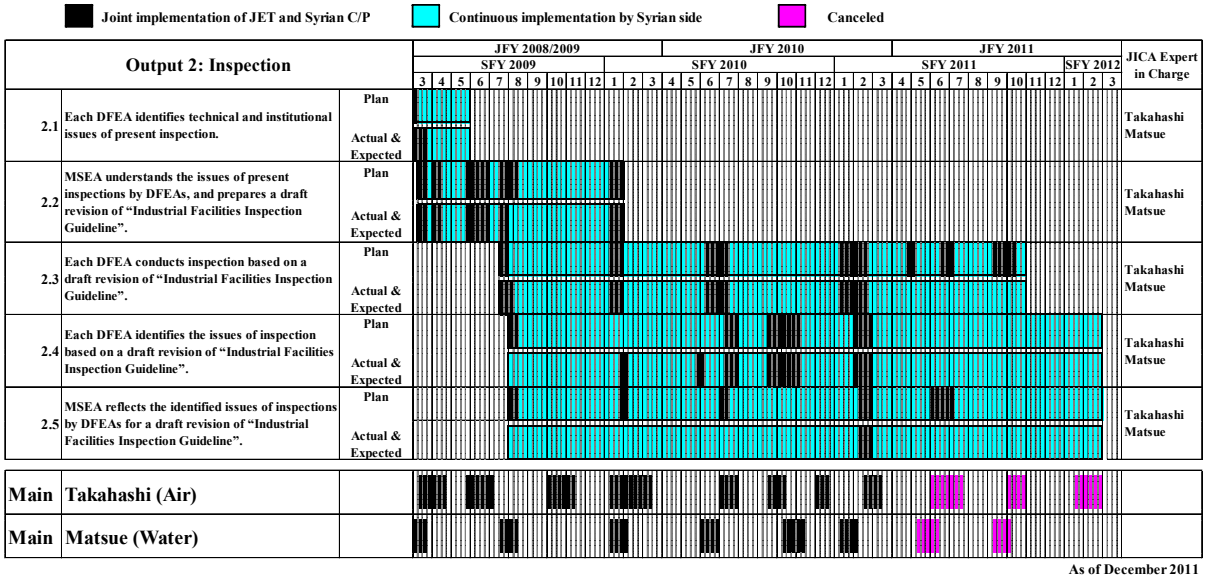
2.2.2 Outline of Output 2

The PDM defines Output 2 to be attained as follows:

Output 2: Capabilities for implementing inspection are strengthened.

The capacity development defined in Output 2 is designed with five sequential activities. The following tables show i) revised PO for Output 2 including the progress or expected schedule of each activity, and ii) the details of activities.

Plan of Operation for Output 2



Details of Activities under Output 2

Activities of C/P Side	Technical Supports to be Provided by JET	Target C/P	Final Results
Each DFEA identifies technical and institutional issues of present inspection.	(2009) - Supporting C/Ps in identifying technical and institutional issues. - Grasping the present situation of inspectors at each DFEA - Grasping budget limits of water quality analysis and inspection	14 DFEAs and MSEA	O
MSEA prepares a draft inspection guideline considering the issues identified by each DFEA.	(2009) - Supporting MSEA in the preparation of inspection guideline (in a simple and easy-to-use style) considering the current Syrian conditions	MSEA	O
Each DFEA conducts inspection based on the draft guideline.	(2009 to 2010) - Supporting each DFEA in the preparation of annual inspection plan - Supporting theoretical training for conducting inspection at five selected DFEAs - OJT for conducting inspection and water sampling for inspection - Supporting basic training activities for stack emissions measurement such as position measurement by GPS, visual observation and smell judgment	5 DFEAs (Deir Ezzor, Aleppo, Tartous, Homs, Rural Damascus) for regional training 14 DFEAs and MSEA	O
Each DFEA identifies the issues of inspection based on the draft guideline.	(2010) - Supporting each DFEA in identifying the issues and grasping the situations of legal system development - Supporting each DFEA in the collection of comments from industrial facilities	14 DFEAs and MSEA	O
MSEA modifies the guideline based on the issues identified.	(2010 to 2011) - Supporting MSEA in modifying the guideline	MSEA	O
Each DFEA conducts inspection based on the modified guideline.	(2011 to 2012) - Supporting each DFEA in the preparation of annual inspection plan - Supporting each DFEA in conducting inspection on water pollution sources by using the modified guideline. - Supporting selected DFEAs in conducting inspection by using stack emission measurement equipment.	14 DFEAs and MSEA For DFEAs where wastewater treatment facilities are installed at factories.	△
	(2012) - Supporting each DFEA in conducting inspection on air pollution sources by using the modified guideline and stack emission measurement equipment.	14 DFEAs and MSEA	△

Note: O means that the activities have been finished and △ means that the activities have been partly finished.

2.2.3 Activity Achievement

(1) Activity 2.1: Each DFEA identifies technical and institution issues of present inspection.

In March and April of 2009, the beginning stage of the project, JET visited all 14 DFEAs and supported them in identifying technical and institutional issues of inspection. The major issues identified are summarized in the following table.

Summary of Major Issues on Inspection in the Beginning Stage of the Project (As of March 2009)

Item		Contents
1	Major issues for the existing inspection guideline	1) Lack of unified formats (such as general information of industrial facility, field inspection records, etc.). 2) Lack of practical tools (such as clear standards for selecting inspection frequency and analysis parameters). 3) Lack of training for inspectors about the existing inspection guideline.
2	Major institutional issues of present inspection	1) No clear standards for enforcement actions of no-compliance cases. 2) Requirements of inspector are too strict. 3) Insufficiency of information exchange with other organizations. 4) No separate inspection section in MSEA and DFEA (under EIA section). 5) Difficulty to deal with public industrial facilities. 6) Shortage of manpower, budget, etc. 7) Cooperation between inspector and laboratory staff is not enough at some DFEAs.
3	Major technical issues of present inspection	1) No practical guideline for implementing inspection. 2) Lack of theoretical trainings and OJT. 3) Lack of knowledge about production process, industrial wastewater treatment, air pollution control technology, preparation of annual inspection plan, field sampling, flow rate measurement, selection of analysis parameters, interpretation of analysis results, QA/QC, etc. 4) Shortage of analysis equipment and sampling equipment (especially for air sampling).
4	Other issues	1) Cooperation with other inspection organizations. 2) Demarcation of inspection activities with other inspection organizations, such as General Commission for Sewage in governorate, Health Affair Department at governorate/city council, Environmental Committee at governorate. 3) Cooperation with environmental monitoring activities. 4) No unified ID card for inspector. 5) Allowance for inspection work.

(2) Activity 2.2: MSEA understands the issues of present inspections by DFEAs, and prepares a draft version of "Industrial Facilities Inspection Guideline".

Considering the issues identified in each DFEA, MSEA and JET prepared a draft inspection guideline for wastewater in June 2009. In October 2009, the draft guideline was modified by adding air pollution inspection. The guideline aimed to provide unified formats and practical tools (such as inspection plan preparation, field inspection and activities after field inspection, etc.)

(3) Activity 2.3: Each DFEA conducts inspection based on a draft version of "Industrial Facilities Inspection Guideline".

1) Wastewater

In order to support each DFEA in conducting inspection on water pollution sources based on the draft version of "Industrial Facilities Inspection Guideline", the following training courses were carried out. Basically, training activities were conducted at five selected regional DFEAs. However, JET carried out OJTs at each DFEA individually, considering that the types of industry in each DFEA varied. The materials used in each training course and the list of attendees are shown in Annexes.

Summary of Training on Inspection (Wastewater)

Course	Objectives and Contents	Period	Venue	Target C/P
1. Theoretical training	- Theoretical training for the draft inspection guideline (wastewater) - One-day training course at each selected regional DFEA	- 26 Jul., 2009 - 27 Jul., 2009 - 28 Jul., 2009 - 29 Jul., 2009 - 30 Jul., 2009	- MSEA - Homs - Tartous - Aleppo - Deir Ezzor	- 26 C/Ps of south DFEAs - 23 C/Ps of central DFEAs - 15 C/Ps of coastal DFEAs - 11 C/Ps of north DFEAs - 9 C/Ps of northeast DFEAs
2. Supplementary training	- Same as above training - Only for C/Ps who missed theoretical lecture mentioned above -One-day supplementary training course	2-10 Aug., 2009	Rural Damascus, Dara'a, Quneitra	16 C/Ps of 3 DFEAs and 1 chief C/P of MSEA
3. On-the-job training	- Field inspection and wastewater sampling - Follow-up training on basic water quality analysis - One-day training course at each DFEA	10 Jan.-1 Feb., 2010	12 DFEAs	105 C/Ps of DFEAs and 1 chief C/P of MSEA
4. On-the-job training	- Field inspection and wastewater sampling - Follow-up training on basic water quality analysis - Identifying the issues of inspection at each DFEA - One-day training course at each DFEA	2-24 Jun., 2010	14 DFEAs	71 C/Ps of DFEAs and 1 chief C/P of MSEA
5. Theoretical training and on-the-job training	- Typical industrial wastewater quality, quantity and sources - Typical wastewater treatment methods and processes - Major check points for wastewater treatment facility inspection - Methods for identifying illegal bypass discharging of wastewater - Field inspection and wastewater sampling - Half- to one-day training course at each DFEA	11 Oct. – 9 Nov., 2010	11 DFEAs	119 C/Ps of DFEAs and 5 chief C/Ps of MSEA
6. On-the-job training	- Field inspection and wastewater sampling at the factories installed with wastewater treatment facilities -	18 - 27 Jan., 2011	11 DFEAs	58 C/Ps of DFEAs and 1 chief C/P of MSEA

2) Air Pollution Source

In June and July 2009, JET and chief C/Ps of MSEA/GCEA conducted lecture training on the basic knowledge of inspection of air pollution sources, such as emission standard for air pollutants, conversion of unit (ppm to μg/m^3), how to use GPS device for inspection, and introduction to flue gas measurement for inspection.

Summary of Lecture Training on Inspection (Air Pollution Sources)

	South	Central	Coastal	North	Northeast
Time	24/25 June 2009	10/11 June 2009	17/18 June 2009	1/2 July 2009	22 June 2009
Venue	Training room of GCEA/MSEA, Damascus	Conference room of Homs DFEA	Meeting room of Tartous DFEA	Laboratory of Aleppo DFEA	Meeting room of Deir Ezzor DFEA
Target DFEAs	Damascus, Rural Damascus, Dara'a, Sweida, Quneitra	Homs, Hama	Tartous, Lattakia	Aleppo, Idleb	Deir Ezzor, Hasakeh, Raqqa
Number of C/Ps	27/22	18/16	11/9	9/10	16
Program	1) Introduction to "The Project for Capacity Development of Environmental Monitoring Phase 2". 2) Background of inspection to factory: Law No.50, Industrial Facilities Inspection Guideline and Executive Procedures for EIA. 3) Type of on-site inspection: regular on-site inspection and specific on-site inspection. 4) Preparation of on-site inspection: safety goods, unified inspection sheet and testing equipment. 5) Confirmation of emission standard of air pollutants and water pollutants, and air quality standard. 6) On the job training: conversion of unit, calculation of air pollutant concentration, from ppm to μ g/m^3 and μ g/m^3 to ppm. 7) Close relation between inspection and inventory: inspection and inventory should complement each other. 8) How to use GPS for inspection. 9) Introduction to flue gas measurement for inspection. 10) Difference between monitoring and inspection: in general, these are different, but inspection/factory inspection, in the broad sense, is a kind of environmental monitoring.				

In October and November of 2009, JET carried out theoretical training for the draft inspection guideline (version 1.1; air was added) to C/Ps in charge of inspection at five selected DFEAs. In addition, lecture and OJT on how to use GPS for air pollution inspection were conducted in February 2010. They mainly focused on the introduction of GPS device and its usage with Google Earth in field inspection. During the OJT, each trainee used one GPS and experienced i) positioning latitude and longitude data, ii) storing field data in GPS memory, and iii) importing data to Google Earth to see marked position on the satellite map. GPS usage for inspection is applicable not only for air pollution inspection but also for water pollution inspection. The training schedule and contents are summarized in the following table.

Summary of Lecture Training on Inspection Guideline (Air Pollution)

	South	Central	Coastal	North	Northeast
Time	26 Oct. 2009	20 Oct. 2009	21 Oct. 2009	22 Oct. 2009	1 Nov. 2009
Venue	Meeting room of DAM DFEAs	Conference room of Homs DFEA	Meeting room of Tartous DFEA	Laboratory of Aleppo DFEA	Meeting room of Deir Ezzor DFEA
Target DFEAs and attendance	Damascus, Rural Damascus, Dara'a, Sweida, Quneitra	Homs, Hama	Tartous, Lattakia	Aleppo, Idleb	Deir Ezzor, Hasakeh, Raqqa
Number of C/Ps	DAMR: 5, DAM: 5, DAR: 6, SWD: 1, QNT: absent	HOM:10 HAM: 6	TAR: 22 LAT: 3	ALP: 14 IDL: 3	DRZ: 11 HSK: 2 RAQ: absent
Program	1) Inspection on an industrial facility. 2) Basic approach. 3) Construction of the guideline. 4) Related standards. 5) Annual inspection plan. 6) Preparation of field inspection. 7) Safety goods. 8) Field inspection. 9) Filling up general information. 10) Activity after field inspection stage.				

Summary of Lecture and OJT on How to Use GPS for Inspection (Air Pollution)

	South	Central	Coastal	North	Northeast
Time	8 Feb 2010	9 Feb 2010	10 Feb 2010	11 Feb 2010	7 Feb 2010
Venue	Conference room of RDAM Governorate Build.	Conference room of Homs DFEA	Meeting room of Tartous DFEA	Laboratory of Aleppo DFEA	Director room of Deir Ezzor DFEA
Target DFEAs and attendance	Damascus, Rural Damascus, Dara'a, Sweida, Quneitra	Homs, Hama	Tartous, Lattakia	Aleppo, Idleb	Deir Ezzor, Hasakeh, Raqqa
Number of C/Ps	DAMR: 6, DAM: 5, QNT: 1, SWD: 1, DAR: absent	HOM:13 HAM: 4	TAR: 11 LAT: 3	ALP: 10 IDL: 6	DRZ: 9 HSK: 3
Program	1) GPS for inventory/field inspection (introduction) Following program (2 to 5) is OJT. 2) How to use GPS for inventory/field inspection. 3) Import "Waypoints" to Google Earth. 4) Start "Google Earth" and Connect GPS to PC by USB 5) "How to import GPS data to PC. (Tool→ GPS, on "Google Earth") 6) GPS points on an industrial facility. 7) Example of emission inventory (air)				

In June 2010, JET carried out a lecture training for practical inspection without equipment (in response to what can be done prior to Output 5), to C/Ps in charge of inspection at five selected DFEAs. Five industrial sectors were selected as main target of inspection, namely: cement, power plant, steel, refinery and fertilizer. In addition, in September and October 2010, a supplementary lecture on what can be done prior to Output 5 was conducted to DFEAs who were absent from the training in July 2010. It mainly focused on getting general information and making judgment from plume color and shade, as well as fuel type and smell. The training schedule and contents are summarized in the following table.

"How to measure height of stack" field training

Summary of Lecture Training on Practical Inspection Prior to Output 5 Measurement (Air Pollution)

Date	DFEAs Targeted	Venue	Contents	Number of Attendees
Jul. 18, '10 (Sun)	ALP IDL	ALP DFEA	- "What can we do?" prior to Output 5 - General information by interview - Judgment from color and shade of plume - Fuel type - Judgment from smell - Complaints from neighbor - Target factory/sector - Importance of O_2 concentration and measurement - How to measure the height of stack	ALP: 7 IDL: 3
Jul. 22, '10 (Thu)	TAR LTK	TAR DFEA	(Ditto)	TAR: 13 LTK: 3
Jul. 25, '10 (Sun)	DRZ HSK RAQ	DRZ DFEA	(Ditto)	DRZ: 5 HSK: absent RAQ: absent
Jul. 26 '10 (Mon)	DAMR DAM DAR SWD QNT	DAM DFEA	(Ditto)	DAMR: 3 DAM: 8 DAR: absent SWD: 2 QNT: absent
Jul. 27, '10 (Tue)	HOM HAM	HOM DFEA	(Ditto)	HOM: 15 HAM: 6

Summary of Supplementary Lecture Training on Practical Inspection Prior to Output 5 Measurement (Air Pollution)

Date	DFEAs Targeted	Venue	Contents	Number of Attendees
Sep. 23, '10 (Thu)	QNT	QNT DFEA	- "What can we do?" prior to Output 5 - General information by interview - Judgment from color and shade of plume - Fuel type - Complaints from neighbor	QNT: 3
Sep. 26, '10 (Sun)	DAR	DAR DFEA	(Ditto)	DAR: 2
Oct. 11, '10 (Mon)	HSK	HSK DFEA	(Ditto)	HSK: 5
Oct. 12 '10 (Tue)	RAQ	RAQ DFEA	(Ditto)	RAQ: 6

In December 2010, JET carried out lecture and OJT on the practical usage of general information for air, using actual data collected in October and November 2010. JET reviewed with C/Ps the recorded actual information sheet/general information of DFEA. Then, during the OJT, a trial calculation of SO_2 concentration from the actual information sheet of a factory (asphalt mixer) was conducted using a calculator, based on the following data: 1) Type of fuel: heavy fuel oil (HFO), 2) Fuel consumption: 500 kg/hour, 3) Flow rate: 70 km/hour, 4) Stack diameter: 0.9 m, and 5) Flue gas temperature: 120ºC. Even though the best condition adopted the catalogue value (flow rate: 70 km/hour), the calculated concentration of SO_2 was 1,617 mg/m^3, which exceeds the Syrian SO_2 emission standard of 1,000 mg/m^3. As an outcome of this trial calculation, it became obvious that whenever a factory uses HFO (5% sulfur content), the flue gas concentration of SO_2 shall exceed the emission standard. The training schedule and contents are summarized in the following table, and the list of attendees are compiled in the Annex.

Summary of Lecture and OJT for Practical Usage of General Information for Air

Date	DFEAs targeted	Venue	Contents	Number of Attendees
Dec. 14, '10 (Tue)	TAR LTK	TAR DFEA	- Reviewing recorded actual information sheet (general information) of each attending DFEA with C/Ps. - Instruction of inputting information correctly. - Trial calculation of SO_2 concentration from actual information sheet/general information. - Conversion of flue gas temperature to 0 degree. - Consideration of possible countermeasures	TAR: 10 LTK: 5
Dec. 15, '10 (Wed)	ALP IDL	ALP DFEA	(Ditto)	ALP: 8 IDL: 2
Dec. 16, '10 (Thu)	HOM HAM	HOM DFEA	(Ditto)	HOM: 5 HAM: 10
Dec. 20, '10 (Mon)	DRZ HSK RAQ	DRZ DFEA	(Ditto)	DRZ: 6 HSK: 1 RAQ: 1
Dec. 21 '10 (Tue)	QNT DAR SWD	MSEA	(Ditto)	QNT: 2 DAR: 4 SWD: 1
Dec. 22, '10 (Wed)	DAM DAMR	MSEA	(Ditto)	DAM: 2 DAMR: 9

In March 2011, JET carried out lecture training for the draft (version 3) of the inspection guideline by adding the following information: 1) condition of temperature and pressure of emission standard, 2) recommended inspection frequency, 3) recommended place to install the flange on stack/duct, 4) equipment/tools checklist for stack emission measurement, 5) instruction on inspection by observing the color/transparency of plume for TSP and by type of fuel for SO_2, and 6) conversion of temperature of flue gas to 0^oC and difference between mg/m^3 and ppm. The training schedule and contents are summarized in the following table, and the list of attendees are compiled in the Annex.

Summary of Lecture Training on the Inspection Guideline (Version 3)

Date	DFEAs targeted	Venue	Contents	Number of Attendees
Mar. 1, '11 (Tue)	HAM	HAM DFEA	-Condition of temperature and pressure of emission standard - Recommended inspection frequency - Recommended place to install the flange on stack/duct - Equipment/tools check list for stack emission measurement - Inspection by color/transparency of plume for TSP and by type of fuel for SO_2 - Conversion of temperature of flue gas to 0^oC	HAM: 13
Mar. 2, '11 (Wed)	ALP IDL	ALP DFEA	(Ditto)	ALP: 8 IDL: 3
Mar. 3, '11 (Thu)	HOM	HOM DFEA	(Ditto)	HOM: 8
Mar. 7, '11 (Mon)	DAR QNT	MSEA	(Ditto)	DAR: 6 QNT: 2
Mar. 9, '11 (Wed)	DAM DAMR SWD MSEA	MSEA	(Ditto)	DAM: 2 DAMR: 9 SWD: 8 MSEA: 2
Mar. 10, '10 (Thu)	TAR LTK	TAR DFEA	(Ditto)	TAR: 20 LTK: 7
Mar. 13, '11 (Sun)	DRZ RAK HSK	DRZ DFEA	(Ditto)	DRZ: 12 RAK: 2 HSK: 2

(4) Activity 2.4: Each DFEA identifies the issues of inspection based on a draft revision of "Industrial Facilities Inspection Guideline".

During the trial period of the draft version of "Industrial Facilities Inspection Guideline" (from June 2009 to January 2011), JET and MSEA supported each DFEA in identifying the issues of inspection

on water and air pollution sources through OJT activities. Major issues identified are summarized in the following table.

Summary of Current Issues of Inspection Based on the Draft Guideline

Item		Contents
1	Major issues for the draft inspection guideline prepared by MSEA and JET	1) Solid waste and noise, etc. items that are out of the scope of the project are not included in the draft guideline. This matter will be considered during preparation of the final version of the guideline.
2	Major institutional issues of present inspection	1) No clear and unified enforcement procedures about no-compliance cases (especially DFEA has not the right to take enforcement action on no-compliance cases, and no clear criteria of fine). 2) Existing requirements of inspector are too strict. 3) Insufficiency of information exchange with other relevant organizations. 4) No overtime allowance for inspectors who have to carry out inspection activities out of official work time (actually some industrial facilities discharge wastewater frequently after DFEA's working time). 5) Shortage of vehicle and budget (especially for gasoline), etc. Due to these issues, inspection activities in almost all DFEAs have been limited. 6) Cooperation between inspector and laboratory staff is not enough at some DFEAs.
3	Major technical issues of present inspection	1) Lack of theoretical trainings and OJT for practical inspection 2) Lack of the knowledge about production process, industrial wastewater treatment, air pollution control technology, selection of sampling point, flow rate measurement, interpretation of analysis results, QA/QC, etc. (especially for identifying illegal discharges of untreated wastewater) 3) Shortage of field measurement equipment (such pH meter, EC meter, DO meter) and sampling equipment (especially for air sampling such as flue gas analyzer and dust sampler) 4) Syrian emission standard of air pollutants at a source is too strict considering availability of fuel quality in Syria.
4	Other issues	1) Cooperation with other inspection organizations. 2) Demarcation of inspection activities with other inspection organizations, such as General Commission for Sewage in Governorate, Health Affair Department at Governorate/City Council, Environmental Committee at Governorate. 3) Cooperation with environmental monitoring activities inside DFEA. 4) The issuance of ID card for inspector is still suspended now. It is recommended to restart the issuance of the ID card. 5) Lack of appropriate transmission system for inspection results from each DFEA to MSEA. 6) Due to the unexpected termination of activities by JICA experts in Syria, especially OJT of Output 5, proper inspection with measurement of concentration on flue gas and dust has been suspended.

(5) Activity 2.5: MSEA reflects the identified issues of inspections by DFEAs for a draft revision of "Industrial Facilities Inspection Guideline".

Considering the issues of inspection based on the draft version in each DFEA, the guideline has been modified. Its final version has been submitted to the minister of MSEA for approval in December 2011. After getting approval, it will be distributed to each DFEA who will conduct the inspection based on the revision.

2.2.4 Products of Activities

The products of activities related to Output 2 are summarized in the table below. The details of products of activities are attached in Annex.

List of Products of Activities

No.	Products of Activities	Remarks
1	Draft version of the "Industrial Facilities Inspection Guideline" including unified formats for inspection	Prepared by JET and MSEA
2	Lecture training for "Industrial Facilities Inspection Guideline"	Prepared by JET
3	Lecture training for the "Typical Wastewater Quantity and Quality, Check Points for Treatment Facility"	Prepared by Jet and characteristics of facilities in each DFEA are considered.
4	Final version of the "Industrial Facilities Inspection Guideline" including unified formats for inspection on wastewater, air pollution, solid wastes and noise	Prepared by JET and MSEA
5	Inspection records in each DFEA	Prepared by each DFEA*
6	Annual inspection plan in each DFEA	Prepared by each DFEA*
7	Annual inspection report of water in each DFEA	Prepared by each DFEA*
8	Criterion for selecting grease interceptors for wastewater treatment from restaurant including operation and maintenance (O&M) methods	Prepared by JET based on the requirement of Damascus DFEA.*

*The products are kept in DFEAs, and not included in Annexes.

2.2.5 Achievements of Output 2

(1) Achievements with PDM Indicator

Achievements of Output 2 were evaluated based on two indicators set in PDM.

<Indicator 2-1> A revision of "Industrial Facilities Inspection Guideline" is prepared..

Evaluation

"Practical Guidelines for Industrial Facilities Inspection" passed the legal wording process and was approved by Minister in February 2012. It is issued with the preface by Minister.

"Practical Guidelines for Industrial Facilities Inspection" is a revision of "Industrial Facilities Inspection Guideline", Substantially.

In addition, inspection is closely related to the following two indicators of the project porposes.

<Indicator of Project Purpose 1> The number of the qualified inspector of the laboratory staff is increased.

< Indicator of Project Purpose 2> The number of the inspection case is increased.

Comparing with PDM indicators, the achievements of Output 2 are summarized in the table below.

Summary of Achievements of Output 2

<table>
<tr><th>Indicators</th><th colspan="2">Achievements</th></tr>
<tr><td>1. The number of the qualified inspector of the laboratory staff is increased.</td><td>O</td><td>As shown in the following table, the number of qualified inspectors in 14 DFEAs has increased from 105 in 2008 to 175 in 2010.
<table>
<tr><th colspan="2">DFEA</th><th>Inspectors as of 2008</th><th>Inspectors as of 2010</th><th>Remarks (authorized inspectors)</th></tr>
<tr><td>1</td><td>Damascus</td><td>4</td><td>19</td><td>19</td></tr>
<tr><td>2</td><td>Rural Damascus</td><td>8</td><td>21</td><td>14</td></tr>
<tr><td>3</td><td>Aleppo</td><td>4</td><td>11</td><td>6</td></tr>
<tr><td>4</td><td>Homs</td><td>19</td><td>23</td><td>22</td></tr>
<tr><td>5</td><td>Hama</td><td>12</td><td>11</td><td>8</td></tr>
<tr><td>6</td><td>Lattakia</td><td>10</td><td>20</td><td>20</td></tr>
<tr><td>7</td><td>Deir Ezzor</td><td>2</td><td>9</td><td>3</td></tr>
<tr><td>8</td><td>Idleb</td><td>8</td><td>10</td><td>9</td></tr>
<tr><td>9</td><td>Hasakeh</td><td>5</td><td>11</td><td>8</td></tr>
<tr><td>10</td><td>Raqqa</td><td>0</td><td>4</td><td>0</td></tr>
<tr><td>11</td><td>Sweida</td><td>4</td><td>7</td><td>7</td></tr>
<tr><td>12</td><td>Dara’a</td><td>10</td><td>6</td><td>6</td></tr>
<tr><td>13</td><td>Tartous</td><td>14</td><td>20</td><td>20</td></tr>
<tr><td>14</td><td>Quneitra</td><td>5</td><td>3</td><td>3</td></tr>
<tr><td colspan="2">Total</td><td>105</td><td>175</td><td>145</td></tr>
</table></td></tr>
<tr><td>2. The number of the inspection case is increased.</td><td>O</td><td>As shown in below table, the number of inspection cases on wastewater pollution sources in 14 DFEAs has increased from 550 in 2008 to 1,183 in 2010. As for air, it has increased from 133 in 2009 to 177 in 2010.
<table>
<tr><th colspan="2" rowspan="2">DFEA</th><th colspan="2">Inspection cases water in 2008/air in 2009</th><th colspan="2">Inspection cases in 2010</th></tr>
<tr><th>Wastewater</th><th>Air</th><th>Wastewater</th><th>Air</th></tr>
<tr><td>1</td><td>Damascus</td><td>28</td><td>0</td><td>0 (complaints)</td><td>0</td></tr>
<tr><td>2</td><td>Rural Damascus</td><td>268</td><td>33</td><td>422</td><td>22</td></tr>
<tr><td>3</td><td>Aleppo</td><td>0</td><td>0</td><td>299</td><td>10</td></tr>
<tr><td>4</td><td>Homs</td><td>85</td><td>30</td><td>115</td><td>45</td></tr>
<tr><td>5</td><td>Hama</td><td>96</td><td>21</td><td>107</td><td>35</td></tr>
<tr><td>6</td><td>Lattakia</td><td>3</td><td>4</td><td>7</td><td>5</td></tr>
<tr><td>7</td><td>Deir Ezzor</td><td>5</td><td>0</td><td>20</td><td>6</td></tr>
<tr><td>8</td><td>Idleb</td><td>5</td><td>0</td><td>21</td><td>1</td></tr>
<tr><td>9</td><td>Hasakeh</td><td>5</td><td>4</td><td>11</td><td>6</td></tr>
<tr><td>10</td><td>Raqqa</td><td>8</td><td>5</td><td>15</td><td>9</td></tr>
<tr><td>11</td><td>Sweida</td><td>8</td><td>4</td><td>11</td><td>4</td></tr>
<tr><td>12</td><td>Dara’a</td><td>32</td><td>6</td><td>34</td><td>10</td></tr>
<tr><td>13</td><td>Tartous</td><td>7</td><td>24</td><td>25</td><td>22</td></tr>
<tr><td>14</td><td>Quneitra</td><td>0</td><td>2</td><td>96</td><td>2</td></tr>
<tr><td colspan="2">Total</td><td>550</td><td>133</td><td>1,183</td><td>177</td></tr>
</table></td></tr>
<tr><td>3. A revision of “Industrial Facilities Inspection Guideline” is prepared.</td><td>O</td><td>A draft inspection guideline was prepared in June 2009. Revision of the guideline was finished in December 2011. Officia Arabic version passed the legal wording process and was approved by Minister in February 2012. It is issued with the preface by Minister in March 2012.</td></tr>
</table>

Note: O means that the achievement is satisfied with indicator.
△ means that the achievement is satisfied with indicator to some extent.
×means that the achievement is not satisfied with indicator.

(2) Challenges for Further Capacity Improvement

By participating in theoretical training and OJTs, the C/Ps in charge of inspection have accumulated experience in dealing with inspection of industrial facilities to some extent. However, the following challenges for further capacity improvement are considered:

1) To gain and accumulate knowledge about production process, industrial wastewater treatment and air pollution control technology.
2) To accumulate experience in identifying illegal discharge of wastewater and to evaluate the operational state of wastewater treatment facilities.
3) To accumulate experience in measuring flow rate of wastewater, and to estimate pollution load in industrial facility.
4) To increase skill in effective communication with representatives of industrial facilities.
5) To discuss and create unified enforcement procedures about non-compliance cases.
6) To establish appropriate transmission system of inspection results (summary) from each DFEA to MSEA.
7) To accumulate experience in measuring flue gas and dust concentrations at site.
8) To introduce standard oxygen concentration as part of emission standard in order to avoid escape inspection by dilution.
9) To establish appropriate emission standard of air pollutants, taking into account the following: 1) scale/emission amount of factory, 2) characteristics of area, 3) year when operation started, 4) type/sector of industry, and 5) quality of available fuel. This is intended as almost all factories using heavy fuel oil exceed the Syrian emission standard due to high sulfur content (5%) found in the available oil in Syria.

In addition, due to the unexpected termination of activities by JICA experts in Syria, especially the OJT of Output 5, proper inspection with measurement of concentration on flue gas and dust has been consequently suspended. It is desired that the situation will be improved and those activities will be resumed soon.

2.3 Output 3: Strengthen Sampling Skills for Inspection for Water Effluent

2.3.1 Background Information

The sampling skills for factory effluent water were developed in each of the 14 DFEAs in the course of the trainings in Phase 1. It can be said that DFEA staffs have enough knowledge to implement the wastewater sampling for basic water analysis. Furthermore, DFEA staff should obtain the following skills through the Project.

Sampling Skills for Inspection of Water Effluent

1. Washing bottle	It is crucial to use clean bottle to obtain correct results. To measure heavy metals, oils and some other parameters, washing method should be selected.
2. Preparation of sampling equipment list	In order to avoid forgetting the tool for sampling, it is recommended to use the sampling equipment list.
3. Measuring the volume of water discharge	To obtain information on pollution load, measuring wastewater volume is necessary.
4. On-site photo	Photo taken with information noted on a white board at the sampling site can be used as evidence. On the white board, information such as date, factory name, location, and DFEA name should be mentioned.
5. On-site preparation and preservation method	Some parameters such as heavy metals and oil need on-site preparation for preserving sample. DFEA staff should know the information about selection of bottles and sustainable period.
6. Field record	DFEA staff should record the information whenever they take a sample. The record is to be stored and used for the next step such as for QC of analysis.

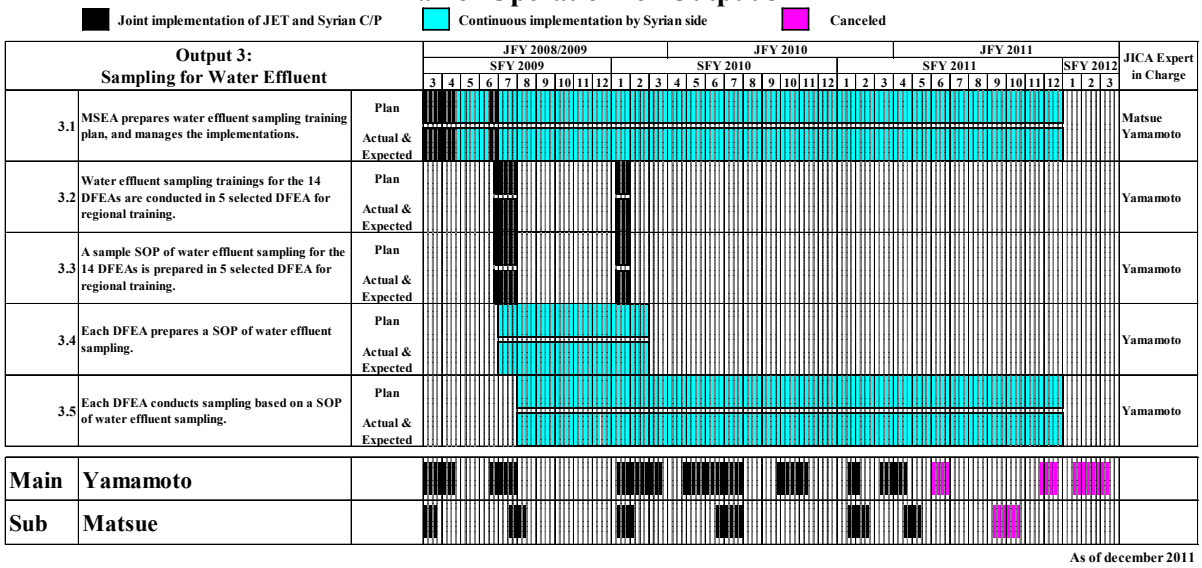
2.3.2 Outline of Output 3

The PDM defines Output 3 to be attained, as follows:

Output 3: Necessary sampling skills for inspection for water effluent are strengthened.

Capacity development defined in Output 3 is designed with five sequential activities. The following tables show i) PO for Output 3 including the progress or expected schedule of each activity, and ii) the details of activities.

Plan of Operation for Output 3



Details of Activities of Output 3

Activities of C/P Side	Technical Supports to be Provided by JET	Target C/P
MSEA prepares water effluent sampling training plan, and manages the implementations.	(2009) - Confirming the present sampling equipment and sampling bottle, and supporting equipment procurement. - Evaluating the capacity of sampling at each DFEA. - Supporting MSEA in preparing training plan for water effluent sampling. - Supporting DFEAs in selecting factories for sampling.	MSEA 14 DFEAs
C/Ps from 14 DFEAs receive water effluent sampling trainings in 5 selected DFEAs for regional training.	(2009) - Training for preparation of sampling, sampling method considering water quality parameter, field pre-treatment of samples. - Field measurement and observation (simple water quality analysis, flow rate measurement, observation record).	Regional training in 5 DFEAs (Dier Ezzor, Aleppo, Tartous, Homs, Rural Damascus) for 14 DFEAs
C/Ps from 14 DFEAs receive the training for preparing SOP of water effluent sampling in 5 selected DFEAs for regional training.	(2009) - Training for preparation of water effluent sampling standard operating procedures (SOP).	Regional training in 5 DFEAs (Dier Ezzor, Aleppo, Tartous, Homs, Rural Damascus) for 14 DFEAs
Each DFEA prepares a SOP of water effluent sampling.	(2009) - Supporting each DFEA in preparing water effluent sampling SOP.	14 DFEAs
Each DFEA conducts sampling based on the SOP of water effluent sampling.	(2009-2011) - Supporting each DFEA in conducting sampling. - Supporting each DFEA in modifying the SOP based on issues identified during sampling.	14 DFEAs

2.3.3 Activity Achievement

(1) Activity 3.1: MSEA prepares water effluent sampling training plan, and manages the implementations.

Preliminary consultation including program and schedule of the training was made by the chief C/P of this output and JET before conducting the training. Concept of the training is listed below. Unfortunately, the chief C/P could not join the training due to confusion on the separation of the ministry and office movement in June 2009.

Concept of Output 3 (Sampling Skill) Training

- Output 3 Training is composed of on-site training on each DFEA and lecture training on selected DFEA.
- Through the course of on-site training, JET evaluates sampling skill such as preparation, sampling, on-site measurement, pre-treatment, transportation, registration, and storage.
- Measurement or estimation of the water discharge is focused in the training.
- In the lecture training, through regional base discussion, C/Ps of DFEA revise their SOP.

Training Program for Water Effluent Sampling

1. Advance preparation
2. Preparation of sampling equipment list
3. Calibration of field measurement equipment
4. Preparation of sampling
5. Sampling (including selection of sampling point)
6. Field measurement and observation (including recording method of field measurement and observation by using field note)
7. Preservation and storage of samples (for each analysis parameter)
8. Sample transport method
9. Laboratory receipt and storage

(2) Activity 3.2: Water effluent sampling trainings for the 14 DFEAs are conducted in 5 selected DFEA for regional training.

This activity was planned to be implemented in selected DFEAs in the PDM. However, in order to evaluate the baseline of their sampling skills, JET joined the sampling activities of 14 DFEAs and conducted OJTs.

Trainings on fundamental sampling skills were conducted during the Phase 1 Project. These focused on the measurement of water discharge, and pre-treatment and preservation method to expound analysis of parameters.

Sampling Skill Training

(3) Activity 3.3: A sample SOP of water effluent sampling for the 14 DFEAs is prepared in 5 selected DFEA for regional training.

Lecture training on SOP for sampling skills was implemented in selected DFEAs in 2009 except in the south region where facilities were limited to accommodate the participants. Therefore, JET decided to hold such training in each DFEA of the south region, during the same day of the on-site training (Activity 3.2).

Record of the Training for Output 3

Month	Day	Subject / Venue	Attendees
2009 June	22 (Mon)	Output 3 Central Regional Training (on-site training) in HOM	HOM
	23 (Tue)	Output 3 Central Regional Training (on-site training) in HAM	HAM
	24 (Wed)	Output 3 Central Regional Training (lecture for SOP)in HOM	HOM, HAM
	29 (Mon)	Output 3 Coastal Regional Training (on-site training) in LTK	LTK
	30 (Tue)	Output 3 Coastal Regional Training (on-site training) in TAR	TAR
2009 July	01 (Wed)	Output 3 Coastal Regional Training (lecture for SOP) in TAR	TAR, LTK
	06 (Mon)	Output 3 North Regional Training (on-site training) in IDL	IDL
	07 (Tue)	Output 3 North Regional Training (on-site training) in ALP	ALP
	08 (Wed)	Output 3 North Regional Training (lecture for SOP) in ALP	ALP,IDL
	12 (Sun)	Output 3 Northeast Regional Training (on-site training) in DRZ	DRZ
	13 (Mon)	Output 3 Northeast Regional Training (on-site training) in HSK	HSK
	14 (Tue)	Output 3 Northeast Regional Training (on-site training) in RAQ	RAQ
	15 (Wed)	Output 3 Northeast Regional Training (lecture for SOP) in DRZ	DRZ,HSK,RAQ
	19 (Sun)	Output 3 South Regional Training (on-site training) in SWD	SWD
	20 (Mon)	Output 3 South Regional Training (on-site training) in DAR	DAR
	21 (Tue)	Output 3 South Regional Training (on-site training) in QNT	QNT
	22 (Wed)	Output 3 South Regional Training (on-site training) in DAM	DAM
	23 (Thu)	Output 3 South Regional Training (on-site training) in DAMR	DAMR

(4) Activity 3.4: Each DFEA prepares a SOP of water effluent sampling.

SOP for sampling for basic water analysis was prepared in Phase 1. Therefore, through the training, JET together with DFEA staff revised the SOP to make it more suitable for their sampling work. List of tools for the wastewater sampling, which is one of the SOP of the output, is included in "Industrial Facilities Inspection Guideline", revised in the training for Output 2.

(5) Activity 3.5: Each DFEA conducts sampling based on a SOP of water effluent sampling.

The activity was confirmed in the training for Output 2 in 2010 and 2011. In the OJT, JET enhanced the usage of checklist of field equipment, as recorded on white board. Also, JET discussed about the location of sampling site for factory wastewater discharge. In the training for Output 4, DFEA staff learned the sampling skills for COD, NO_3-N, oil and heavy metal analysis in 2010.

2.3.4 Products of Activities

Through the activities of the output, SOP for wastewater effluent sampling was prepared. Contents of the SOP are as follows:

(1) List of tools for on-site survey

Basically, C/Ps learned all tools for on-site survey before starting the Project. Consequently, JET prepared the list through discussion with C/Ps in DFEAs. The list is included in the Industrial Facilities Inspection Guideline, which was prepared in Output 2.

(2) List of preservation methods

When C/Ps conduct advanced water quality analysis, such as heavy metal analysis, they should also learn the method of preserving the water sample. MSEA and JET prepared the list to be used in their advanced water quality analysis.

2.3.5 Achievements of Output 3

(1) Achievements with PDM Indicator

Achievements of Output 3 were evaluated based on two indicators set in PDM.

<Indicator 3-1> SOP for water effluent sampling is prepared in more than 11 DFEAs.

Evaluation

SOP for water sampling was prepared in 14 DFEAs.

<Indicator 3-2> More than 60% of the staff, who got the training, are able to conduct the water effluent sampling based on the SOP.

Evaluation

More than 60% of the staff who participated in the training can now conduct wastewater effluent sampling based on SOP.

(2) Challenges for Further Capacity Improvement

Wastewater effluent sampling is conducted in 14 DFEAs. At some DFEAs, on-site pretreatment for advanced water quality analysis, taking picture at site as evidence of the sampling activities, and water discharge measurement were performed during the training conducted by JET in the Project. These

activities are required for the implementatioin of advanced water quality inspection. However, inspection skills have not been achieved to the level required for advanced sampling skills. It is recommended that C/Ps be reminded on the necessity of accurately measuring water quality of wastewater, to fairly judge its conditions. Such advanced sampling skills will be useful to measure the water quality condition accurately.

2.4 Output 4: Strengthen Capabilities Concerning Water Quality Analysis for Water Effluent and Surface Water

2.4.1 Background Information

Before starting the Project, most DFEAs were able to measure basic water quality. As for heavy metal analysis, only DAMR DFEA could perform related measurements as part of their regular work. Meanwhile, DAM DFEA could measure the heavy metals despite the absence of serious pollution sources in their jurisdiction. Moreover, other DFEA possessing AAS did not have enough capacity to practically measure the samples.

Atomic Energy Commission (AEC) program is a kind of external quality control conducted by AEC. To obtain a rating of good evaluation (A grade) from AEC, the laboratory should be able to measure the water quality of the sample distributed by AEC three times a year, and corresponding results should be close to the reference value.

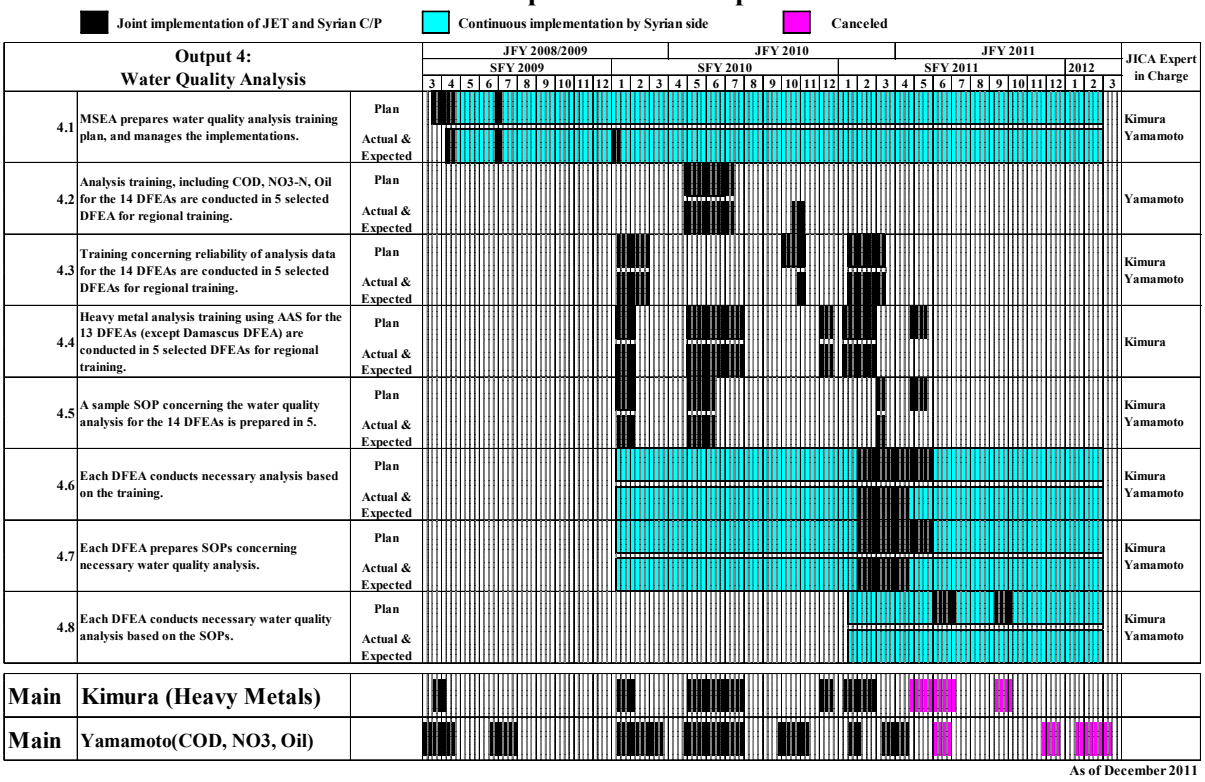
2.4.2 Outline of Output 4

The PDM defines Output 4 to be attained as follows:

Output 4: Capabilities concerning water quality analysis for water effluent and surface water are improved.

The capacity development defined in Output 4 is designed with eight sequential activities. The following tables show i) PO for Output 4 including the progress or expected schedule of each activity, and ii) the details of activities.

Plan of Operation for Output 4



As of December 2011

Details of Activities under Output 4

Activities of C/P Side	Technical Supports to be Provided by JET	Target C/P
MSEA prepares water quality analysis training plan, and manages the implementation.	(2009) - Confirming the existing equipment and reagents for the analysis of COD, NO_3-N, oil and heavy metals. - Evaluating the capacity on water quality analysis of each DFEA. - Supporting MSEA in the preparation of training plan for water quality analysis. - Technology transfer for management of laboratory equipment and instrument.	MSEA 14 DFEAs
C/Ps from 14 DFEAs receive analyses trainings, including COD, NO_3-N and oil in 5 selected DFEAs for regional training.	(2009 to 2010) - Training for the analysis theory of COD, NO_3-N and oil (standard method), and technology transfer for analysis skills for the three parameters. - Technology transfer for management methods of reagents and waste liquids, and use of water purifying equipment.	Regional training in 5 DFEAs (Dier Ezzor, Aleppo, Tartous, Homs, Rural Damascus) for 14 DFEAs
C/Ps from 14 DFEAs receive the trainings concerning reliability of the analyses data in 5 selected DFEAs for regional training. 14 DFEAs participate in the activities of external QC.	(2009 to 2010) - Technology transfer for data management - Theoretical training on QA/ QC, as internal QC activities. (2011) - Follow-up through OJT. - Supporting DFEAs in carrying out activities on external QC	Regional training in 5 DFEAs (Dier Ezzor, Aleppo, Tartous, Homs, Rural Damascus) for 14 DFEAs
C/Ps from 13 DFEAs (except DAM DFEA) receive the trainings for heavy metals analyses using AAS in 6 selected DFEAs for regional training.	(2010 to 2011) - Training on the analysis of heavy metals, and technology transfer for skills in analyzing heavy metals	Regional training in 6 DFEAs (Dier Ezzor, Hasakeh, Aleppo, Tartous, Hama, Rural Damascus) for 14 DFEAs
C/Ps from 14 DFEAs receive the trainings for preparing SOPs' samples of water quality analyses.	(2010 to 2011) - Technology transfer for preparing SOP sample of each water quality analysis parameter	Regional training in 5 DFEAs (Dier Ezzor, Aleppo, Tartous, Homs, Rural Damascus) for 14 DFEAs
Each DFEA conducts necessary analyses based on the trainings above.	(2010 to 2012) - Supporting each DFEA in grasping present situations of water pollution - Supporting each DFEA to select analysis methods based on actual water quality (including interferences' solutions)	Regional training in 5 DFEAs (Dier Ezzor, Aleppo, Tartous, Homs, Rural Damascus) for 14 DFEAs
Each DFEA prepares SOPs concerning necessary water quality analyses.	(2010 to 2012) - Supporting each DFEA in preparing SOP through OJT	14 DFEAs
Each DFEA conducts necessary water quality analyses based on the SOPs	(2010 to 2012) - Supporting each DFEA in conducting necessary water quality analyses through OJT	14 DFEAs

2.4.3 Activity Achievement

(1) Activity 4.1: MSEA prepares water quality analyses training plan, and manages the implementations.

Training of Output 4 was made based on the following concept. Overall training plan was prepared by chief C/Ps and JET.

Concept of Output 4 (Wastewater Quality Analysis) Training

- Procedure for Output 4 Training is as follows:
  - 1st Step: Confirming Current Condition
  - 2nd Step: Holding Short Lecture and Showing Analysis Method
  - 3rd Step: On the Job Training (OJT)
  - 4th Step: Additional Training (If necessary)
- Main part of the training should be on an OJT basis.
- Draft SOP will be prepared by chief C/P and JET.
- Knowledge which is necessary for managing laboratory such as QA/QC and basic technique of analysis will be transferred through the conversations in the OJT.

(2) Activity 4.2: Analysis training, including COD, NO3-N, Oil for the 14 DFEAs are conducted in 5 selected DFEA for regional training.

Water Quality Analysis Training

Training for Oil, COD, and NO_3-N analysis was conducted in five selected DFEAs. During the OJT on such basic water quality analysis, NO2 analysis, preaparation of chemicals, laboratory safety management were also trained. It was observed that there was a problem in NO_3-N analysis training of some DFEAs due to the method of the analysis and procured glassware. USEPA analysis method doesn't descrived detail procedure of the analysis. Stack was found in the several glass culmns which JET supplied in the Project. Test to clear up the cause of the problem had been done in Japan. Finally, JET solved such problem. JET consequently held the training for NO_3-N analysis in the DFEAs and supplied new glassware in October 2010. However, it is necessary to hold additional NO_3-N analysis training for C/Ps to conduct the analysis by themselves. Record of the training is shown as follows:

Record of the Training for Oil and Grease Analysis

Month	Day	Subject / Venue	Attendees
2010 Feb.	2 (Tue)	Delivering the equipment and OJT for oil and grease in TAR	TAR
	3 (Wed)	Delivering the equipment and OJT for oil and grease in HOM	HOM
	4 (Thu)	Delivering the equipment and OJT for oil and grease in ALP	ALP
	7 (Sun)	Output 4 Coastal regional training, OJT, oil and grease in TAR	LTK, TAR
	8 (Mon)	Output 4 Central regional training, OJT, oil and grease in HOM	HOM, HAM
	9 (Tue)	Output 4 North regional training, OJT, oil and grease in ALP	ALP, IDL
	10 (Wed)	Output 4 Northeast regional training, OJT, oil and grease in DRZ	DRZ,HSK,RAQ
	11 (Thu)	Output 4 South1 regional training, OJT, oil and grease in DAMR	DAM, DAMR
	17 (Wed)	Output 4 South2 regional training, OJT, oil and grease in DAMR	SWD,DAR, QNT
	18 (Thu)	Supporting chemical arrangement in HOM, fixing conductivity meter in TAR	HOM, TAR
	22 (Mon)	Supplemental training of oil and grease analysis in DAM	DAM
	28 (Sun)	Supplemental training of oil and grease analysis in DRZ	DRZ, HSK, RAQ
2010 Mar.	1 (Mon)	Supplemental training of oil and grease analysis in ALP	ALP, IDL
	2 (Tue)	Move to TAR via Lab. of IDL, LTK DFEA	IDL, LTK
	3 (Wed)	Supplemental training of oil and grease analysis in TAR	TAR, LTK
	4 (Thu)	Supplemental training of oil and grease analysis in HOM	HOM, HAM

Record of the Training for NO_3 and COD Analysis

Month	Day	Subject / Venue	Attendees
2010 May	12(Wed)	Output 4 South1 regional training for NO_3 in DAMR	DAMR,DAM
	13(Thu)	Output 4 Central regional training for NO_3 in HOM	HOM, HAM
	16(Sun)	Output 4 Northeast regional training for NO_3 in DRZ	DRZ,HSK,RAQ
	17(Mon)	Output 4 North regional training for NO_3 in ALP	ALP, IDL
	19(Wed)	Output 4 Coastal regional training for NO_3 in TAR	TAR, LTK
	20(Thu)	Output 4 South2 regional training for NO_3 in DAMR	DAR, SWD, QNT
2010 Jun.	17(Thu)	Output 4 South1 regional training for Output 4 NO_3 in DAMR	DAM/ DAMR
	20(Sun)	Output 4 South2 regional training for Output 4 NO_3 in DAMR	SWD,DAR, QNT
	21(Mon)	Supplemental training on NO_3 in QNT	QNT
	22(Tue)	Supplemental training on NO_3 in DAM	DAM
	23(Wed)	Supplemental training on NO_3 in SWD	SWD
	24(Thu)	Supplemental training on NO_3 in DAR	DAR
	28(Mon)	Output 4 Coastal regional training for Output 4 NO_3 in TAR	TAR, LTK
	29(Tue)	Output 4 Central regional training for Output 4 NO_3 in HOM	HOM, HAM
	30(Wed)	Output 4 North regional training for Output 4 NO_3 in ALP	ALP, IDL
2010 Jul.	1(Thu)	Output 4 Northeast regional training for Output 4 NO_3 in DRZ	DRZ,HSK,RAQ
	4(Sun)	Preparation for COD with open reflux method in DAM	DAM,DAMR
	5(Mon)	Preparation for COD with close reflux method in DAM	DAM,DAMR
	7(Wed)	Supplemental training for NO_3 in DAM	DAM
	11(Sun)	Regional training for COD in DAMR	SWD,DAR, QNT
	12(Mon)	Output 4 Coastal regional training for COD in TAR	LTK, TAR
	13(Tue)	Output 4 Central regional training for COD in HOM	HAM, HOM
	14(Wed)	Output 4 North regional training for COD in ALP	IDL, ALP
	15(Thu)	Output 4 Northeast regional training for COD in DRZ	DRZ,HSK,RAQ
	19(Mon)	Regional training for COD in DAMR	DAM/ DAMR
2010 Oct.	21(Thu)	Output 4 Supplemental training for NO_3 in DAM	DAM
	24(Sun)	Output 4 Northeast regional training for Output 4 NO_3 in DRZ	DRZ,HSK,RAQ
	25(Mon)	Output 4 North regional training for Output 4 NO_3 in ALP	ALP, IDL
	26(Thu)	Output 4 North regional training for Output 4 NO_3 in HOM	HAM, HOM
2011 Mar.	30(Wed)	Output 4 Supplemental training for NO_3 in DAM	DAM
2011 Apr.	4(Mon)	Output 4 Supplemental training for NO_3 in DAM	DAM

(3) Activity 4.3: Training concerning reliability of analysis data for the 14 DFEAs is conducted in 5 selected DFEAs for regional training.

QA/QC activities listed below were discussed in the training for oil, NO_3-N, COD, and heavy metal analysis. Additionally, JET conducted two lecture trainings for QA/QC in regional DFEAs. The record of the training is shown below. RAQ, HSK DFEA C/Ps did not attend the first lecture training due to the shortage of transportation budget. However, they attended the second lecture training and were able to catch up at that time.

Contents of Laboratory Management Topics related to QA/QC

Quality Assurance (QA)	1. SOP 2. Record of analysis data, sampling data 3. Training record 4. Certification of AEC program 5. O/M manual 6. Laboratory manual
Quality Control (QC)	7. Calibration Curve 8. Blank analysis (discussed in the training) 9. Duplicate analysis 10. Detection Limit 11. AEC program (External QC) 12. Data Traceability

Record of the Training for QA/QC and Data Management

Month	Day	Subject / Venue	Attendees
2010 Oct.	31(Mon)	Output 4 Northeast regional training for data management and QA/QC in DRZ	DRZ
2010 Nov.	1(Tue)	Output 4 North regional training for data management and QA/QC in ALP	ALP, IDL
	2(Wed)	Output 4 Central regional training for data management and QA/QC in HOM	HOM, HAM
	3(Thu)	Output 4 Coastal regional training for data management and QA/QC in TAR	TAR, LTK
	8(Mon)	Output 4 South regional training for data management and QA/QC in DAM	DAM, SWD, DAR, QNT
	9(Tue)	Output 4 South regional training for data management and QA/QC in DAMR	DAMR
2011 Jan.	31(Sun)	Output 4 South regional training for data management and QA/QC in DAM	DAM, SWD, DAR, QNT
2011 Feb.	1(Tue)	Output 4 Central regional training for data management and QA/QC in HOM	HOM, HAM
	2(Wed)	Output 4 Coastal regional training for data management and QA/QC in TAR	TAR, LTK
	3(Thu)	Output 4 North regional training for data management and QA/QC in ALP	ALP, IDL
	6(Sun)	Output 4 Northeast regional training for data management and QA/QC in DRZ	DRZ
	7(Mon)	Output 4 Northeast regional training for data management and QA/QC in DAMR	DAMR

(4) Activity 4.4: Heavy metal analysis training using AAS for the 13 DFEAs (except Damascus DFEA) are conducted in 5 selected DFEAs for regional training.

This activity was conducted in the following procedures.

1) The 1st Activity (Mar. 2009)

Confirmation on conditions of metal analysis equipment in the DFEAs (DAM, DAMR, ALP, HAM, DRZ, LTK, HSK, IDL, SWD, DAR, and TAR) had been carried out by JET in March 2009, in order to grasp necessity of procurement and prepare installation plans.

2) Second Activity (January 2010)

Confirmation on conditions of heavy metal analysis with AAS in the DFEAs (ALP, DAM, DAMR, DAR, DRZ, HAM, HSK, IDL, LTK, SWE and TAR) had been carried out by JET from January 10-24, 2010 in order to grasp present levels and prepare the next trainings (from May 2010).

3) Third Activity (May – July 2010)

Theoretical and hands-on trainings on heavy metal analysis with AAS in 12 DFEAs (ALP, DAMR, DAR, DRZ, HAM, HOM, HSK, IDL, LTK, SWD, TAR and QNT) had been carried out by JET from May 19 to July 28, 2010. Contents of the trainings were considered based on the result of OJT

implemented in DAM DFEA in Phase 1. In other words, the achievement in Phase 1 was set as the goal in Phase 2. The trainings were conducted basically in order, as shown in the following table.

Training Contents on Heavy Metal Analysis

Training No.	Title
1	Sampling and preservation for metal analysis (T/HO)
2	Principle of atomic absorption spectrophotometry (T)
3	Basic condition for analysis on AAS (T)
4	Interference in atomic absorption spectrophotometry (T)
5	Preparation of apparatus for metal analysis (HO)
6	Handling toxins (T/HO)
7	Preparation of calibration curve and determination method (T/HO)
8	Basic AAS operation (flame and furnace) (HO)
9	Hydride generating method (HO)
10	Cold vapor method (HO)
11	Pretreatment (HO)
12	Dilution (T)
13	Significant digits (T)
14	Statistics (T)
15	Data management (T/HO)

(T: theoretical, HO: hands-on)

Lecture trainings for heavy metal analysis were conducted with several DFEAs together until early June 2010, based on one of the original concepts of the project design. However, as hands-on trainings with AAS started, individual trainings in each DFEA using their own AAS had been increasingly required. JET responded to the requests and delivered trainings in 12 DFEAs. On the other hand, JET had to decrease the numbers of the trainings for each DFEA. Moreover, C/Ps should implement more self-trainings by themselves during JET's absence.

The record of trainings is shown in the table below. Some "Training No." (i.e., 1, 4 and 6) are not shown in the table because they were postponed until such time that they would be necessary through OJT, for better comprehension.

Record of the Training for Heavy Metal Analysis

Date	Venue	ALP	DMR	DAR	SWD	QNT	DRZ	HSK	RAQ	HAM	HOM	IDL	TAR	LTK
19-May	DMR		1-3	1-3	1-3	1-3								
20-May	DMR		7/8a											
24-May	DMR		5-7	5-7	5-7									
25-May	SWD				7									
26-May	DMR		7/8b	7/8a	7/8a									
30-May	HAM									2-5,7	2-5,7			
31-May	ALP	2-5,7										2-5,7		
1-Jun	ALP	7/8a												
2-Jun	TAR												2-5,7	2-5,7
6-Jun	DRZ						1-6	1-6						
7-Jun	HSK							7/8a						
8-Jun	HSK							7/8b						
9-Jun	DRZ						7/8a							
13-Jun	HAM									7/8a		7/8a		
14-Jun	TAR												7/8a	7/8a
15-Jun	SWD				7/8b									
16-Jun	DAR			7/8b										
20-Jun	HAM									7/8b				
21-Jun	ALP	7/8b												
22-Jun	ALP	7/8c												
23-Jun	TAR												7/8b	
27-Jun	DRZ						7/8b							
28-Jun	HSK							7/8c						
29-Jun	HSK							7/8d						
30-Jun	DRZ						7/8c							
4-Jul	HOM										Install -ation			
5-Jul	LTK													7/9
6-Jul	HAM									7/8c				
7-Jul	DMR		7/9											
12-Jul	IDL											7/8b		
13-Jul	ALP	7/8d												
14-Jul	TAR												7/9	
18-Jul	QNT					7/8								
19-Jul	SWD				7/8c									
20-Jul	DMR		7/8c											
21-Jul	DAR			7/8c										
26-Jul	IDL											7/8c		
27-Jul	LTK													7/8b
28-Jul	HOM										7/8			

Numbers in the table: Training No. (as mentioned in table “Training contents” in previous page)
a – d: repeated trainings

Through the trainings conducted until this time, several contents had already been implemented. In the next period (from Dec. 2010 to Feb. 2011), the contents shown below were planned to be conducted. Training Nos. 1, 6, 9, and 10 partially took place but should still be conducted in several other DFEAs.

4) Fourth Activity (Dec. 2010 – Mar. 2011)

Theoretical and hands-on trainings on metal analysis with AAS in 12 DFEAs (ALP, DAMR, DAR, DRZ, HAM, HOM, HSK, IDL, LTK, SWD, TAR and QNT) had been carried out by JET from December 9, 2010 to March 3, 2011. The record of trainings during this period is shown in the table below.

Training Record on Heavy Metal Analysis (2010-2011)

Date	ALP	DMR	DAR	DRZ	HAM	HOM	HSK	IDL	LTK	QNT	SWD	TAR
Former trainings	2,3,5,7	1-3	1-3	1-3,5-6	2,3,5,7	2,3,5,7	1-3,5-6	2,3,5,7	2,3,5,7	1-3	1-3	2,3,5,7
	7,8a	7,8a	5-7	7,8a	7,8a	Installation	7,8a	7,8a	7,8a	7,8a	5-7	7,8a
	7,8b	5-7	7,8a	7,8b	7,8b	7,8a	7,8b	7,8b	7,9	-	7	7,8b
	7,8c	7,8a	7,8b	7,8c	7,8c	-	7,8c	7,8c	7,8b	-	7,8a	7,9
	7,8d	7,9	7,8c	-	-	-	7,8d	-	-	-	7,8b	-
	-	7,8b	-	-	-	-	-	-	-	-	7,8c	-
	-	7/10	-	-	-	-	-	-	-	-	-	-
8-Dec			Cnfm								Cnfm	
9-Dec										7,8b		
12-Dec									Cnfm			Cnfm
13-Dec	Cnfm							7,8d				
14-Dec					Cnfm	Cnfm						
15-Dec		Cnfm										
20-Dec							7,8e					
21-Dec				7,8d								
13-Jan			7,8d									
17-Jan												9
18-Jan											9	
19-Jan										9(intr)		
24-Jan						1, 6, 12-14						
25-Jan	(cncl)							9				
26-Jan					1, 6, 11-14			1, 6, 11-14				
27-Jan		11-14										
31-Jan							9					
1-Feb				9								
3-Feb			9									
7-Feb									1, 6, 11-14			1, 6, 11-14
8-Feb												8c,11
9-Feb										5, 6,11 13,14		
10-Feb			11,12									
14-Feb				11-14			11-14					
16-Feb		(intr)										
17-Feb										(cncl)	(cncl)	
21-Feb					9	(cncl)						
22-Feb	9											
23-Feb						(cncl)						
24-Feb										9, 12		
28-Feb									7,8c			
1-Mar												4,7,8d
2-Mar			Maintenance,13,14									
3-Mar										8c,11		

Numbers in the table: Training No. (as mentioned in table "Training contents")

a – e: repeated trainings / cnfm: confirmation only / intr: interrupted by an accident (such as blackouts) / cncl: cancelled by CPs / blank cells: no trainings

(5) Activity 4.5: A sample SOP concerning the water quality analysis for the 14 DFEAs is prepared in 5 selected DFEAs for regional training.

The sample SOP for oil, NO_3-N, COD, and heavy metal analysis is prepared by JET, and revised by chief C/P. The sample SOP has been distributed to DFEAs in the training.

(6) Activity 4.6: Each DFEA conducts necessary analyses based on the trainings.

Each DFEA conducted water quality analysis in their regular monitoring and inspection. The analysis results were submitted to MSEA four times per year. Moreover, in Output 6, environmental report in 2010 including the water quality analysis results were also submitted to MSEA in 11 DFEAs.

(7) Activity 4.7: Each DFEA prepares SOPs concerning necessary water quality analyses.

DFEAs still find it difficult to prepare SOP by themselves as most of the analysis methods are written in English, making it hard for their staff to understand correctly.

(8) Activity 4.8: Each DFEA conducts necessary water quality analyses based on the SOPs.

As above mentioned in Activity 4.7, DFEAs conducted the necessary water quality analysis based on SOP prepared in Phase 1 and Phase 2.

2.4.4 Products of Activities

In the activities of Output 4, SOPs for COD, NO_3-N, oil and grease, and heavy metals analysis, were prepared. Contents of the SOP are as follows:

(1) SOPs for COD, NO_3-N, oil and grease analysis

Apparatus and chemicals necessary for the analysis, as well as the analysis procedure, are mentioned in the SOP. Reflecting the comments from C/Ps, wastewater standard values are listed in the SOP.

(2) SOP for heavy metal analysis

Contents of the SOP are as follows. The procedure of the analysis is mentioned in the SOP.

Contents of the SOP for Heavy Metal Analysis

1 Sampling procedure for metal analysis
2 Pretreatment procedures for general metals (except As and Hg)
3 Preparation of calibration curves for metal analysis
4 Procedure of operating AAS with flame method
5 Procedure of operating AAS with furnace method
6 Analysis of As
7 Analysis of Hg

(3) Documents for trainings on heavy metal analysis

Contents of the training documents, which were utilized by JET, are as follows:

Contents of the Documents for Trainings on Heavy Metal Analysis

1 Sampling and preservation for metal analysis (T/HO)
2 Principle of atomic absorption spectrophotometer (T)
3 Basic condition for analysis on AAS (T)
4 Interference in atomic absorption spectrophotometer (T)
5 Preparation of apparatus for metal analysis (HO)
6 Handling toxins (T/HO)
7 Preparation of calibration curve and determination method (T/HO)
8 Basic AAS operation (flame and furnace) (HO)
9 Hydride generating method (HO)
10 Cold vapor method (HO)
11 Pretreatment (HO)
12 Dilution (T)
13 Significant digits (T)
14 Statistics (T)
15 Data management (T/HO)

(T: theoretical, HO: hands-on)

2.4.5 Achievements of Output 4

(1) Achievements with PDM Indicator

Output 4 has been evaluated based on four indicators set in PDM.

<Indicator 4-1> SOP for water quality analysis is prepared in more than 7 DFEAs of the 9 DFEAs, except Damascus DFEA, which possess AAS.

Evaluation

SOP for COD, NO3-N, oil, and heavy metal analysis was prepared in 13 DFEAs, which possess AAS.

<Indicator 4-2> A (Acceptable) grade of the AEC Program is obtained for at least 6 parameters in each DFEA.

Evaluation

Chief C/P of Output 4 and JET reviewed the result of AEC Program 2008, 2009, and 2010. Moreover, the following facts are recognized:

Number of DFEAs which obtain A grade in at least six parameters has increased from six in 2008, and four in 2009, to ten in 2010. However, for instance, RAQ DFEA did not participate in the program, even if JET and MSEA included them in their recommendation. In this case, it is difficult to achieve the indicator. Therefore, DFEAs should increase their number of parameters to be applied in the AEC program. Results of the AEC program are summarized in Annex 2-4.

< Indicator 4-3> The number of possible analytical parameter is increased by 8 different parameters more on average in 9 DFEA , which possess AAS.

Evaluation

Progress of DFEAs is evaluated in a certain level as explained below. Original levels were confirmed in Jan. 2010 and are compared with updates such as achievements in July 2010, December 2010 and March 2011. Generally, progress levels shown here are composed of both results from the trainings by JET and from C/Ps' self-trainings. On the other hand, the results of December 2010 were achieved only by C/Ps.

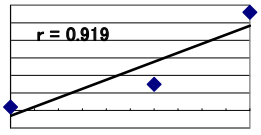
1) Measurement level

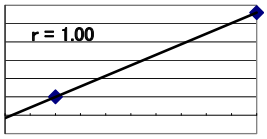
The measurement levels (original and progress until March 2011) in the DFEAs are summarized in the following table. Each item is evaluated as 0 to 4 level such as:

- : no available equipment installed,

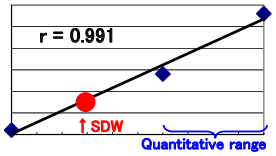
0 : never measured,

1 : measurement is conducted but without sufficient result (less than 3 points in calibrations and/or coefficient of determination (R^2) is less than 0.99),

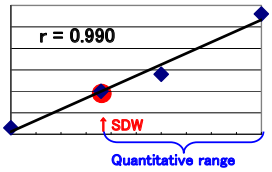


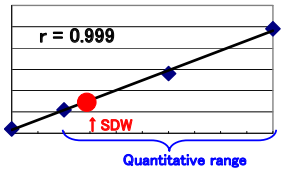


2 : calibration curves can be drawn (with 3 or more points, and R^2 >= 0.99). However, measurement of the standard value for discharged water (SDW) is not included in the quantitative range as it is unavailable. It means that the condition is not accurate enough to measure the concentration of SDW.



3 : calibration curves can be drawn (with 3 or more points, R^2 >= 0.99) and SDW is included in the quantitative range. This means that the concentration of SDW can be measured





accurately.

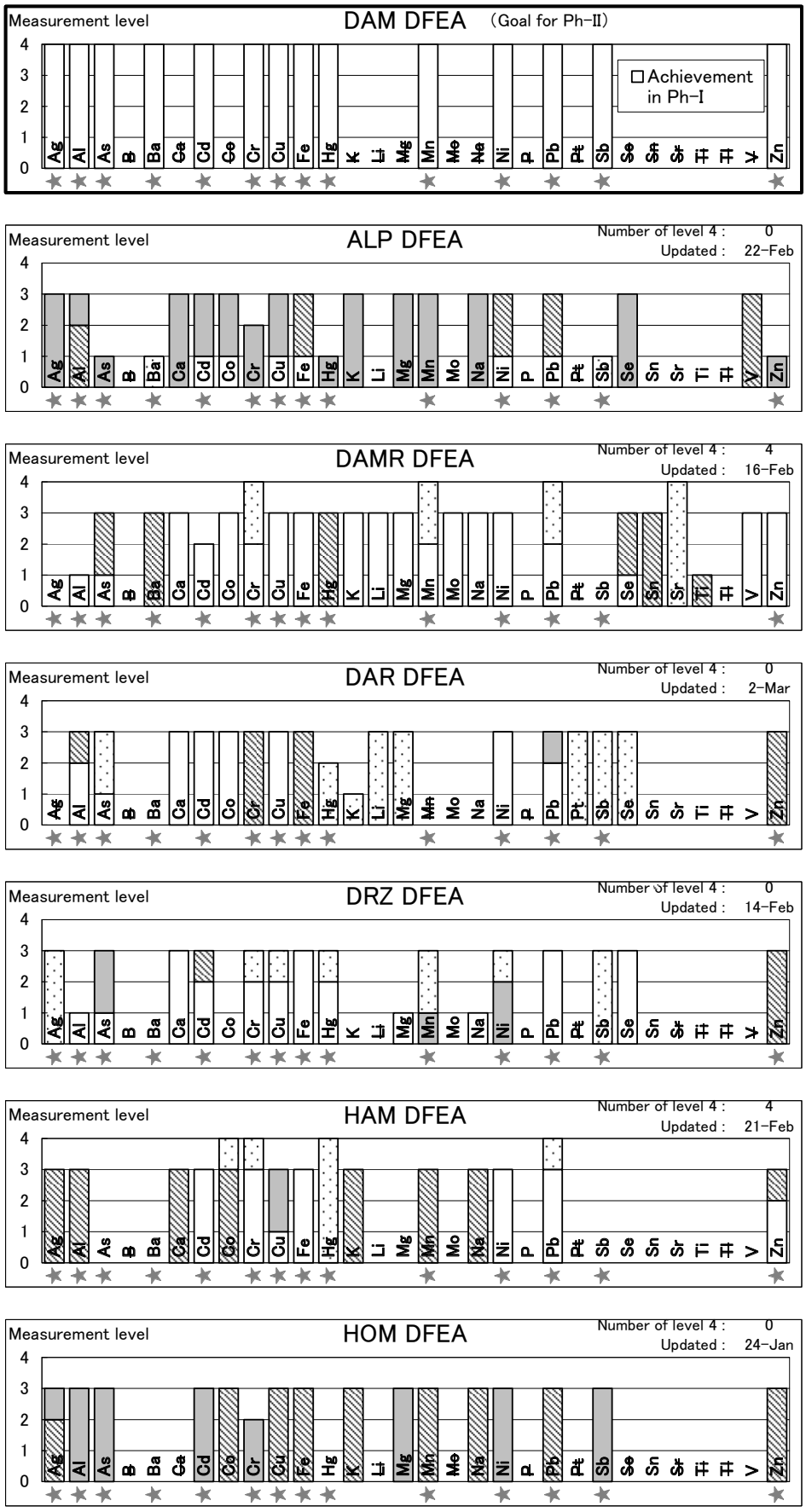
4 : DFEA can pretreat and measure samples.

The measurement levels for the DFEAs are shown in the following tables and charts. These show the original and progress level conditions (made up to March 2011).

Measurement Levels for Each Item in the DFEAs (as of March 2011)

	ALP	DAMR	DAR	DRZ	HAM	HOM	HSK	IDL	LTK	QNE	SWE	TAR	SDW
Ag	3	0	-	3	3	3	3	-	3	-	-	3	++
Al	3	1	3	1	3	3	3	3	0	3	0	3	++
As	1	3	3	3	0	3	3	0	3	3	3	3	++
B	-	-	-	0	-	-	-	-	-	-	-	-	
Ba	1	3	0	0	0	0	1	3	0	4	0	3	++
Ca	3	3	3	3	3	-	1	0	3	0	0	-	
Cd	3	2	3	3	3	3	3	3	3	1	3	4	++
Co	3	3	3	0	4	3	1	0	3	0	0	-	
Cr	2	4	3	3	4	2	3	3	3	4	3	3	++
Cu	3	3	3	3	3	3	3	3	3	3	3	4	++
Fe	3	3	3	3	3	3	3	3	1	3	3	4	++
Hg	1	3	2	3	4	0	3	3	3	3	2	2	++
K	3	3	1	0	3	3	1	1	3	0	1	3	
Li	0	3	3	-	0	-	0	0	-	0	3	-	
Mg	3	3	3	1	0	3	1	0	3	0	0	3	
Mn	3	4	-	3	3	3	3	3	3	3	-	3	++
Mo	0	3	0	0	0	-	1	0	-	0	0	-	
Na	3	3	0	1	3	3	1	0	3	3	3	1	
Ni	3	3	3	3	3	3	3	3	3	3	3	4	++
P	0	0	-	0	0	-	-	0	-	0	0	-	
Pb	3	4	3	3	4	3	3	3	3	3	3	4	++
Pt	-	-	3	-	-	-	-	-	-	-	-	-	
Sb	1	0	3	3	0	3	3	3	0	4	-	3	++
Se	3	3	3	3	0	-	0	0	3	4	3	3	
Sn	0	3	0	0	0	0	0	0	0	0	0	0	
Sr	0	4	0	-	0	-	0	0	0	0	-	0	
Ti	0	1	0	-	0	-	-	0	-	0	0	-	
Tl	-	-	-	-	-	-	0	-	-	-	-	-	
V	3	3	0	-	0	0	0	0	-	-	0	4	
Zn	1	3	3	3	3	3	3	3	3	3	3	4	++

++SDW: Items from Standards for Discharged Water in Syria
Measurement levels:
- / not equipped,
0 / not measured,
1 / measurement without sufficient result,
2 / calibration curves can be drawn (with 3 or more calibrations, r >= 0.99) but not available for the SDW,
3 / calibration curves can be drawn (with 3 or more calibrations, r >= 0.99) and available for the SDW if it exists,
4 / DFEA can pretreat and measure samples accurately



【Measurement level】

- / not equipped,

0 / not measured,

1 / measurement without sufficient result,

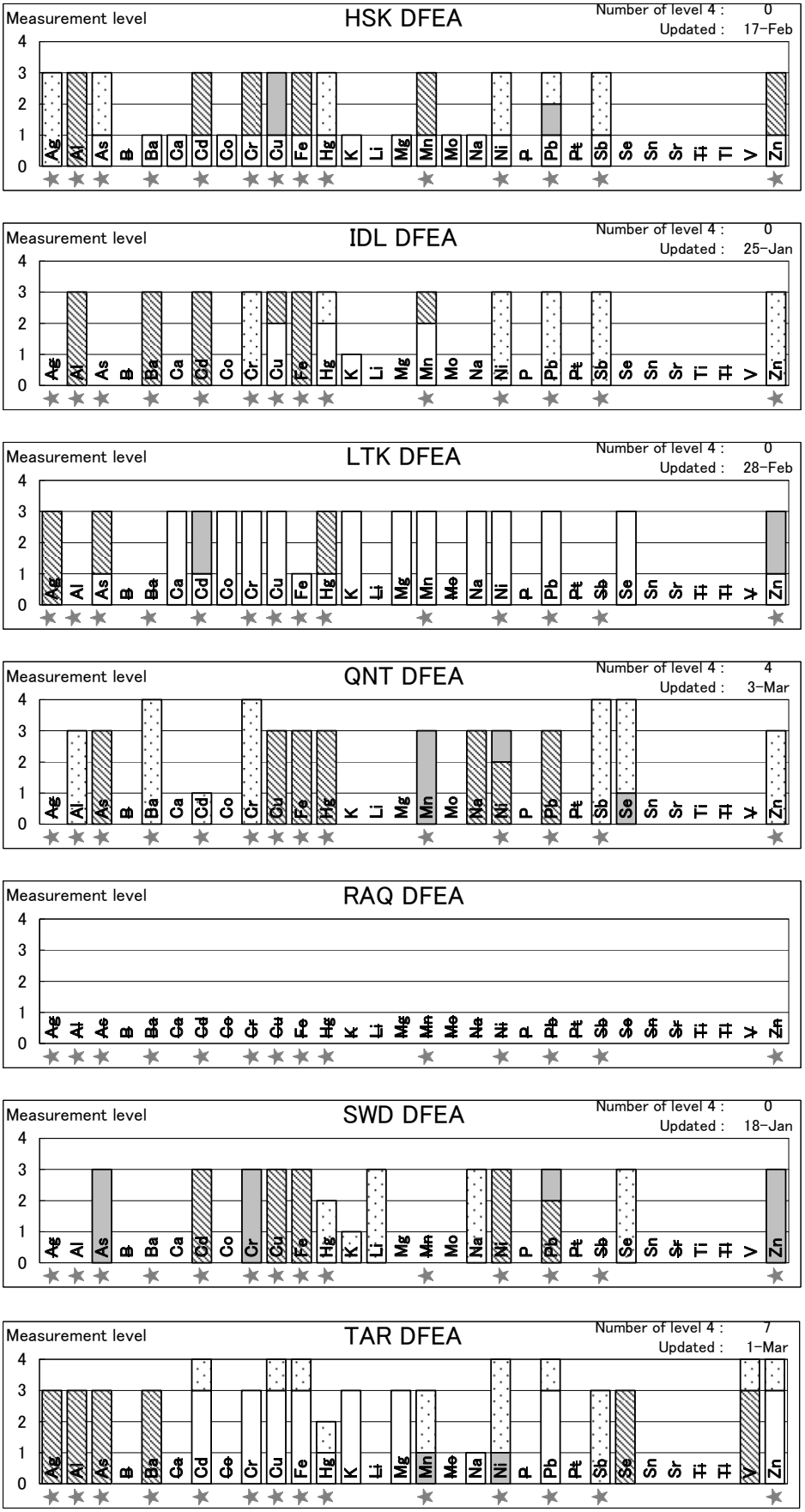
2 / calibration curves can be drawn (with 3 or more calibrations, r >= 0.99) but not available for the SDW,

3 / calibration curves can be drawn (with 3 or more calibrations, r >= 0.99) and available for the SDW if it exists,

4 / DFEA can pretreat

★ :
Items with the standard value for discharged water

Measurement Levels in the DFEAs as of March 2011 (1)



【Measurement level】

- / not equipped,

0 / not measured,

1 / measurement without sufficient result,

2 / calibration curves can be drawn (with 3 or more calibrations, r >= 0.99) but not available for the SDW,

3 / calibration curves can be drawn (with 3 or more calibrations, r >= 0.99) and available for the SDW if it exists,

4 / DFEA can pretreat

★ :
Items with the standard value for discharged water

Measurement Levels in the DFEAs as of March 2011 (2)

2) Status of DFEAs

The current conditions and abilities of each DFEA with regards to heavy metal analysis as of March 2011 are summarized in the table below.

Status of DFEAs (as of March 2011)

DFEA	Received Trainings*)															Sample Pretreat -ment	Available methods on AAS				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		Flame Air-Ace	Flame N_2O-Ace	Furnace	Hydride Generation	Cold Vapor
ALP		■	■		■		■	■	■	NA						**MW****)	✔	✔	✔	✔	**NA**
DAMR	■	■	■		■	■	■	■	■	■	■	■	■	■		**DC**	✔	✔	✔	✔	✔
DAR	■	■	■		■	■	■	■	■		■	■	■	■		**DC/MW**	✔	✔	✔	✔	-
DRZ	■	■	■		■	■	■	■	■	NA	■	■	■	■		**DC/MW**	✔	-	✔	✔	**NA**
HAM	■	■	■		■	■	■	■	■	NA	■	■	■	■		**DC/MW**	✔	✔	✔	✔	**NA**
HOM	■	■	■		■	■	■	■		NA		■	■	■		**-**	✔	✔	✔	-	**NA**
HSK	■	■	■		■	■	■	■	■	NA	■	■	■	■		**DC**	✔	✔	✔	✔	**NA**
IDL	■	■	■		■	■	■	■	■	NA	■	■	■	■		**DC/MW**	✔	✔	✔	✔	**NA**
LTK	■	■	■		■	■	■	■	■	NA	■	■	■	■		**DC**	✔	-	✔	✔	**NA**
QNT	■	■	■		■	■	■	■	■	NA	■	■	■	■		**Ventilator**	✔	✔	✔	✔	**NA**
SWD	■	■	■		■	■	■	■	■	NA						**-**	✔	-	✔	✔	**NA**
TAR	■	■	■		■	■	■	■	■	NA	■	■	■	■		**DC**	✔	✔	✔	✔	**NA**

Shadowed: conducted, ✔: confirmed, -: not confirmed, NA: not applicable, DC: draft chamber, MW: microwave
*) Refer to the table "Training contents", **) Not Working as of March 2011

Training Contents

Training No.	Title
1	Sampling and preservation for metal analysis (T/HO)
2	Principle of atomic absorption spectrophotometry (T)
3	Basic condition for analysis on AAS (T)
4	Interference in atomic absorption spectrophotometry (T)
5	Preparation of apparatus for metal analysis (HO)
6	Handling toxins (T/HO)
7	Preparation of calibration curve and determination method (T/HO)
8	Basic AAS operation (flame and furnace) (HO)
9	Hydride generating method (HO)
10	Cold vapor method (HO)
11	Pretreatment (HO)
12	Dilution (T)
13	Significant digits (T)
14	Statistics (T)
15	Data management (T/HO)

3) Summary

The indicator mentions that the number of possible analytical parameters has increased by eight different parameters or more on average, in nine DFEAs, which possess AAS. In fact, 12 DFEAs have already achieved more than 11 or more possible analytical parameters. The difference between level 3 and 4 is whether pretreated samples are measured or not. Nine DFEAs have already learned the methods for pretreatment. Thus, it is potentially possible for them to reach level 4 in subsequent activities. Moreover, the other three DFEAs can learn from trainings on pretreatment, which could be shared by nearby DFEAs who participated in such training.

Numbers of Items with Measurement Level 3 or 4 (as of March 2011)

	ALP	DAMR	DAR	DRZ	HAM	HOM	HSK	IDL	LTK	QNE	SWE	TAR
Lv.3	15	17	16	14	11	15	13	12	16	10	11	10
Lv.4	0	4	0	0	4	0	0	0	0	4	0	7
Total	15	21	16	14	15	15	13	12	16	14	11	17

< Indicator 4-4> Water quality analyses with preparation of reagent are able to conduct for at least 1 parameter in more than 11 DFEAs.

Evaluation

Through the training on COD, NO_3-N, oil and grease, and heavy metal analysis, most DFEAs are able to dilute acids and measure the weight of chemicals. For example, it is possible to evaluate which DFEA could reach measurement level 3 in terms of heavy metal analysis for diluting standard solution, and which DFEAs could prepare reagent by themselves.

(2) Challenges for Further Capacity Improvement

To increase the number of measureable parameters, the following table would be the target list of the self-training. The parameters listed under the second column below are intended for those who achieved measurement level 3. If C/Ps tried to measure the parameter during their self-training, it would be regarded as a measurable parameter.

Action Assignments for Heavy Metal Analysis in the Future

DFEA	Parameters to be Analyzed with Pretreated Samples	Parameters whose Levels are to be Improved	Others
1) Aleppo	-	As, Ba, Cr, Hg, Sb, Zn	To enable microwave
2) Rural Damascus	As, Ba, Cu, Fe, Hg, Ni, Zn	Ag, Al, Cd, Sb	-
3) Dara'a	Al, As, Cd, Cr, Cu, Fe, Ni, Pb, Sb, Zn	Ba, Hg	-
4) Deir ez Zor	Ag, As, Cd, Cr, Cu, Fe, Hg, Mn, Ni, Pb, Sb, Zn	Al	-
5) Hama	Ag, Al, Cd, Cu, Fe, Mn, Ni, Zn	Ba, Sb	-
6) Homs	-	Cr	To enable draft chamber
7) Hasakeh	Ag, Al, As, Cd, Cr, Cu, Fe, Hg, Mn, Ni, Pb, Sb, Zn	Ba	-
8) Idleb	Al, Ba, Cd, Cr, Cu, Fe, Hg, Mn, Ni, Pb, Sb, Zn	As	-
9) Lattakia	Ag, As, Cd, Cr, Cu, Hg, Mn, Ni, Pb, Se, Zn	Al, Fe	-
10) Quneitra	Al, As, Cu, Fe, Hg, Mn, Ni, Pb, Zn	Cd	-
11) Sweida	-	Hg	Trial for pretreatment
12) Tartous	Ag, Al, As, Ba, Cr, Mn, Sb	Hg	-

For futher capacity improvement, problems obstructing activities or progress should be solved. Through hands-on trainings with AAS, JET found problems in each DFEA as shown below. Countermeasures mentioned in the table are strongly recommended to be taken by DFEAs.

Problems and Countermeasures (up to March 2011)

DFEA	Sources	Problems / Status	Countermeasures
1) ALP	Gas supply	-Short, a training cancelled/ procured later	-Storing spares, budget planning
	Microwave	-Exploded, pretreatment disabled/ not solved	-Repairing
2) DAMR	Electricity	-Power failure, a training cancelled	-No effective countermeasure for long-period power failure
3) DAR	Hg reaction bottle	-Short, a training postponed	-To be procured by JET
4) DRZ	N_2O-Ace. Method	-Flame produces unbearable loud noise	-To be recovered by replacing gas cylinders (according to the supplier)
5) HAM	Hydride generator	-Not installed, a training postponed / installed later	-Solved
6) HOM	Pretreatment facility	-Absence	-Procuring
	Hydride generator	-Not installed, a training postponed/ installed later	-Solved
	Laboratory	-Soaked after a heavy rain, a training cancelled	-Not confirmed
7) HSK	Nebulizer	-Not confirmed	-Not confirmed
	Autosampler	-Alignment failure, a training for a manual method required	-Conducting maintenance
8) IDL	Assignment	-No technical transfer to new CPs, repetition of the same trainings required	-Conducting technical transfer
9) LTK	Gas supply	-Short, trainings cancelled / procured later	-Storing spares, budget planning
	Lamps	-Short, standard items cannot be measured	-Procuring
	Standard solutions	-Short, standard items cannot be measured	-Procuring
10) QNT	Hydride generator's cell	-Ruined by heat, a training postponed/ replaced later	-Solved
	UPS	-Power failure, a training postponed / fixed later	-Solved
	Fuse of AAS	-Finished, a training cancelled / replaced later	-Solved
11) SWD	N_2O gas facility	-Not installed, no OJTs	-To be installed
	Draft chamber	-Not installed, no OJTs	-To be installed
12) TAR	Absorbance	-Not measured for Cr, the solution interrupted by wavelength calibration	-Not confirmed
	Wavelength calibration	-Not executed, a training cancelled	-Not confirmed

2.5 Output 5: Strengthen Capabilities for Stack Emission Measurement (Gases and Particulate Matter)

2.5.1 Background Information

In Phase 1 Project, conducted from 2005 to 2007, measurement of air pollutants in the ambient air, such as NO_2, SO_2, O_3, NH_3, TSP, PM10 and Pb in TSP had been introduced in Syria. After Phase 1, ex-MOLAE introduced full auto and hourly air quality monitoring stations to Damascus and Aleppo DFEAs, while mobile cabins for air quality monitoring were introduced to Rural Damascus and Lattakia DFEAs. Furthermore, additional full auto and hourly air quality monitoring stations and mobile cabins for air quality monitoring were procured by MSEA.

As for stack emission measurement/flue gas measurement, MSEA provided as one of the mobile laboratory equipment, a flue gas measuring equipment, TESTO 350 XL, to six DFEAs, namely: Rural Damascus DFEA, Aleppo DFEA, Homs DFEA, Deir Ezzor DFEA, Sweida DFEA and Tartous DFEA in 2005,. However, almost all these equipment have not been used until 2009, since lecture training for using the equipment was only conducted once by MSEA in May 2005.

In Phase 2, the equipment for flue gas measurement was procured in Japan and delivered to five selected DFEAs functioning as regional training center in March 2010. Training on both flue gas measuring equipment, TESTO 350 XL, and equipment for dust/particulate matter was conducted in the regional training.

It is noted that it was the first time for a Syrian government agency to conduct stack emission measurement, especially dust measurement. In order to implement pollution control through enforceable measures, and to conduct inspection effectively, it is essential to conduct flue gas measurement for the stack of the factories.

2.5.2 Outline of Output 5

The PDM defines Output 5 to be attained, as follows:

Output 5: Capabilities concerning measurement of stack emissions (gases and particulate matter) are strengthened.

The capacity development defined in Output 5 is designed with four sequentialial activities. The following tables show i) Revised PO for Output 5 including the progress or expected schedule of each activity, and ii) the details of activities. The revised PDM defined Output 5 to be attained, as follows:

Plan of Operation for Output 5

Joint implementation of JET and Syrian C/P | Continuous implementation by Syrian side | Canceled

Output 5: Stack Emission Measurement			JFY 2008/2009 (SFY 2009: 3 4 5 6 7 8 9 10 11 12)	JFY 2010 (SFY 2010: 1 2 3 4 5 6 7 8 9 10 11 12)	JFY 2011 (SFY 2011: 1 2 3 4 5 6 7 8 9 10 11 12; SFY 2012: 1 2 3)	JICA Expert in Charge
5.1	MSEA prepares stack emissions (gases and particulate matter) measurement training plan, and manages the implementations.	Plan				Takahashi Hirao
		Actual & Expected				
5.2	Stack emissions (gases and particulate matter) measurement training using portable stack emissions (gases and particulate matter) measurement equipment for 14DFEAs are conducted in 5 for regional training.	Plan				Hirao
		Actual & Expected				
5.3	A SOP concerning the stack emissions (gases and particulate matter) measurement for 14 DFEAs is prepared in 5 for regional training.	Plan				Hirao
		Actual & Expected				
5.4	Each DFEA conducts necessary stack emissions (gases and particulate matter) measurement based on the SOP.	Plan				Hirao
		Actual & Expected				
Main	**Hirao**					
Sub	**Takahashi**					

As of December 2011

Details of Activities of Output 5

Activities of C/P Side	Technical Supports to be Provided by JET	Target C/P
MSEA prepares stack emissions (gases and particulate matter) measurement training plan, and manages the implementations.	（2009） - Supporting MSEA in surveying existing flue gas analyzers and isokinetic dust samplers which belong to DFEAs. - Supporting MSEA in preparing stack emission measurement training plan. - Supporting DFEAs in selecting factories to be measured. - Supporting DFEAs in designing a flange for measuring hole, and providing technical support for manufacturing flange. - Supporting JICA in procuring the equipment for stack emissions (gases and particulate matter) measurement. （2010 to 2011） - Supporting MSEA in revising stack emission measurement training plan, if necessary.	MSEA 14 DFEAs
DFEAs shall select the factories which can accept trial measurement for training and installation of flange to a stack.	（2010） - Supporting DFEAs in selecting factories to be measured. - Technical support to DFEAs on how to install flange on selected stacks.	Regional training in 5 selected DFEAs (Dier Ezzor, Aleppo, Tartous, Homs, Rural Damascus) for 14 DFEAs
C/Ps from 14 DFEAs receive stack emission measurement trainings (gases and particulate matter) by mobile gas analyzer and isokinetic sampling device.	（2010 to 2011） - Training for measurement of gaseous component (SO_2, NOx, CO) in stack emission. - Training for measurement of dust in stack emission. - Training on how to minimize the error of stack emission measurement. - Training on how to use MS Excel for calculating gases and particulate concentration.	(2010) Regional training in 5 selected DFEAs (Dier Ezzor, Aleppo, Tartous, Homs, Rural Damascus) for 14 DFEAs (2011) Ditto.
C/Ps from 14 DFEAs prepare a SOP concerning the stack emissions (gases and particulate matter) measurement at 5 (North, North-East, South, Central, Coastal Area) selected DFEAs for regional training.	（2010 to 2011） - Training on how to prepare basic SOP to be used commonly. - Lecture training on measurement in individual industrial sector, with special care.	(2010) Regional training in 5 selected DFEAs (Dier Ezzor, Aleppo, Tartous, Homs, Rural Damascus) for 14 DFEAs (2011) Ditto.
Each DFEA conducts necessary stack emissions (gases and particulate matter) measurement based on the SOP.	（2010 to 2011） - Training on how to select target factories. - Technical training for minimizing measurement error. - Technical training for primitive interpretation of measured data. - Supporting DFEAs in revising SOP based on the lesson learned during measurement.	(2010) Regional training in 5 selected DFEAs (Dier Ezzor, Aleppo, Tartous, Homs, Rural Damascus) for 14 DFEAs (2011) Ditto.
Each DFEA identifies the technical issues of stack emission measurement and revise each SOP based on countermeasure for issues.	（2011） - Wrap-up seminar for self-sustained measurement based on the lesson learned during measurement. - Wrap-up seminar on each DFEA-oriented SOP, on how to minimize measurement error, and coordination of Outputs 1, 2 and 6. -. Supporting in sustainable stack emission measurement being adapted according to each DFEA's situation.	Regional training in 5 selected DFEAs (Dier Ezzor, Aleppo, Tartous, Homs, Rural Damascus) for 14 DFEAs
Each DFEA continue to conduct stack emission (gases and particulate matter) measurement based on the SOP.	（2012） - Advisory activity for sustainable stack emission measurement applicable for each DFEA. - Support in coordinating activities of Outputs 1 and 2. - Supporting in inspectin factories. - Training for data management of stack emission measurement (QA/QC).	Regional training in 5 selected DFEAs (Dier Ezzor, Aleppo, Tartous, Homs, Rural Damascus) for 14 DFEAs

2.5.3 Activity Achievement

(1) Activity 5.1: MSEA prepares stack emissions (gases and particulate matter) measurement training plan, and manages the implementations.

Chief C/P in MSEA and JET jointly prepared the training plan for stack emission measurement (gases and particulate matter). In order to implement the training on schedule, chief of laboratory together with another personnel (the head of inspection department or person in charge of air measurement) visited the factories of candidate sites in February and March 2010 to confirm their condition to receive the training under the supervision of chief C/P. The activities are summarized in the following table.

Visited Factories for Stack Emissions Measurement Training

	DAMR	HOM	HAM	TAR	ALP
Date of visit in factories	3 Mar., 2010	16 Feb., 2010	2 Mar., 2010	1 Mar., 2010	17 Feb., 2010
Date of pre-discussion with director	2 Feb., 2010	3 and 4 Feb., 2010	2 Feb., 2010	10 Feb., 2010	4 Feb., 2010
Visited factories	Adra Cement Factory Annnama detergent	Homs Refinery Company General Company for Fertilizers	General Company for Cement Factory No.1 Mhardeh Power Plant General Company for Iron and steel	Tartous Cement Factory Banyas Thermal Power Plant Al Wahieb (Steel) Banyas Refinery Company	Shiekh Saied Cement Company- Shahba Factory Aleppo Power Plant Jibreen Steel Factory
Applicability of receiving training on average.	OK	OK	OK	OK	OK
Remarks	1) Public factories visited are very cooperative to receive flue gas measurement training. 2) Most of power plants have existing hole for sampling (flange). 3) Factories which do not have existing hole will prepare flange before training except Tartous Cement.				

Also, the chief C/P in MSEA with JET prepared the training plan. The contents of the training are mentioned in the following table.

Contents of the Training for Output 5

Item	Training Contents	Purpose
Lecture training	• General method of stack emission measurement • Notes about the investigation • Method of estimating the pollutants concentration • Assessment procedure of measurement result	Understanding the basic knowledge of stack emission measurement
Basic practical training	• Handling of stack emission measuring instrument (Orsat (O_2, CO_2, CO) and DUSTAC sampler) • Preliminary measurement training in the factory	Skillful handling of stack emission measuring instrument
Additional lecture training	• Pollutants concentration expectation in the exhaust gas • Filling in the measurement data sheet • Applying the measured data for environment protection (energy saving) • Assigning stack emission measurement work • Developing calibration system in Syria • Training on SOP preparation	Understanding the concept of inspection Hold the responsibility as a consultant inspector with pride.
Practical training	• Handling of stack emission measuring instrument (TESTO (O_2, CO_2, CO, NO, NO_2, SO_2) and DUSTAC sampler) • Conducting training of stack emission measurement in the factories. • Extracting the problems in stack emission measurement	Obtaining the inspection technology through the practical training. Extracting the problems of inspection.

(2) Activities 5.2 to 5.3: Stack emissions (gases and particulate matter) measurement training using portable stack emissions measurement equipment for 14DFEAs is conducted in 5 for regional training. And a SOP concerning the stack emissions measurement for 14 DFEAs is prepared in 5 for regional training.

1) First Training (June to November, 2010)

JET executed basic lecture and practical trainings for stack emission measurement. Then, C/Ps of 14 DFEAs prepared SOP for Orsat (CO_2, O_2, CO) and dust measurement in cooperation with JET. These activities are summarized in the following table.

Summary of Lecture and Practical Training for Flue Gas Measurement (1)

Date	Training	Technical Supports to be Provided by JET
Jun - Aug 2010	Lecture training	1. Method of measuring smoke and soot in flue gas (basic version) • Summary of measurement • Composition of measuring instrument • Preparation of measurement • Procedure of measurement • Measuring method • Checking of measurement result • Record of measured values 2. Importance of isokinetic sampling 3. SOP for the method of measuring dust in flue gas • Outline of measuring method • Handling flow • Point of preparation • Method of measurement • Checking of measurement result 4. SOP for the Orsat flue gas analyzer
	Basic practical training (1)	1. Handling of stack emission measuring instrument (DASTAC sampler and Orsat gas analyzer) 2. Basic practical training of emission measurement of the combustion facilities using DASTAC sampler and Orsat gas analyzer. • DAMR (DAM): Adra Cement Factory • DAMR (SWD/ DAR/ QNT): Adra Cement Factory • HOM (HAM): Homs Refinery Company • ALP (IDL): Electric Power Generation Aleppo • TAR (LTK): Banyas General Company Generation • DRZ(HSK/ RAQ): Deir Ezzor Sugar Co.
Sep – Nov 2010	Additional lecture training	1. Calibration certificate of "TESTO" and suggestion toward the future 2. Suggestion for measuring and rinsing cycles in toxic sensors 3. Relations between CO_2 and SO_2 concentration 4. Assuming air pollution gas concentration range in chimney exhaust gas 5. Inspection record sheet 6. Energy saving and environmental protection by combustion control 7. Working assignment of stack emission measurement 8. About installation of the measurement hole
	Basic practical training (2)	1. Handling of stack emission measuring instrument (TESTO gas analyzer) 2. Basic practical training of emission measurement of the combustion facilities using DASTAC sampler and TESTO gas analyzer. • DAMR (DAM): Daaboul Soap Factory • DAMR (SWD/ DAR/ QNT): Daaboul Soap Factory • HOM (HAM): Homs Sugar Co. • ALP (IDL): Undecided • TAR (LTK): Banyas General Company Generation • DRZ(HSK/ RAQ): Deir Ezzor paper Co. (Schedule)
Remarks	1) Measurement hole (flange) installation for combustion facilities of the factory is delayed. JET showed the installation position of the flange in the figure, made 20 flanges, and supported installation promotion. 2) JET proposed to develop a calibration system in Syrian side for TESTO350S/XL using standard gasses.	

2) Second Training (January to March, 2011)

JET has executed lecture and practical trainings for stack emission measurement. Then, C/Ps of 14 DFEAs have amended SOP for TESTO 350 M/XL (CO_2, O_2, CO, NO, NO_2, SO_2), and dust measurement in cooperation with JET. The activities are summarized in the following table.

Summary of Lecture and Practical Training for Flue Gas Measurement (2)

Date	Training	Technical Supports to be Provided by JET
Jan - Mar 2011	Preparation in advance of the measurement	1. Preparation and reconfirmation of practical training • Decision of measuring object factory • About necessary materials for the field investigation • Preparation for preprocessing device and moisture absorption bottle • Reconfirmation of measuring method • Calculation of dust concentration • About the measurement frequency • Conversion factor of ppm and mg/m^3 (Flue gas and Ambient air) 2. Energy saving and environmental protection by combustion control 3. Working range of person in charge of flue gas measurement 4. Contents confirmation of SOP
	Practical training	1. Handling of stack emission measuring instrument (DASTAC sampler and TESTO 350 M/XL gas analyzer) 2. Practical training of emission measurement of the combustion facilities using DASTAC sampler and TESTO 350 M/XL gas analyzer. • DAMR (DAM): Heating furnace of the OURFALI & Co. (Balkis Ceramic Industry) Boiler of the Daaboul Soap Factory Heating furnace of aluminum factory (MADAR Machinery) • DAMR (SWD/ DAR/ QNT): Boiler of the DAR Ba'albaki Co. Boiler of the dairy products factory Boiler of the DAR Ba'albaki Co. (2) • HOM (HAM): Homs Refinery Company Power boiler of HAM Mhardeh Public Generation Company Heating furnace of the Homs Refinery Power boiler of the Homs Refinery • TAR (LTK): Heating furnace of Al Wahieb Co. (Steel factory) M & M Abdel Razzak (Tartous Olive Oil Extraction Machinery) Heating furnace of LAT NMISHO Steel Plant S.A • ALP (IDL): Electric Power Generation Aleppo Power boiler of Electric Power Generation Aleppo Heating furnace of SARKIS TUFENKJI & CO. (Hot Rolling Mills) • DRZ(HSK/ RAQ): Deir Ezzor Sugar Co. Paper factory （No.1 boiler） Paper factory （No.2 boiler）

(3) Activity 5.4: Each DFEA conducts necessary stack emissions (gases and particulate matter) measurement based on the SOP.

1) First Training (June to November, 2010)

In October 2010, JET and chief C/P started the basic practical training for dust and emission gases measurement based on the SOP. The training records are listed as follows:

Records of the Training for Output 5 (1)

Month	Day	Contents	DFEA	No. of C/Ps
2010 Jul.	1 (Thu)	Stack emission measurement basic lecture training	HOM/ HAM	8
	4 (Sun)	Basic lecture training and handling of Orsat gas analyzer	HOM/ HAM	8
	5 (Mon)	Stack emission measurement basic lecture training	ALP/ IDL	7
	6 (Tue)	Basic lecture training and handling of Orsat gas analyzer	ALP/ IDL	5
	7 (Wed)	Stack emission measurement basic lecture training	DRZ/ HSK/ RAQ	5
	8 (Thu)	Basic lecture training and handling of Orsat gas analyzer	DRZ/ HSK/ RAQ	4
	11 (Sun)	Stack emission measurement basic lecture training	LTK/ TAR	10
	12 (Mon)	Basic lecture training and handling of Orsat gas analyzer	LTK/ TAR	4
	13 (Tue)	Stack emission measurement basic lecture training	DAM/ DAMR SWD/ DAR/ QNT	14
	14 (Wed)	Basic lecture training and handling of Orsat gas analyzer	DAM/ DAMR SWD/ DAR/ QNT	14
	15 (Thu)	Handling of stack emission measuring instrument	DAM/ DAMR	10
	18 (Sun)	Basic practical training of the stack emission measurement	DAM/ DAMR	5+Chief C/P
	19 (Mon)	Handling of stack emission measuring instrument	HOM/ HAM	6
	20 (Tue)	Basic practical training of the stack emission measurement	HOM/ HAM	6
	21 (Wed)	Handling of stack emission measuring instrument	ALP/ IDL	6
	22 (Thu)	Basic practical training of the stack emission measurement	ALP/ IDL	7
	25 (Sun)	Handling of stack emission measuring instrument	LTK/ TAR	4
	26 (Mon)	Basic practical training of the stack emission measurement	LTK/ TAR	4
	28 (Wed)	Handling of stack emission measuring instrument	DRZ/ HSK/ RAQ	4
	29 (Thu)	Basic practical training of the stack emission measurement	DRZ/ HSK/ RAQ	3
2010 Aug.	1 (Sun)	Handling of stack emission measuring instrument	SWD/ DAR/ QNT	5
	2 (Mon)	Basic practical training of the stack emission measurement	SWD/ DAR/ QNT	5
2010 Sep.	29 (Wed)	Additional lecture of the stack emission measurement	DAM/ DAMR	8+Chief C/P
	30 (Thu)	Basic practical training of the stack emission measurement	DAM/ DAMR	5+Chief C/P
2010 Oct.	3 (Sun)	Additional lecture of the stack emission measurement	DAMR/ QNT	8+Chief C/P
	4 (Mon)	Basic practical training of the stack emission measurement	DAMR/ QNT	4
	5 (Tue)	Additional lecture of the stack emission measurement	HOM/ HAM	10
	7 (Thu)	Basic practical training of the stack emission measurement	HOM/ HAM	6
	10 (Sun)	Additional lecture of the stack emission measurement	LTK/ TAR	20
	11 (Mon)	Basic practical training of the stack emission measurement	LTK/ TAR	4
	17 (Sun)	Additional lecture of the stack emission measurement	ALP/ IDL	9
	18 (Mon)	Basic practical training of the stack emission measurement	ALP/ IDL	8
	19 (Tue)	Additional lecture of the stack emission measurement	DRZ/ HSK/ RAQ	7
	20 (Wed)	Basic practical training of the stack emission measurement	DRZ/ HSK/ RAQ	5
	24 (Sun)	Evaluation of the measurement result and subject extraction	DAM/ DAMR	8
	25 (Mon)	Practical training of the stack emission measurement	DAM/ DAMR	4
	26 (Tue)	Evaluation of the measurement result and subject extraction	SWD/ DAR/ QNT	8
	27 (Wed)	Practical training of the stack emission measurement	SWD/ DAR/ QNT	8
	28 (Thu)	Evaluation of the measurement result and subject extraction	HOM/ HAM	11
	31 (Sun)	Practical training of the stack emission measurement	HOM/ HAM	8
2010 Nov.	1 (Mon)	Evaluation of the measurement result and subject extraction	LTK/ TAR	7
	2 (Tue)	Practical training of the stack emission measurement	LTK/ TAR	5
	3 (Wed)	Evaluation of the measurement result and subject extraction	ALP/ IDL	5
	4 (Thu)	Practical training of the stack emission measurement	ALP/ IDL	8
	7 (Sun)	Evaluation of the measurement result and subject extraction	DRZ/ HSK/ RAQ	6
	8 (Mon)	Practical training of the stack emission measurement	DRZ/ HSK/ RAQ	5
Note	Training time : 10:00 - 14:00		14 DFEAs	

2) Second Training (January to March, 2011)

The SOP-based practical training for dust and emission gases measurement was implemented from January to March 2011. Various types of facilities were selected for the training. The result of the practical training and problems in performing measurements were evaluated.

Records of the Training for Output 5 (2)

Month	Day	Contents	DFEA	No. of C/Ps
2011 January	13 (Thu)	Preparation and reconfirmation of practical training	DAM/ DAMR	8
	16 (Sun)	Practical training of the stack emission measurement	DAM/ DAMR	4
	17 (Mon)	Preparation and reconfirmation of practical training	DAM/ DAMR SWD/ DAR/ QNT	11
	18 (Tue)	Practical training of the stack emission measurement	DAM/ DAMR SWD/ DAR/ QNT	10
	19 (Wed)	Preparation and reconfirmation of practical training	HOM/ HAM	9
	20 (Thu)	Practical training of the stack emission measurement	HOM/ HAM	7
	24 (Mon)	Preparation and reconfirmation of practical training	LTK/ TAR	5
	25 (Tue)	Practical training of the stack emission measurement	LTK/ TAR	5
	26 (Wed)	Preparation and reconfirmation of practical training	ALP/ IDL	5
	27 (Thu)	Practical training of the stack emission measurement	ALP/ IDL	5
	30 (Sun)	Preparation and reconfirmation of practical training	DRZ/ HSK/ RAQ	5
	31 (Mon)	Practical training of the stack emission measurement in laboratory	DRZ/ HSK/ RAQ	3
2011 February	2 (Wed)	Practical training of the stack emission measurement	DAM/ DAMR	4
	3 (Thu)	Practical training of the stack emission measurement	DAM/ DAMR	7
	7 (Mon)	Practical training of the stack emission measurement	DAM/ DAMR SWD/ DAR/ QNT	6
	8 (Tue)	Practical training of the stack emission measurement	DAM/ DAMR SWD/ DAR/ QNT	4
	9 (Wed)	Practical training of the stack emission measurement	HOM/ HAM	11
	10 (Thu)	Practical training of the stack emission measurement	HOM/ HAM	11
	13 (Sun)	Practical training of the stack emission measurement	LTK/ TAR	5
	14 (Mon)	Practical training of the stack emission measurement	LTK/ TAR	7
	16 (Wed)	Practical training in laboratory (because of a heavy rain)	ALP/ IDL	5
	17 (Thu)	Practical training of the stack emission measurement	ALP/ IDL	4
	20 (Sun)	Practical training of the stack emission measurement	DRZ/ HSK/ RAQ	4
	21 (Mon)	Practical training of the stack emission measurement	DRZ/ HSK/ RAQ	4
	28 (Mon)	Practical training of the stack emission measurement (Supplementary training)	HOM/ HAM	
Note	Training time : 10:00 - 14:00		14 DFEAs	

2.5.4 Products of Activities

During the activities to achieve the outputs, the SOP for stack emissions measurement and other reference materials were prepared. Contents of the SOP are as follows:

Contents of the SOP for Stack Emissions Measurement

I.	How to proceed with our duties	
II.	Measurement outline of the flue gas	
	1.	Frequency of factory measurement during the year
	2.	Initial investigation and preparation in advance
	3	Measurement plan
	4	Checking items before the measurement day
	5	Preparation of the necessary materials for the field investigation
	6	Decision of measurement frequency
	7	Working assignment
III	Measurement method of flue gas	
	1.	Measurement of gaseous substances by "TESTO 350M/XL"
	2	Measurement of CO_2, O_2 and CO by Orsat flue gas analyzer
	3	Method of measuring dust in the flue gas
	4	Heavy metal analysis in the flue gas
	5	Measurement method of other emission standard items
IV	Use of investigation results	
	1.	Evaluation and use of measurement results
	2.	Use of the findings by the governmental administration

Contents of Other Reference Materials

Material－1 Assumed Air Pollution Gas Concentration Range in Flue Gas
Material－2 Exhaust Gas Measurement Record
Material－3 Method of Checking Measurement Result (Details)
Material－4 Energy Saving and Environmental Protection by Combustion Control
Material－5 Emission Control Measures of Air Pollutant
Material－6 The Maximum Emission Limits of Air Pollution
Material－7 National Standards for Air Quality
Material－8 Conversion Factor of ppm and mg/m^3
Material－9 Importance of Isokinetic Sampling (Dust Sampling)
Material－10 “Testo” Instrumentation Notes (Measurement Time and Rinse Time)

2.5.5 Achievements of Output 5

(1) Achievement with PDM Indicator

Output 5 has been evaluated based on three indicators set in PDM.

< Indicator 5-1> SOP for stack emission is prepared in more than 5 DFEAs.

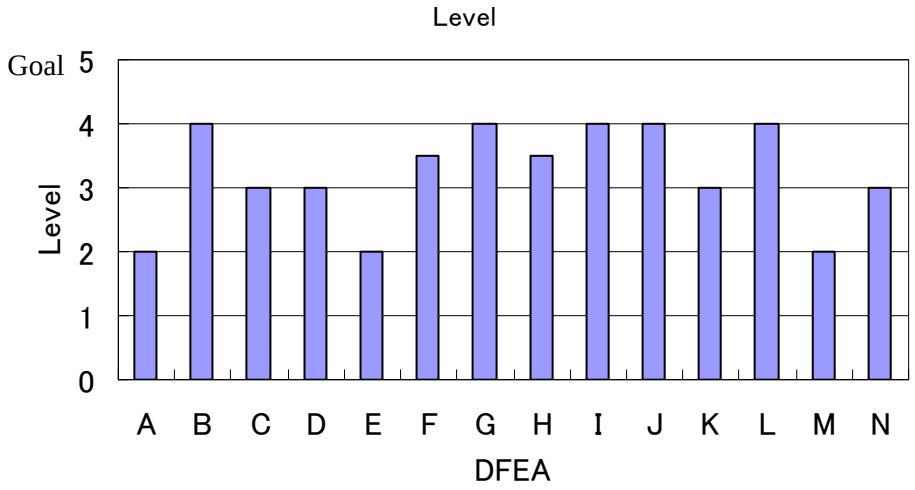
Evaluation

The practical training in five selected DFEAs has started in July 2010. Integrated SOP (draft) of stack emission measurement was prepared. Through the practical trainings from January to March 2011, suitability of the contents was confirmed. This SOP was prepared for 14 DFEAs’ common use. Revision of SOP was completed and the revised version was already translated to Arabic.

< Indicator 5-2> More than 60% of the staff, who got the training, are able to conduct the stack emission measurement based on the SOP for stack emissions.

Evaluation

The C/Ps were participating earnestly in the stack emission measurement trainings. In March 2011, achievement level of each DFEA is generally shown as follows. Due to incompleteness of a series of training, none of the staff of DFEAs achieved the level set in the indicator.



*Names of DFEAs are not shown for confidential reasons. Levels mentioned in the graph are defined as follows:

Level 5	Some (2-3) C/Ps can measure the stack emission and conduct data management based on the SOP considering quality control. (= Goal of the Project)
Level 4	Some (2-3) C/Ps can measure the stack emission based on the SOP
Level 3	One (1) C/P can measure the stack emission based on the SOP.
Level 2	Some C/Ps can measure the stack emission under the support by a trainer
Level 1	Some C/Ps attended the training. However, no one can measure the stack emission even if the SOP is available.

Average of Measurement Level Achievement of Main C/Ps (2-3 personnel)

< Indicator 5-3> The number of possible analytical parameters for stack emissions is increased by 3 more different parameters.

Evaluation

At the beginning of the Project, HOM DFEA had basic skills in measuring gaseous pollutants (NO, NO_2, CO, SO_2) using TESTO equipment. Furthermore, other selected DFEAs (DAMR, ALP, DRZ, and TAR) were able to measure these pollutants through the Project. Therefore, it can be judged that the indicator has been achieved at an acceptable level.

(2) Challenges for Further Capacity Improvement

1) Post-project Challenge

A series of basic trainings including theoretical lectures and field works have been completed under Output 5 activities. SOP for flue gas measurement was also prepared. However, an unavoidable situation in Syria caused sudden termination of the Project during the essential phase prior to OJT for enhancing the practical capability on flue gas measurement. Therefore, it is important, as post-project efforts, for MSEA/DFEAs to accumulate experiences and technical skills through site measurement works at factories. These would enable MSEA/ DSEAs to develop better and reliable inventories for air emission sources. In this context, the following are recommended:

- The field works for flue gas measurement and data accumulation should be part of the daily activities of DFEAs, in order to polish the technical capability and flexibility of site works according to various status/ conditions of emission sources.
- Availability of equipment for flue gas measurement should be extended from the 5 selected DFEAs to the other DFEAs as much as possible. It will contribute to the mutual relief among DFEAs as back up against stoppage of activities for flue gas measurement.
- MSEA/ DFEAs should try conducting capacity development on data management/ interpretation obtained through the flue gas measurement.

In order to facilitate self-reliant approaches abovementioned, due considerations should be paid to the following:

- Mutual cooperation among DFEAs should be enhanced, especially regarding the internal trainings for flue gas measurement. Instruction and trainings rendered by the selected five DFEAs to the other DFEAs should be well-planned and implemented.
- SOP should be utilized effectively to perform challenging measurements for various pollution sources.
- As primary purpose, data obtained from flue gas measurement will be the basis of the inventory for air pollution emission sources. In addition, discussion and examination of more practical application of obtained data are better initiated, such as proposal and guidance to the factories, integration with EIA study, etc.

2) Long-term Challenge

As long-term challenge for MSEA/ DFEAs, the consulting service to the factories could be one of the ideas to push the flue gas measurement forward to a higher level of environmental management, in addition to the enforcement purpose of the emission standards. Based on the measurement data obtained, the possible consulting service means providing instructions to factories for saving fuel/ energy. The saved fuel/ energy would be converted into monetary equivalent. If a small charge for the consulting service based on the saved fuel/ energy could be realized from the factories, it would be beneficial for the following:

- Motivation of the staff toward the daily duties in DFEAs would be enhanced if the income from the charges would be allocated for the benefit of the staff, such as providing allowance for hardship compensation for site and laboratory works.
- The income from the charges could be also allocated as subsidy for the daily operation of DFEAs, such as travel cost and car fuel for inspection activities.

Although it is necessary to have discreet preparedness to meet the above challenges, it would contribute to realizing the win-win solution on air pollution abatement for both Syrian industries and MSEA/ DFEAs.

3) Sustainability of provided Equipment under the project

In order to conduct the dust measurement based on international standard method, 5 set of dust sampling and analysis equipment, using Isokinetic sampling method, some consumables and relating equipment were provided by the project. This was the first time to introduce the Isokinetic dust sampling equipment and technology to Syria. Taking account of facilities of the target factories in Syria and the technical levels of C/Ps, it was the best choice of the equipment.

Because the manufacturer does not have a branch and/or authorized supplier overseas countries including Syria, JET was scheduled to select a reliable supplier, which can mediate between the

manufacture and C/Ps such as the repair, the import of spare parts and consumables etc., instead of authorized one in cooperation with the C/Ps, from 2011 to 2012. However, due to the unexpected situation of Syria, the project was interrupted. Therefore, JET could not commence this activity unfortunately.

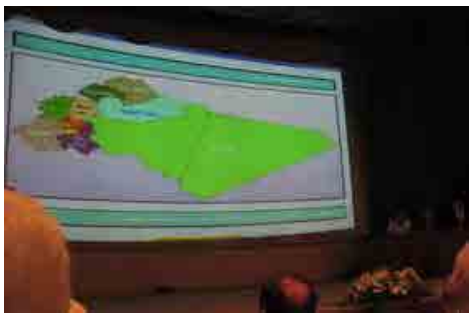
It is expected that, if C/Ps use the equipment frequently from two to five years, the consumables supplied at the beginning will be consumed and it will be necessary to obtain the spare parts, repair, etc. In near future, it is expected the equipment provided will be no longer possible to operate. After improvement of the domestic situation in Syria, it is essential to support the selection of an intermediary supplier[2] between the C/Ps and the manufacturer for the sustainability of the equipment provided. .

2.6 Output 6: Strengthen Capabilities for Evaluation of Water and Air Quality Conditions in Each Governorate

2.6.1 Background Information

As for water, database management skills were developed in Phase 1. However, during said phase, DFEAs did not have enough information to interpret the monitoring data. Most of them compared their monitoring results with wastewater quality standards, but was still in an initial stage. Moreover, the annual environmental monitoring report had been prepared by DFEA in Phase 1. However, the reporting system ceased when Phase 2 started. Because MSEA was not fully involved in Phase 1, it was not aware of the importance of preparation of such report, and thus neglected encouraging DFEAs to prepare them. Although MSEA asked DFEAs to send the analysis data four times per year, the sampling location or name of the sampling was not indicated in the data. Consequently, MSEA could not integrate the data and grasp the environmental status of the country.

In such circumstance, DAMR DFEA introduced the environmental map in the workshop held on February 15, 2010, which was an epoch-making event for participants. Although the water quality data was not interpreted in the map, the map was linked to water quality data and photographs, and showed the environmental status of the governorate. Because the Minister of MSEA recommended DFEAs to introduce the environmental map in the workshop, some DFEAs, such as ALP, HAM, IDL, have started to develop such map using GIS. MSEA also planned to develop the environmental map covering the entire country using GIS provided by another donor, CEDARE.



WS for Environmental Map by DAMR DFEA

As for air, the training on stack emission measurement has just commenced in June 2010 as an activity of Output 5. The recorded results of stack emission measurement have been accumulated since October 2010. However, the number of available results is still limited.

[2] As a candidate for supplier/mediator, "Millennium Technologies", which is authorized supplier of TESTO (Germany, flue gas measurement equipment of output 5), is recommended. (Tel at Damascus office: 011-2240519, Eng. Samer Kahef: 0933-322-657). The reason is as follows. 1) A high technical level of dealing with analyzer due to the long experience of supplier and technical services of industrial flue gas measurement equipment. 2) Familiar with the business of export and import of the equipment to Germany for repair. 3) Keeping deadlines, for example, CO2 cell exchange of TESTO in Germany in the project, were delivered one month before the delivery date mentioned in the contract. As supplier of equipment such as analyzer, measurement device which JET deal with in Syria, it would be considered especially reliable.

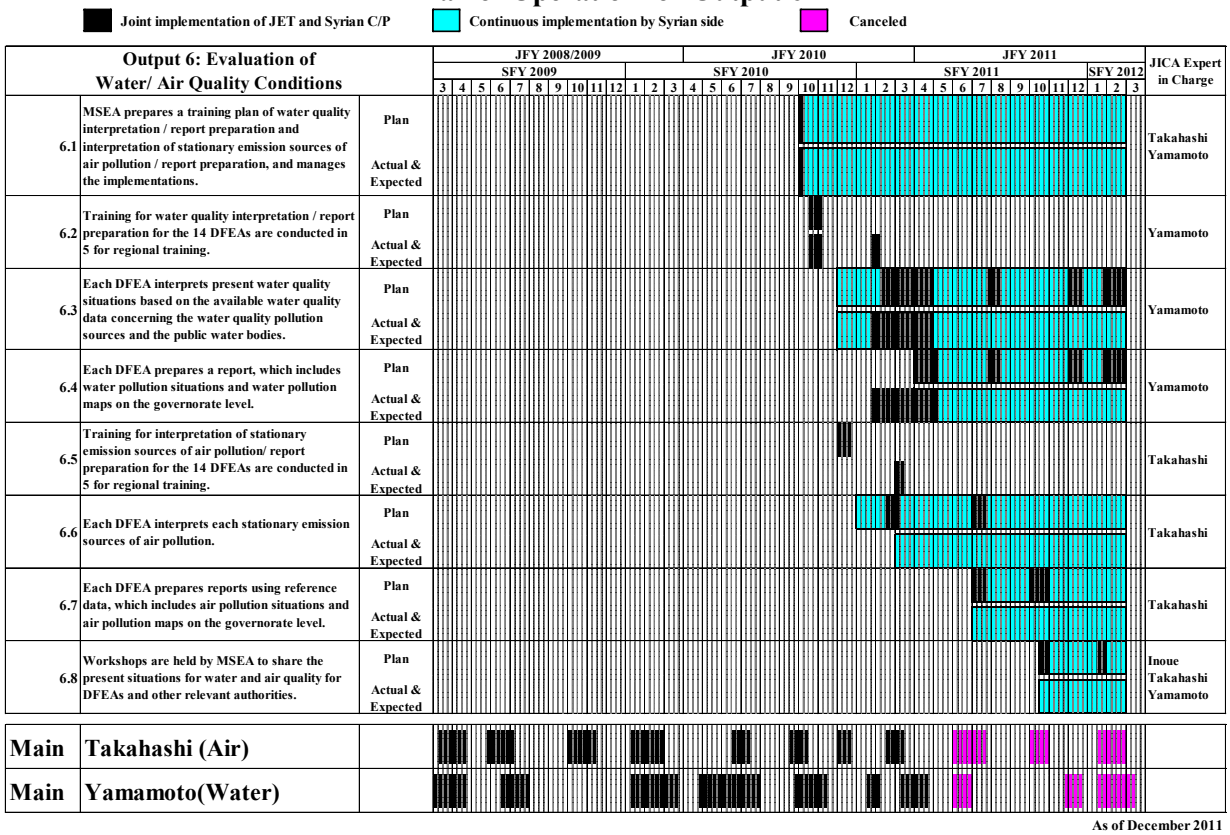
2.6.2 Outline of Output 6

The PDM defines Output 6 to be attained, as follows:

Output 6: Capabilities concerning evaluation of present condition of water and air quality in each governorate are strengthened.

The capacity development defined in Output 6 is designed with eight sequential activities. The following tables show i) PO for Output 6 including the progress or expected schedule of each activity, and ii) the detail of activities.

Plan of Operation for Output 6



As of December 2011

Details of Activities of Output 6

Activities of C/P Side	Technical Supports Provided by Experts	Target C/P
MSEA prepares a training plan of water quality interpretation/report preparation and interpretation of stationary emission sources of air pollution/report preparation, and manages the implementations.	(2010) - Supporting MSEA in preparing a training plan of water and air quality interpretation / report.	MSEA
C/Ps from 14 DFEAs receive a training of water quality interpretation/report	(2011) - Technical training on water quality interpretation/report (Detailed descriptions are shown below)	Regional training in 5 selected DFEAs (Dier Ezzor, Aleppo, Tartous, Homs,

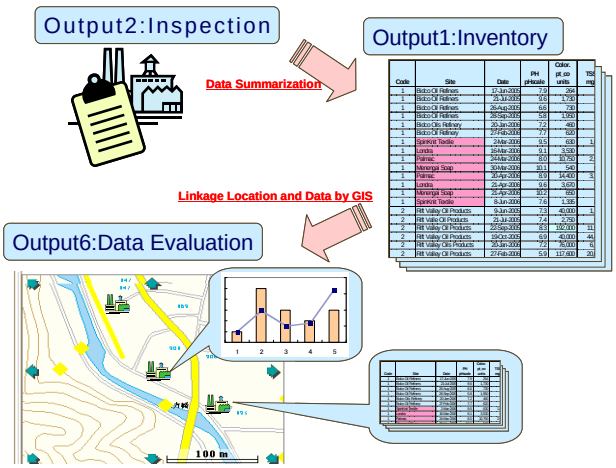
Activities of C/P Side	Technical Supports Provided by Experts	Target C/P
preparation in 5 selected DFEAs for regional training.		Rural Damascus) for 14 DFEAs
Each DFEA interprets present water quality situations based on the available water quality data concerning the pollution sources and the public water bodies.	（2011） - Supporting DFEA in the interpretation of water quality data concerning pollution sources and public water bodies.	Regional training in 5 selected DFEAs (Dier Ezzor, Aleppo, Tartous, Homs, Rural Damascus) for 14 DFEAs
Each DFEA prepares a report which includes water pollution situations and water pollution maps on the governorate level.	（2011 to 2012） - Supporting DFEA in the preparation of the report.	Regional training in 5 selected DFEAs (Deir Ezzor, Aleppo, Tartous, Homs, Rural Damascus) for 14 DFEAs
C/Ps receive training for interpretation of stationary emission sources of air pollution/report preparation in 5 selected DFEAs for regional training.	（2011） - Technical training for the interpretation of measured data (NOx, SO_2 and dust) in cooperation with Output 5.	Regional training in 5 selected DFEAs (Deir Ezzor, Aleppo, Tartous, Homs, Rural Damascus) for 14 DFEAs
Each DFEA interprets each stationary emission sources of air pollution.	（2011 to 2012） - Supporting DFEA in the interpretation of measured data (NOx, SO_2 and dust), mainly through OJT.	Regional training in 5 selected DFEAs (Deir Ezzor, Aleppo, Tartous, Homs, Rural Damascus) for 14 DFEAs
Each DFEA prepares a report using stationary emission data, which includes air pollution situations and air pollution maps in governorate level.	（2011 to 2012） - Training on how to plot GPS information derived from activities in Outputs 1 and 2 on the map. - Training for preparation of the report which includes air pollution situations and air pollution maps at governorate level based on Outputs 2 and 5.	Regional training in 5 selected DFEAs (Deir Ezzor, Aleppo, Tartous, Homs, Rural Damascus) for 14 DFEAs
MSEA hold Workshops to share the present situations for water and air quality for DFEAs and other relevant authorities.	（2011 to 2012） - Supporting MSEA in the preparation of materials for public awareness based on the report on above activities for water and air quality.	MSEA

2.6.3 Activity Achievement

(1) Activities 6.1: MSEA prepares a training plan of water quality interpretation/ report preparation and interpretation of stationary emission sources of air pollution/ report preparation, and manages the implementations.

Relationship between Output 6 and other outputs is illustrated in the chart herein. Through activities of other outputs, accurate water and air quality data could be obtained. Output 6 uses these data, especially those from Output 1 PSI.

In the beginning of the activity of Output 6, JET discussed with MSEA about the relationship among the outputs and objectives of the environmental map and environmental report preparation. As a conclusion, MSEA realized the objectives as follows. JET decided to support MSEA to collect the data of the environmental monitoring report accordingly.



Relationship between Output 6 and Other Outputs

Objectives of Activities in Output 6 for MSEA

Objectives of Environmental Map
- To cooperate the environmental administration in future - To provide comprehensive environmental information to decision maker - To consider zoning system for applying wastewater quality standard - To measure water contamination accident
MSEA Objectives with Regard to Preparation of Environmental Monitoring Report
- To grasp measure of pollution sources (level of the contamination, location) - To prioritize the seriousness of the pollution sources - To report the annual activities in DFEAs

As for air, MSEA and JET briefly discussed the training plan and contents of training in December 2010. Both reached a common understanding that activity related to stack emission measurement was already five years behind compared with water quality activity considering the six-year history since 2005 (Phase 1). Moreover, only five DFEAs were equipped with analyzers (TESTO 350XL for gases and Dustac for TSP/dust) as of February 2011.

(2) Activity 6.2: Trainings for water quality interpretation / report preparation for the 14 DFEAs are conducted in 5 for regional training.

In November 2010 and February 2011, JET carried out lecture training twice for explaining the outline of Output 6, interpretation method for environmental water quality, and contents of the reports. The training record and contents are summarized in the following table.

Record of Output 6 Lecture Training (Water, October 2010 – February 2011)

Date	DFEAs targeted	Venue	Contents	Number of Attendees
Oct. 31, 2010 (Sun.)	DRZ, HSK, RAQ	DRZ DFEA	- Evaluating current data management and reporting status - Introduction of Output 6 - Idea about the contents of annual report	DRZ: 5
Nov. 1 (Mon.)	ALP, IDL	ALP DFEA	(Ditto)	ALP: 8 IDL: 2
Nov. 2 (Tue.)	HOM, HAM	HOM DFEA	(Ditto)	HOM: 6 HAM: 8
Nov. 3 (Wed.)	TAR, LTK	TAR DFEA	(Ditto)	TAR: 6 LTK: 2
Nov. 8 (Mon.)	DAR, SWD, QNT, DAM	DAM DFEA	(Ditto)	DAR:2 SWD:1 QNT:2 DAM:4
Nov. 9 (Tue.)	DAMR	DAMR DFEA	(Ditto)	DAMR:3 MSEA:1
Jan. 31, 2011 (Mon.)	DAR, SWD, QNT, DAM	MSEA	- Contents of the Annual Environmental Monitoring Report - 4 types of water quality evaluation - Practiccal training of MS Excel and GIS software	DAR:2 SWD:3 QNT:1 DAM:3
Feb. 1 (Tue.)	HOM, HAM	HOM DFEA	(Ditto)	HOM: 4 HAM: 5
Feb. 2 (Wed.)	TAR, LTK	TAR DFEA	(Ditto)	TAR: 6 LTK: 3
Feb. 3 (Thu.)	ALP, IDL	ALP DFEA	(Ditto)	ALP: 5 IDL: 2
Feb. 7 (Mon.)	DRZ, HSK, RAQ	DRZ DFEA	(Ditto)	DRZ: 8 HSK:1 RAQ:1
Feb. 8 (Tue.)	DAMR	DAMR DFEA	(Ditto)	DAMR:4

(3) Activity 6.3: Each DFEA interprets present water quality situations based on the available water quality data concerning the water quality pollution sources and the public water bodies; and
Activity 6.4: Each DFEA prepares a report, which includes water pollution situations and water pollution maps on the governorate level

Contents of the environmental monitoring report prepared by MSEA and JET are as follows. In January 2011, MSEA requested DFEAs to prepare the report for 2010.

Table of Contents of the Annual Environmental Monitoring Report

Table of Contents
Location Map
CHAPTER 1 INTRODUCTION
1.1 Legal Background of the Monitoring
1.2 Organization for the Monitoring (Name of Staff for the Monitoring)
CHAPTER 2 MONITORING PLAN
2.1 Objectives of the Monitoring
2.2 Monitoring Location (including Location Map)
2.3 Monitoring Parameter
2.4 Monitoring Date & Frequency
2.5 Analysis Method
CHAPTER 3 MONITORING RESULT
3.1 Result of Industrial Wastewater
3.2 Result of Surface Water (River and Lake)
CHAPTER 4 EVALUATION OF THE RESULT
4.1 Comparing with the Standard
4.2 Serious Pollution Sources (Water)
4.3 Pollution Load Evaluation (Water)
4.4 Trend of Water Quality of Surface Water (Water)
CHAPTER 5 SUMMARY AND RECOMMENDATION
5.1 Environmental Problem in the Governorate
5.2 Recommendation for the Next Monitoring
List of Attachments
Attachment 1 Photo of Sampling Site
Attachment 2 Certification of the AEC program

Up to April 15, 2011, 11 DFEAs submitted the reports to MSEA (SWD, IDL and RAQ did not submit the report yet). Since the reports had some revisable points, MSEA requested DFEAs to revise the reports. The most difficult matter for DFEA staff was to prepare pollution source maps. After MSEA asked DFEAs to revise the report, JET provided hands-on training by visiting all DFEAs. At the same time, JET interviewed each governorate concerning current respective environmental problems, and summarized them into a map. The revised report was planned to be collected in June 2011. However, due to the unexpected situation in Syria, such activities were interrupted.

Record of Output 6 Hands-on Training (Water, March 2011)

Date	DFEAs Targeted	Venue	Main Contents	Number of Attendees
Mar. 9, 2011 (Wed)	SWD	SWD DFEA	Interview for current monitoring status in SWD DFEA	SWD: 1
10 (Thu)	HOM	HOM DFEA	Evaluating water quality of Oruntus River in Homs	HOM: 2
13 (Sun)	ALP	ALP DFEA	Interview for current monitoring status in ALP DFEA	ALP: 3
16 (Wed)	DAR	DAR DFEA	Preparing pollution source map by using GIS software	DAR:3
17 (Thu)	QNT	QNT DFEA	Preparing graph by using MS Excel Evaluating water quality of lakes	QNT:3
21 (Mon)	DAMR	DAMR DFEA	Preparing pollution source map by using GIS software	DAM:1
22 (Tue)	DAM	DAM DFEA	Preparing pollution source map by using GIS software	DAM:3
29 (Tue)	TAR	TAR DFEA	Reviewing the TAR report Preparing graph by using MS Excel	TAR:1
30 (Wed)	HAM	HAM DFEA	Reviewing the HAM report Evaluating water quality of Oruntus River in Hama	HAM:1
31 (Thu)	IDL	IDL DFEA	Re-training for IDL DFEA staff Evaluating water quality of Oruntus River in IDL	IDL:2
Apr. 11, 2011 (Mon)	DRZ	DRZ DFEA	Reviewing the DRZ report Evaluating water quality of Euphratis River in DRZ	DRZ:1
12 (Tue)	HSK	HSK DFEA	Reviewing the HSK report Evaluating environmental status in HSK	HSK: 4
13 (Wed)	RAQ	RAQ DFEA	Re-training for RAQ DFEA staff Evaluating environmental status in RAQ	RAQ: 4
14 (Thu)	ALP	ALP DFEA	Reviewing the HSK report Interview for current monitoring status in ALP DFEA	ALP: 2

(4) Activity 6.5: Training for interpretation of stationary emission sources of air pollution/ report preparation for the 14 DFEAs are conducted in 5 DFEAs for regional training.

It was scheduled to conduct this activity in parallel with the accumulation of data obtained from Output 5. Because OJT of Output 5 had commenced in October 2010, it was impossible to make a complete annual report in 2011. Thus, in March 2010, the chief C/P and JET concluded that interim report of 2011 should be prepared, and had agreed about the contents of the annual/interim report for air pollution inspection. JET carried out lecture training for evaluation of present conditions and annual report preparation. The contents of the report are as follows:

Table of Contents of Annual/Interim Report for Air Pollution Inspection in 2011

Summary of the Training for Output 6 (Air)

Date	DFEAs targeted	Venue	Contents	Number of Attendees
Mar. 1, '11 (Tue)	HAM	HAM DFEA	- Contents of interim annual report - Introduction (characteristic of industry) - Inspection activities of air (method) - Inspection result (fuel type, consumption and stack emission measurement) - Evaluation of result (comparison with emission standard) - Pollution sources map	HAM: 13
Mar. 2, '11 (Wed)	ALP IDL	ALP DFEA	(Ditto)	ALP: 8 IDL: 3
Mar. 3, '11 (Thu)	HOM	HOM DFEA	(Ditto)	HOM: 8
Mar. 7, '11 (Mon)	DAR QNT	MSEA	(Ditto)	DAR: 6 QNT: 2
Mar. 9 '11 (Wed)	DAM DAMR SWD MSEA	MSEA	(Ditto)	DAM: 2 DAMR: 9 SWD: 8 MSEA: 2
Mar. 10, '10 (Thu)	TAR LTK	MSEA	(Ditto)	TAR: 20 LTK: 7
Mar. 13, '11 (Sun)	DRZ RAK HSK	DRZ DFEA	(Ditto)	DRZ: 12 RAK: 2 HSK: 2

(5) Activity 6.6: Each DFEA interprets each stationary emission sources of air pollution.

Together with Activity 6.5, JET explained the following: 1) characteristics of air emission standard in Syria, 2) conversion of temperature of flue gas to 0ºC, and 3) calculation of SO_2 concentration from existing information (OJT) in March 2011. More detailed OJT for interpretation of air pollution of stationary emission sources was scheduled to be conducted in June and July 2011.

(6) Activity 6.7: Each DFEA prepares reports using reference data, which includes air pollution situations and air pollution maps on the governorate level.

It was scheduled to be implemented in July and October in 2011. However, due to the unexpected situation of Syria, the activities were interrupted.

(7) Activity 6.8: Workshops are held by MSEA to share the present situations for water and air quality for DFEAs and other relevant authorities.

It was scheduled to be held by the end of 2011 or in January and February 2012. However, due to the unexpected situation in Syria, the activities were interrupted.

2.6.4 Products of Activities

The Water Environmental Monitoring Report 2010, which includes water pollution situations and their maps, was prepared in 11 DFEAs. Although the report which includes air pollution situations and their maps was planned to be prepared in August 2011, it was difficult for DFEA to initiate preparation under the current condition in Syria. The water environmental reports are included in the Annex.

2.6.5 Achievements of Output 6

(1) Achievement with PDM Indicator

Output 6 has been evaluated based on three indicators set in PDM.

< Indicator 6-1> A report, which includes water pollution situations and water pollution maps on the governorate level is prepared in more than 11 DFEAs.

Evaluation

Eleven DFEAs prepared the Water Environmental Report, which included the water pollution maps at the governorate level. However, most of the reports needed more modifications. The most difficult matter which DFEA staff had been facing was the preparation of pollution source map. Thus, JET supported the preparation through hands-on training by visiting all DFEAs. However, due to the unexpected situation in Syria, such activities were interrupted.

< Indicator 6-2> A report, which includes air pollution situations and air pollution maps on the governorate level is prepared in at least 5 selected DFEAs.

Evaluation

This has not been achieved yet. A preliminary interim/annual report about inspection of air for 2011 was prepared by Quneitra DFEA in May 2011. However, there are only two asphalt mixers in Quneitra Governorate. It is therefore necessary to prepare interim/annual report about the inspection of air in DFEAs which have target polluters such as DAMR, ALP, HOM, TAR and HAM DFEA.

< Indicator 6-3> A report, which includes the workshops mentioned in Activity 6-8 to share the present situations for water and air quality among DFEAs and other relevant authorities, is prepared by MSEA.

Evaluation

This has not been achieved yet. The workshop was scheduled to be held by the end of 2011 or in January and February 2012. However, due to the unexpected situation in Syria, such activities were interrupted.

(2) Challenges for Further Capacity Improvement

1) In order to make a pollution map with data obtained through on-site inspection, it is essential to have internet connection to combine GPS information with map. Especially, RDAM and HOM DFEAs have very poor internet accessibility. Therefore, it is recommended for DFEAs to improve such condition.
2) As for air, it is necessary to gain and accumulate knowledge about the production process of target industries such as cement, power plant, steel, and refinery and fertilizer factory, as well as air pollution control technology such as dust removal, desulfurization and denitration.
3) As for air, in order to make a reasonable recommendation to the factory, it is necessary to gain and accumulate knowledge about combustion technology such as excess air, oxygen monitoring and total heat control.

2.7 Output 7: Strengthen Capabilities for Formulation and Implementation of Monitoring Plan

2.7.1 Background Information

The monitoring plans were developed in each of the 14 DFEAs in the course of the Phase 1 activities. The monitoring activities have been initiated in each DFEA on governorate basis by using the outcomes of Phase 1. MSEA has been supervising said activities of DFEAs.

The monitoring activities of MSEA and DFEAs can be said to be at an initial stage, and thus it is important to polish the activities as well as the annual plan continuously. In this regard, it is advisable for each DFEA to i) conduct the measurement more reliably, ii) interpret the data and information more accurately, and iii) identify the issues to be considered in the next planning of monitoring. Output 7 and its activities have been designed under the abovementioned background in order to have better monitoring activities and results.

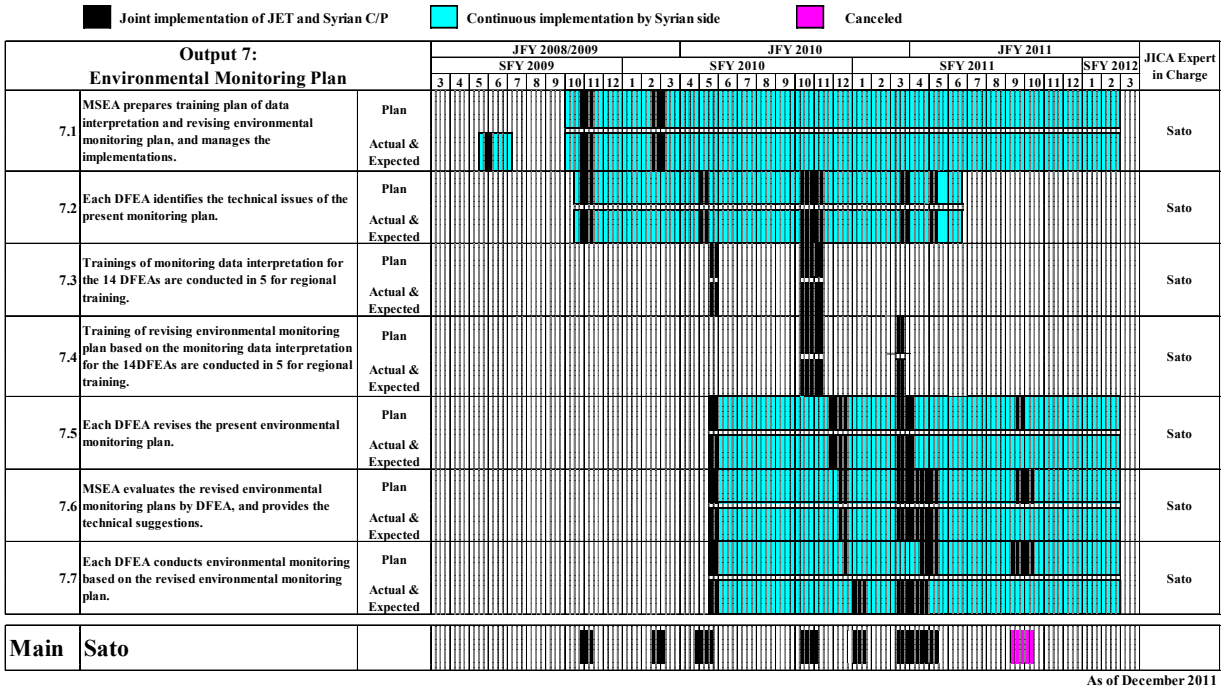
2.7.2 Outline of Output 7

The PDM defines Output 7 to be attained, as follows:

Output 7: Capabilities concerning formulation and implementation of environmental monitoring plan are strengthened.

The capacity development defined in Output 7 is designed with seven sequential activities. The following tables show the i) PO for Output 7 including the progress or expected schedule of each activity, and ii) details of activities.

Plan of Operation for Output 7



As of December 2011

2.7.3 Activity Achievement

Since the environmental monitoring and pollution source monitoring were conducted, Output 7 was closely connected with the development of PSI. Moreover, the trainings for Output 7 had been implemented together with those for Output 1. Therefore, as for the training schedule for Output 7, refer to the training schedule mentioned in Section 2.1.3 (Activity Achievement).

The table below summarizes the details of activities done for Output 7 from March 2009 to April 2011

Details of Activities under Output 7

Activities of C/P Side	Technical Supports Provided by Experts	Target C/P
MSEA prepares training plan of data interpretation and revising environmental monitoring plan, and manages the implementation.	(2009) - Supporting MSEA in the preparation of a training plan on data interpretation and revising environmental monitoring plan.	MSEA
Each DFEA identifies the technical issues of the present monitoring plan.	(2009-2010) - Supporting each DFEA in identifying the technical issues of the present monitoring plan	Regional training in 5 selected DFEAs (Dier Ezzor, Aleppo, Tartous, Homs, Rural Damascus) for 14 DFEAs
C/Ps receive training for interpretation of environmental monitoring data.	(2010) - Training for interpretation of environmental monitoring data	Regional training in 5 selected DFEAs (Dier Ezzor, Aleppo, Tartous, Homs, Rural Damascus) for 14 DFEAs
C/Ps receive training for revising environmental monitoring plan.	(2010-2011) - Training for revising environmental monitoring plan	Regional training in 5 selected DFEAs (Dier Ezzor, Aleppo, Tartous, Homs, Rural Damascus) for 14 DFEAs
Each DFEA revises the present environmental monitoring plan.	(2010-2011) - Supporting each DFEA in revising the present environmental monitoring plan.	14 DFEAs
MSEA evaluates the environmental monitoring plans revised by DFEAs, and provides the technical suggestions.	(2010-2011) - Evaluating the environmental monitoring plans revised by DFEAs and providing the technical suggestions. - JET will evaluate the revised monitoring plan with C/Ps, and apply the monitoring plan for next year.	14 DFEAs
Each DFEA conducts environmental monitoring based on revised environmental monitoring plan.	(2010-2011) - Supporting each DFEA in conducting environmental monitoring based on revised environmental monitoring plan.	14 DFEAs

(1) Activity 7.1: Preparation of the training plan for data interpretation and revising environmental monitoring plan, and management of the implementations by MSEA

As mentioned above, each DFEA is implementing the monitoring activities mainly focusing on pollution sources such as factories. Data and information concerning pollution sources have been accumulated through factory inspection in each DFEA. The environmental monitoring plan is to be prepared taking into account the results of Output 1 (PSI) and Output 2 (factory inspection). In order to prepare and develop the PSI for water, existing monitoring plans have been reviewed, and pollution sources located in the governorates have been listed by DFEAs. During the review of the existing monitoring plan and pollution sources, some technical issues were revealed, such as type of pollution sources, number of pollution sources, frequency of monitoring, etc. These data and information arranged by DFEAs were further studied in detail for the preparation of the new water pollution monitoring plan.

The word “environmental monitoring” generally means monitoring of environmental quality such as quality of surface water, ambient air, etc. With this meaning, monitoring of pollution sources, both of water and air, is covered in a narrow sense. This Project mainly focused on the monitoring of pollution sources. In order to achieve Output 7 defined in the PDM, it was necessary to clarify the meaning of “environmental monitoring”. The following summarizes the responsibility and demarcation of “environmental monitoring”:

Responsibility and Demarcation of Environmental Monitoring

		Water	Air
Environmental monitoring (In a wide sense)	**Standard/Criteria**	No	Yes
	Competent authority	(Ministry of Irrigation is the responsible authority for the monitoring of quality of water used for irrigation)	MSEA/DFEA
	Project scope	Basically not incorporated	Basically not incorporated
Pollution source monitoring	**Standard/Criteria**	Yes	Yes
	Competent authority	MSEA/DFEA	MSEA/DFEA
	Project scope	Incorporated	Incorporated

After April 2010, the meaning of environmental monitoring used in this Project has been clarified through discussions made with MSEA, DFEAs and JET. The ultimate target of environmental monitoring in this Project was to keep and/or improve environmental quality such as river water quality. Although the monitoring of surface water quality is the responsibility of the Ministry of Irrigation, considering the target in this Project, environmental monitoring should include the monitoring of surface water quality in order to grasp the impacts caused by pollution sources to the environment. Such monitoring activity in this Project incorporates that for ambient quality of water and air together with the monitoring of pollution source quality discharged to the environment.

(2) Activity 7.2: Each DFEA identifies the technical issues of the present monitoring plan

The DFEAs were conducting water quality monitoring according to the present monitoring plan. In order to identify the technical issues of the present monitoring plan, the current status of the water quality monitoring was confirmed in each DFEA. The table below shows the number of monitoring stations by DFEAs and by pollution media.

Number of Monitoring Stations (Year: 2008 or 2009)

DFEA	Factory /Manufacture	Municipal	Commercial	Waste	Surface water		Groundwater	Others	Total
					River	Lake/pond /reservoir			
DAM	**15**	**-**		**-**	**3**	**-**	**2**	**-**	**20**
DAMR	**124**	**-**	**-**	**-**	**-**	**-**	**8**	**-**	**132**
ALP	**56**	**-**	**-**	**-**	**-**	**1**	**3**	**-**	**60**
HOM	**24**	**-**	**-**	**-**	**10**	**-**	**-**	**-**	**34**
HAM	**19**	**2**	**-**	**-**	**1**	**-**	**-**	**-**	**22**
LTK	**12**	**3**	**-**	**-**	**6**	**4**	**-**	**-**	**25**
DRZ	**2**	**4**	**-**	**-**	**8**	**-**	**-**	**-**	**14**
IDL	**26**	**5**	**-**	**-**	**7**	**2**	**-**	**-**	**40**
HSK	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	
RAQ	**5**	**2**	**-**	**-**	**2**	**3**	**1**	**2**	**15**
SWD	**1**	**-**	**-**	**-**	**-**	**-**	**12**	**33**	**46**
DAR	**15**	**2**	**-**	**-**	**-**	**5**	**6**	**-**	**28**
TAR	**2**	**-**	**-**	**-**	**8**	**4**	**-**	**21 springs + 10**	**45**
QNT	**2**	**1**	**-**	**-**	**-**	**6**	**7**	**2**	**18**
Total	**303**	**19**	**-**	**-**	**45**	**25**	**39**	**68**	**499**

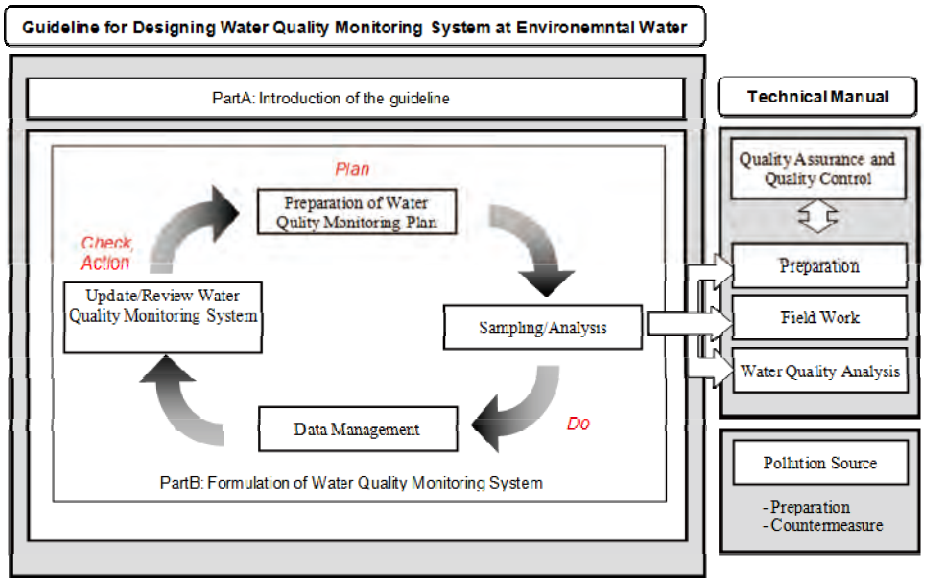
Note: Table above is not definite, and to be confirmed and finalized by each DFEA.

(3) Activity 7.3: C/Ps receive training for interpretation of environmental monitoring data

Together with the confirmation of the status of the present monitoring plan, the basic concept, role and function of environmental monitoring in relation with the PSI and factory inspection were explained in

the regional training conducted in May 2010. The training included explanation of data elements required for environmental monitoring.

Due to the unexpected situation in Syria, the traning was interrupted in April 2011. However, JET developed "the guideline for designing water quality monitoring system at environmental water", which includes useful information for designing monitoring plan and interpliting the monitoring data. Technical manual for conducting water environmental monitoring is attached on the guideline. Countermeasure for water contamination accident is included in the technical manual. The contents of the guideline were explained in March 2012, using the TV conference system of JICA.



Outline of the Guideline

(4) Activity 7.4: C/Ps receive training for revising environmental monitoring plan

As mentioned in the section for Output 1, the monitoring is closely related with the development of PSI and factory inspection. In order to start the review of the existing environmental monitoring plan, trainings concerning environmental monitoring shown below had been carried out as the first step in the fourth training conducted from October to November 2010:

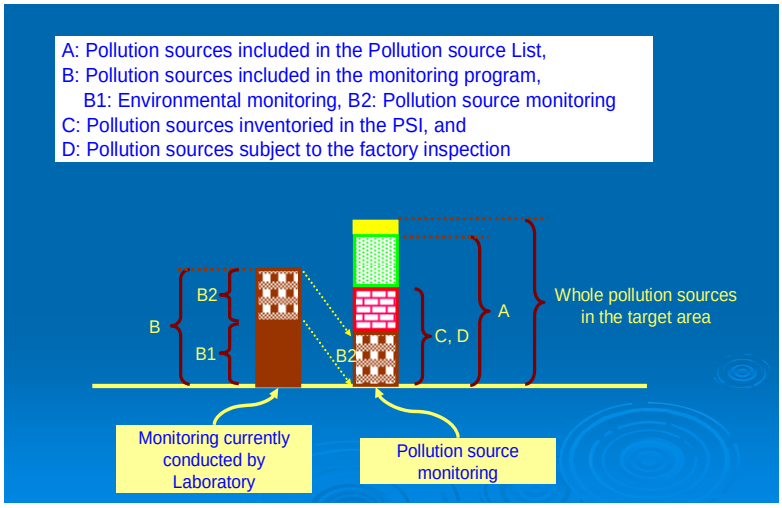
- How to complete the list of pollution sources
- Necessity of review of number of the current monitoring stations
- Confirmation of the scheme of current national environmental monitoring
- Explanation of the concept of monitoring cycle
- Relationship between environmental monitoring, factory inspection and PSI
- Monitoring objectives
- Items to be studied for preparation of environmental monitoring plan
- Type and function of environmental monitoring
- Items to be studied for planning monitoring plan

In order to continue the training for revising the environmental monitoring plan, homework had been given to the DFEAs until the next training to be conducted in January 2011.

(5) Activity 7.5: Each DFEA revises the present environmental monitoring plan.

The training related to Activity 7.5 started in January 2011 with the review of the submitted homework given in the previous training conducted from October to November 2010. In this training,

necessity and importance of selection and prioritization of the target pollution sources were stressed. The schematic figure below shows the concept of the number of pollution sources to be covered by the monitoring program, PSI, factory inspection and pollution source list.



Concept of the Number of Pollution Sources

For the implementation of Activity 7.6 (*MSEA evaluates the environmental monitoring plans revised by DFEAs, and provides technical suggestions*), a lecture training that concerns the issues below had been conducted for MSEA in January 2011.

- Selection of pollution sources to be covered by the monitoring program, PSI, factory inspection and pollution source list
- Meaning and significance of the linkage among PSI, factory inspection and environmental monitoring
- Necessity of clear definition of jurisdictional arrangement for environment-related activities among concerned organizations/agencies
- Number of monitoring stations by type of monitoring activities

(6) Activity 7.6: MSEA evaluates the revised environmental monitoring plans by DFEAs, and provides the technical suggestions; and
Activity 7.7: Each DFEA conducts environmental monitoring based on the revised environmental monitoring plan.

Activities 7.6 and 7.7 were planned to start from March 2011. However, due to the unexpected situation in Syria, said activities were interrupted.

2.7.4 Achievements of Output 7

(1) Achievements with PDM Indicator

Output 7 has been evaluated based on one indicator set in PDM.

< Indicator 7-1> The environmental monitoring plan is revised and implemented in 14 DFEAs.

Evaluation

The existing monitoring plan has not been fully revised yet. There are many preparatory works prior to such revision. MSEA and the DFEAs were in the process of considering the purpose and target of the monitoring.

(2) Challenges for Further Capacity Improvement

In order to revise the existing environmental monitoring plan, the above aspects need to be reexamined and defined. DFEAs had already identified the technical issues of the existing monitoring plans through the trainings for Activities 7.1 and 7.2. The trainings conducted in March 2011 were focused on defining the scheme of environmental monitoring. Together with these trainings, JET also placed great importance on the linkage among the environmental monitoring, factory inspection and PSI. Hence, one of the targets of the trainings was to make the DFEAs understand such linkage. To revise the environmental monitoring plan, JET recommends DFEAs to reflect the scheme and targets in their monitoring plan.

2.8 Common and Advisory Activities

2.8.1 Supplementary Trainings

(1) Supplementary Training for Wastewater

During the project implementation period, some supplementary trainings were carried out based on the requirement from some DFEAs. The details of supplementary trainings are summarized in the following table.

Summry of Supplementary Trainings

Training Item	Objectives and Contents	Period	Venue	Target C/P
1. Basic water quality analysis	- Practical BOD analysis: determination of amount of sample, special seeds method, interpretation of analysis result, QA/QC, etc. - Practical COD analysis: selection of reagents, QA/QC, analysis safety, interpretation of analysis result, etc. - Practical Cl^- analysis: sill for judging end point, etc. - Interpretation of existing AEC program results - Usage of spectrophotometer	27 Jan. 2010 1 Feb. 2010	Quneitra	3 C/Ps of laboratory
2. Data management for basic water quality analysis	- Unified file naming rule - Measuring range and EDL (estimated detection limit) - Making data holder by type of sample water - Checking result in recording format taking account of EDL and maximum limits - Checking essential digits and decimal places of the result	18 Apr. and 27 Jun. 2010	Quneitra	3 C/Ps of laboratory
3. Pollution control	- Criterion for selecting grease interceptors in Japan - Calculation method of flow rate - Calculation method of the amount of interceptors grease and sediments - Selection method of grease interceptors - Maintenance and operation of grease interceptors - Design maps and materials in other countries as reference	1 to 6 Jun., 2010	Damascus	3 C/Ps in EIA section
4. Basic water quality analysis	- Practical BOD analysis - Determination of amount of sample - Special seeds method - Interpretation of analysis result and QA/QC, etc.	29 Jun., 2010	Rural Damascus	3 C/Ps laboratory

Training Item	Objectives and Contents	Period	Venue	Target C/P
5. Basic water quality analysis	- Cl^- standard solution preparation: decision of the range of standard solution, confirmation of end point color and QA/QC, etc. - Practical Cl^- analysis: skill for judging end point, etc.	26 Oct., 2010	Damascus	3 C/Ps of laboratory

(2) Supplementary Training for Damascus DFEA

Based on the requirement of laboratory staff of Damascus DFEA laboratory, a supplementary training for Cl^- (one of the basic water quality analysis parameters) was conducted. The contents of the supplementary training are summarized in the following table:

Summary of Supplementary Training for Damascus DFEA

Item	Contents	Remarks
Time	26th October, 2010	
Venue	Laboratory of Damascus DFEA	
Participant	3 persons (laboratory staff)	
Training contents	1) Cl^- standard solution preparation: decision of the range of standard solution, confirmation of end point color and QA/QC, etc. 2) Practical Cl^- analysis: skill for judging end point, etc.	Cross check by using another analysis method is recommended.
Results	All the members could conduct analysis.	Results of AEC program were not satisfied.
Major issues and recommendations	1) Further training for practical analysis skills and QA/QC is still necessary. 2) The method with high accuracy is recommended considering less accuracy of existing analysis method.	1) Some DFEAs are also facing similar issues. (especially for new staff) 2) Limitation of budget 3) Limitation of assignment period of JET for providing more supplementary trainings.

2.8.2 Wastewater Treatment Facility

A wastewater treatment facility (WTF) was procured/ installed under the Project and is working in HOM DFEA who already assigned three staffs for the O&M of the facility. When it was installed, C/Ps faced difficulty in operating the WTF due to the special quality of the laboratory wastewater. Therefore, JET supported the training after the technician for installation returned to Japan. The record of the supplemental trainings, which were held until March 2011, is shown as follows.

Record of Training for O&M of WTF

Date	Subject
29 June 2010	Treating wastewater of HOM DFEA / Testing configuration step
13 July 2010	Treating wastewater of HOM DFEA / Testing configuration step
20 July 2010	Treating wastewater of HOM DFEA / Testing configuration step
22 July 2010	Treating wastewater of HOM DFEA / Testing all steps
22 Sep 2010	Treating wastewater of HOM DFEA / Testing configuration step
30 Sep 2010	Treating wastewater of HOM DFEA / Testing configuration step
10 Mar 2011	Trouble shooting for WTF

During the training, the staff assigned for the facility treated all wastewater of their laboratory, as well as the wastewater from Tartous DFEA. As an initial stage, transporting and treating of laboratory wastewater went well. Thus, MSEA and DFEAs are recommended to stabilize such management system through planning the cost-sharing mechanism, and arranging transportation of wastewater, with due consideration to the capacity and maintenance requirements of WTF.

2.8.3 Sharing Workshop

Sharing workshop (WS) was planned to be held every year end under the initiative of MSEA, with the support of JET. The first WS was held on March 23, 2010, as shown the following table. MSEA and DFEAs presented the Project activities and achievements in the WS, with inviting the members of S/C and T/C, donors, representatives of factories/industries, and others.

First Sharing Workshop (WS)

Purpose	- Presentation and discussion on the achievements of the Project and outputs. - Reporting and sharing the achievement of capacity development and improvement.
Date	- March 23, 2010
Host, Invitee	- Host: MSEA - Invitee: Ministry of MSEA, Members of S/C & T/C, C/Ps, Donors, Representatives of factories/ industries, and other stakeholders (approx. 50 participants in total).
Major program of WS	1. History of Phase 1 Project and Sequence to Phase 2 2. Phase 2 Project Outline and Achievements 3. Project Achievement at Rural Damascus DFEA 4. Project Achievement at Aleppo DFEA 5. Project Achievement at Homs DFEA

The second WS was held on April 10, 2011, with the following objectives:

- To share and discuss the Project achievements and capacity development among MSEA/ DFEAs, as well as external partners essential for pollution source control and environmental management in Syria.
- To discuss about initiating the cooperation mechanism among stakeholders for better pollution source control and environmental management in Syria.

Second Sharing Workshop (WS)

Purpose	- Presentation and discussion on the achievements of the Project and outputs. - Reporting and sharing the achievement of capacity development and improvement.
Date	- April 10, 2011
Host, Invitee	- Host: MSEA - Invitee: Ministry of MSEA, Members of S/C & T/C, C/Ps, Donors, Representatives of factories/ industries, and other stakeholders (approx. 55 participants in total).
Major program of WS	1. Phase 1 History, Phase 2 Outline and Overall Achievements 2. Project Achievement in Output 2 3. Project Achievement in Output 4 4. Project Achievement in Output 5 5. Prospect of the Ministry to Establish National Monitoring Plan in cooperation with Other Ministries

2.8.4 Public Relations [SPOT]

In order to share the status and progress of the Project activities among C/Ps, MSEA and JET prepared and distributed brief messages (called SPOT) to C/Ps periodically, in a postcard style. A total of eight SPOTs were prepared during the Project period as follows:

Contents of SPOT

Vol., No. and Date of Issue		Main Contents	Destination
SPOT vol. 1 (200 sets)	20 April, 2009	Introduction of this Project, Overall goal, Manager of the Project, Leader of JET	C/Ps in MSEA and 14 DFEAs, Donors, Japanese side, etc.
SPOT vol. 2 (250 sets)	27 July, 2009	Main target of this Project, Current activity (Training of Outputs 2 and 3)	C/Ps in MSEA and 14 DFEAs, Donors, Japanese side, etc.

SPOT vol. 3 (300 sets)	14 January, 2010	Asking DFEA to use Draft of "Practical Guideline for Industrial Facilities Inspection" as Guideline of Inspection Current activity (Training of Outputs 1 and 2)	C/Ps in MSEA and 14 DFEAs, Donors, Japanese side, etc.
SPOT vol. 4 (350 sets)	16 March, 2010	Arrival of the equipment procured by the Project 2nd Technical Committee	C/Ps in MSEA and 14 DFEAs, Donors, Japanese side, etc.
SPOT vol. 5 (350 sets)	19 July, 2010	Current activity (Training of Outputs 4 and 5) 1st Sharing Workshop held on March 23, 2010	C/Ps in MSEA and 14 DFEAs, Donors, Japanese side, etc.
SPOT vol. 6 (400 sets)	7 October, 2010	Reviewing for Mid-term Evaluation for the Project New Project Manager assignment	C/Ps in MSEA and 14 DFEAs, Donors, Japanese side, etc.
SPOT vol. 7 (400 sets)	24 January, 2011	Note to prepare Annual Environmental Report 3rd Technical Committee	C/Ps in MSEA and 14 DFEAs, Donors, Japanese side, etc.
SPOT vol. 8 (400 sets)	18 April, 2011	Status of Capacity Assessment 2nd Sharing Workshop	C/Ps in MSEA and 14 DFEAs, Donors, Japanese side, etc.

2.8.5 Capacity Assessment

(1) Purpose and Approach of Capacity Assessment (CA)

C/P and JET conducted the Capacity Assessment (CA) jointly in order to grasp the extent of capacity development and improvement obtained by DFEAs in the course of the Project activities. Although there were various elements composing capacity, the target capacity elements of CA in the Project were confined only into the elements expected to be developed/ improved in the Project, considering the verifiable indicators described in PDM.

Targeting the technical C/Ps of 14 DFEAs, the purpose of CA were i) to understand the baseline of capacity of technical C/Ps of 14 DFEAs at the initial stage of the Project, ii) to measure the level of capacity development by the Project activities, and iii) to re-arrange the activities/ schedule if necessary during the Project implementation. A self assessment by top managers of DFEAs such as directors and laboratory chiefs was the major approach of CA to measure the average capacity of DFEA staff. This was executed using the inquiry format prepared by MSEA and JET.

Another approach had been employed during the Project progress, using objective information such as attendance records of trainings provided, as well as observation of JET.

(2) Progress and Compilation of CA

The first CA was conducted at the initial stage of the Project from June to August 2009, to understand the baseline capacity level compared with the verifiable indicators defined in PDM. The second CA was conducted in May 2010 during the second year of the Project to grasp the extent of capacity development/improvement. Both CAs were made by i) distributing inquiry sheets to directors and laboratory chiefs, and collecting them afterwards, and ii) consulting directly JET and directors/ laboratory chiefs.

The third CA was originally planned to commence in April 2011, as the final opportunity to measure the level of capacity development/ improvement obtained by the Project activities. Its results were intended to be fed into the terminal evaluation of the Project. However, due to the unexpected situation in Syria from April 2011, the third CA was not completed.

(3) Findings and Key Issues

The major findings obtained at the initial stage of the Project (first year) in the self assessment made by directors and laboratory chiefs of DFEAs are summarized in the table below. The assessment results and capacity levels considerably varied among DFEAs. Generally, however, it could be said that i) many DFEAs faced constraints or difficulties in administrative aspects such as insufficient budgetary arrangement and human resources, ii) many DFEAs faced insufficient technical capability in performing water quality analysis, flue gas measurement, and data interpretation, and iii) some

DFEAs faced problems due to less or unorganized accessibility of SOPs. Along with the Project progress, it could be judged that such constraints, problems or difficulties had been tackled and improved to a certain extent according to the second CA and observations of JET together with MSEA.

Major Findings of Self Assessment by DFEAs (Initial Stage)

DFEA	Major Findings
DAM	- Judged the most of technical capability of staff as averaged or above averaged on most technical aspects. - Non-availability of SOP for water effluent sampling. - Recognition of deficit of physical assets or material resources such as equipment, apparatus, etc. - Recognition of more communication with MSEA/ GCEA.
DAMR	- Judged that the allocated staff and budget were almost sufficient. - Sufficient technical skills for conducting water effluent sampling, but non-availability of SOP for water effluent sampling. - Judged the technical skills on AAS as average or more than average. - Necessity of technical skills on water quality analysis through self-preparation of reagent. - Recognition of deficit of physical assets or material resources especially for stack emission measurement. - Judged the planning and implementation of monitoring as more than average.
ALP	- Sufficient technical skills for conducting water effluent sampling. - Recognition of insufficiency of staff and budget especially on inventory and inspection works. - Needs of developing technical skills on i) water quality analysis through self-preparation of reagent, ii) flue gas measurement, iii) analysis by using AAS and GC. - Recognition of importance of i) QA/QC, and ii) proper calibration and maintenance of laboratory equipment. - The only DFEA who reports the monitoring results to MSEA/ GCEA with preliminary interpretation of data
HOM	- Recognition of insufficient technical skills on inspection, despite of high motivation of staff. - Sufficient technical skill for water effluent sampling. - Recognition of insufficient collaboration between inspectors and laboratory staff. - Recognition of technical capability on AAS analysis, but constraints of non-availability of equipment. - Necessity of modification of monitoring plan based on inspection plan and complaints. - Judged the technical capability of staff developed in Phase 1 as average or more than average.
HAM	- Sufficient technical skill for water effluent sampling. - Recognition of less communication with MSEA/ GCEA in terms of monitoring plan and activities. - Judged the technical skills on water quality analysis through self-preparation of reagent as average or more than average (but the parameters are unknown).
LTK	- Judged the allocated staff and budget as almost sufficient except flue gas measurement. - Judged the capacity for PSI and water quality analysis as average or more than average. - Needs of training on AAS, GC and data interpretation.
DRZ	- Judged that its allocated staff and budget were almost sufficient except for cost for participating in JICA training. - Recognition of the needs for developing technical skills for AAS. - Recognition of less communication with MSEA/ GCEA in terms of monitoring plan and activities.
IDL	- Recognition of insufficiency of budget for daily activities especially on pollution source inventory and inspection. - Recognition of insufficiency of full-time staff in laboratory (especially with chemical background) causing the difficulty of data interpretation. - Necessity of networking with MSEA/ GCEA. - Resignation of 6 staff in total so far who were trained in Phase 1. - Challenging awareness activities in governorate by laboratory staff.
HSK	- Recognition of insufficiency of staff and budget for daily activities. - Non-availability of SOP for water effluent sampling. - Recognition of technical capability on AAS analysis, but constraints of non-availability of equipment. - Necessity of technical skills on water quality analysis through self-preparation of reagent. - Recognition of less communication with MSEA/ GCEA in terms of monitoring plan and activities.
RAQ	- Recognition of insufficiency of staff and budget for daily activities. - Recognition of necessity of technical skills especially for inspection works. - Recognition of non-revision of monitoring plan as well as less communication with MSEA/ GCEA in terms of monitoring plan and activities. - Concurrent jobs/ mandates in all staff in laboratory bridging more than two sections/ departments.
SWD	- Recognition of insufficiency of staff and budget for daily activities, especially for laboratory work. - Recognition of deficit of physical assets or material resources such as equipment, apparatus, etc. - Judged the technical skills for water quality analysis as average or more than average.

DFEA	Major Findings
	- Needs of developing technical skills for AAS, GC and stack emission measurement (equipment is available). - Provision of service to the citizens requesting water quality analysis to check the safety.
DAR	- Recognition of insufficiency of staff and budget for daily activities, especially for inspection work. - Concurrent jobs/ mandates in most of staff bridging more than two sections/ departments. - Sufficient technical skill for water effluent sampling. - Needs of developing technical skills for AAS and GC. - Recognition of less communication with MSEA/ GCEA in terms of monitoring plan and activities.
TAR	- Sufficient technical skill for water effluent sampling. - Needs of developing technical skills for AAS and GC (pesticides), and noise. - Judged the technical skills for data interpretation as average or more than average.
QNT	- Recognition of insufficiency of technical skills for inspection. - Recognition of less communication with MSEA/ GCEA in terms of monitoring plan and activities. - Sufficient technical skill for water effluent sampling.

2.8.6 Enhancement of Cooperation with External Partners

(1) Coordination with Other Donors

Whenever opportunities arose, the Project communicated with other donors such as UNDP and EU, who were working/cooperating in environment-related fields in Syria, in order to effectively achieve the Project outcomes as well as to exchange initiatives among donors' cooperation with Syria. The possibility of cooperation between the JICA Project and programs of other donors will be further examined and discussed in such synergistic effectiveness as QA/QC of laboratory analysis, which EU is commencing, with specific cooperation in Syria.

As example, the Ministry of Irrigation (MOI)/ General Commission for Water Resources (GCWR) and JICA Syria hosted "The Sixth Syrian-Japanese Water Symposium" on June 30, 2009. The objectives of the symposium were 1) to share the information and experience among the organizations related to water, once a year, and 2) to contribute to the water resources management activities in Syria and its neighboring countries. Presenters from GCWR, Water Resources Information Center (WRIC), GIZ, JICA Syria office and JICA Jordan office shared their experiences, results of the project, and outlines of activities. The total number of attendees in the symposium were about 130. JET was invited to the symposium, and presented the outline of the Phase 2 Project, emphasizing the importance of data exchange/sharing and cooperation between MOI/ GCWR and MSEA/ GCEA in the future.

(2) Other Notable Topics

The Phase 2 Project was reported in several domestic newspapers in the course of the Project duration, as shown in Annex. The newspaper reports were mainly issued i) during launching the second term of technical cooperation between Syria (MSEA/ GCEA & DFEAs) and Japan (JICA) in the environmental sector in 2008, ii) during series of domestic workshops under the Project, and iii) during the S/Cs. Introduction of the Project in the newspapers implies that the Syrian society has been concerned, to a certain extent, on environmental issues and/or improvement in the country.

2.8.7 Weekly and Monthly Meetings

In order for MSEA to conduct smooth administration of the Project, regular meetings were organized between MSEA and JET. Said meetings were held in principle i) on weekly basis between Project Manager and JET, with participation of Project Director and key chief C/P(s) whenever necessary, and ii) on monthly basis under the chairmanship of Project Manager, with chief C/Ps, managers of MSEA, and JET as the attendees.

Both weekly and monthly meetings were functioning to administer and manage the daily activities of the Project, such as i) scheduling of activities and training, ii) facilitation with 14 DFEAs on Project-related activities and arrangement, iii) discussion and solution of miscellaneous issues arising during the course of the Project implementation, and iv) sharing the technical knowledge with chief C/Ps which were provided to DFEAs by JET in the course of regional trainings. Along with the Project progress, monthly meetings were gradually merged into the weekly meeting, since chief C/Ps were motivated on the needs of sharing the technical knowledge as well as the activity progress. Thus, the weekly meetings were organized not only by Project Manager and JET, but also by the chief C/Ps, especially in the latter half of the Project duration.

The weekly meetings were held 64 times in total during the joint operation of the Project (from March 2009 to April 2011), whereas the monthly meetings were held seven times in total during the initial stage of the Project. The agendas of all the weekly and monthly meetings are presented in Annex.

2.8.8 Other Technical Advisory Activities

(1) Supplementary Training Provided on the Opportunity of Visit of Junior Japanese Expert

A junior Japanese expert (Mr. Takafumi KATAYANAGI) was dispatched to Syria from June 1 to 30, 2009, for the purpose of conducting OJT under the internal training system of company staff in Nippon Koei Co., Ltd. (one of the consortium members composing JET). During his visit, the supplementary lecture and instruction were provided especially to MSEA/ GCEA and ALP DFEA. The outlines of lecture/ instruction provided by Mr. Katayanagi are summarized hereinafter.

1) Instruction of Japanese EIA System in MSEA/ GCEA and ALP DFEA

The EIA system and procedure were furnished to Syria in January 2008 in collaboration with GIZ. These were not extensive since the system had already been put into practice. Therefore, the Japanese EIA system was introduced to MSEA/ GCEA on June 9 and 11, 2009, and to ALP DFEA on June 14, 2009, in order to have a better understanding on EIA for C/Ps. The lecture materials are compiled in Annex.

The discussion between C/Ps and JET was very active, as it even interrupted the lecture of the speaker. Such discussions especially focused on i) legislative framework such as enforcement, penal regulations, qualification of EIA consultants, ii) interaction of socio-economic condition and impacts within EIA system, and iii) concept of mitigation and monitoring on environment. This implied that MSEA/ GCEA and DFEAs needed more practical knowledge and enough experiences in EIA study and procedure, and that further steps for developing capacity on EIA should be examined.

2) Training/ Support for Statistical Analysis of Air Quality Monitoring Data in ALP DFEA

Aleppo DFEA established five full-auto and hourly air quality monitoring stations in the governorate in December 2008, and started hourly monitoring of ambient air quality. The monitoring data were transmitted to DFEA through modems and telephone lines. It was the first time to conduct real time air quality monitoring and data transmission in the whole of Syria. However, the DFEA suffered from insufficiency of information and training for conducting data evaluation and statistical analysis. According to the needs raised by the DFEA director, JET developed a template excel file for air monitoring data, which would be expected to contribute to data evaluation and statistical analysis. The template included 1) daily data table of CO, NO, NO_2, NOx, O_3, SO_2, Benzene, Ethyl Benzene, Xylene, Toluene and meteorological data; 2) monthly table and graph with air quality standards for CO, NO_2, O_3, SO_2, Benzene; and 3) table and graph per day of the week for CO, NO_2, O_3, SO_2 with air quality standards. This excel file was introduced to DFEA on June 16, 2009 and received by

seven staffs, who were instructed on how to manipulate the file and interpret the results. The instruction manual with figures for user-friendly purpose was also provided to DFEA.

(2) Supplementary Training for Homs DFEA

Homs DFEA had a lot of chemicals but less knowledge in chemical storage. JET conducted a short lecture on the principle of safe chemical storage. Contents of the training and the principles are shown below.

Summary of Supplementary Training for Homs DFEA

Item	Contents	Remark
Time	18 February 2010	
Venue	Laboratory of Homs DFEA	
Participant	2 persons (all the members of laboratory staff)	
Training contents	1) Confirmation of the current condition 2) Grouping chemicals by symbol put on the label 3) Reason why chemical should be arrange by group 4) Considering applicable chemical storage method for the DFEA	Homs DFEA has a room for equipment and will use the room for chemical storage.
Major issues	Homs DFEA has not rearranged its chemicals yet.	Other DFEAs are facing similar issues.

Chemical Storage Grouping

	Toxic and /or Harmful 		Not Toxic nor Harmful	
	Solid	Liquid	Solid	Liquid
Oxidizing 	Group1	Group4	Group7	Group10
Flammable 	Group2	Group5	Group8	Group11
Others	Group3	Group6	Group9	Group12

(3) Technical Advisory Activities for Air Aspect

1) Aleppo DFEA

Replying to the request from Aleppo DFEA, JET showed how to repair the basic trouble of PM10 high volume sampler on July 15, 2010.

2) Damascus DFEA

Replying to the request from Damascus DFEA, JET visited three ambient air quality monitoring stations, Jeser, Zahera and Afeef, which were among the four monitoring stations installed in January 2008 and were facing difficulties to operate. Moreover, JET checked the situation of analyzer and advised that an investigation by an engineer from the Australian manufacturer should be performed on July 12 and 26, 2010.

JET also visited three ambient air ambient air quality monitoring stations, Jeser, Afeef and Nasr, among the four monitoring stations, on September 23, 2010 together with the engineer from Australia, and checked the situation of the repair activities. Corresponding results were reported to the director of Damascus DFEA.

JET instructed C/Ps the method of using PM10 low volume air sampler at the request of Damascus DFEA on July 28, 2010.

3) Banyas Refinery

At the request of Banyas Refinery Company during OJT, JET sent technical information about desulfurization of refinery plant on September 28, 2010.

4) Al Chahaba Cement Company/ Meslmieh Cement Company

At the request of Al Cahaba Cement Company during OJT, JET sent technical information about treatment system of dust for cement plant on October 17, 2010.

2.8.9 Mid Term Review of the Project

The Mid-term Review was performed from July 19 to 22, 2010, with the objectives of i) exchanging opinions with C/Ps to confirm and assess the progress, achievements and implementation process of the Project, ii) identifying the positive factors and/or negative issues regarding the Project, iii) making the recommendations for better implementation of the Project, and iv) revising the PDM and PO based on the above evaluation, if necessary.

The review was made jointly by Syrian side and Japanese side. Consequently, the PDM was revised especially on activities and indicators of Output 6 as shown in Chapter 5 and Attachment 9.

The review drew the following findings, conclusions and recommendations. Both Syrian and Japanese sides have agreed to take the following points into considerations in the course of implementing the latter half of the Project schedule. These were initiated by taking the necessary actions under the close cooperation between both sides in order to achieve fruitful outcomes after the Project would be terminated:

- Generally, the Project had been implemented effectively and efficiently according to the PDM and PO, and its purpose was expected to be achieved upon its completion.
- In some DFEAs, difficulties found include those related to the participation of the regional trainings at selected five DFEAs, due to insufficiency of budget for transportation and necessary allowances. In order to implement the Project smoothly and to fruitfully achieve the Project purpose, it was confirmed by both sides that sufficient budget for such items should be allocated. Her Excellency, the minister of MSEA, committed the maximum efforts to tackle this issue in the 3rd S/C on July 22, 2010.
- It was recognized by both sides that the internal trainings among staff in each DFEA would be important to achieve better effects and sustainability of the Project.

2.9 Achievements and Evaluation of Overall Goal and Project Purpose

2.9.1 Project Purpose

The Project purpose and indicators prescribed in the PDM are shown below.

Project Purpose

Capabilities of the DFEAs for implementing inspection and environmental monitoring concerning the water and air pollution sources are strengthened under the management by GCEA.

Indicators

1) The number of the qualified inspector of the laboratory staff is increased.
2) The number of the inspection case is increased.
3) The number of the monitoring item is increased.

It can be judged that the Project purpose is expected to be achieved at an acceptable level by the time of its completion based on the following indicators, considering the unexpected situation in the last year of the Project:

Indicator 1: The number of qualified inspectors in DFEAs was 108 in 2009, whereas in 2010, it increased to 145. Although the increasing number of qualified inspectors in 2011 cannot be realized as effective, the increment from 2009 to 2010 implies that the Project achieved the purpose in terms of this indicator.

Indicator 2: The number of inspection cases related to wastewater effluent in 2008 was 550 in all of 14 DFEAs, and increased to 1,005 in 2009, then 1,183 in 2011. In terms of air pollution emission, the number of inspection cases in 2009 was 133, and increased to 177 in 2010. The inspection cases in both wastewater and air pollution emission have increased remarkably during the Project duration. Therefore, it can be said that this indicator has been achieved satisfactorily, although the increment status in 2011 cannot be identified

Indicator 3: In the course of the Project activities, the staff of DFEAs obtained skills in analyzing the water quality of wastewater discharged from factories, such as oil and some of the parameters of heavy metals. On the other hand, a series of trainings on flue gas measurement has not been completed. This means that the skills for measurement are still underdeveloped at the time of the Project completion. In addition, the monitoring activities especially under Output 7 have not been completed as well. As a whole, it can be said that the potential of increasing the monitoring items has been arranged in DFEAs through the Project, but the substantial increment of monitoring items has not been realized completely. Therefore, it can be judged that this indicator would be achieved to an acceptable level, under the condition of the commitment by MSEA/ DFEAs toward the continuous efforts during the post-project stage.

2.9.2 Overall Goal

The overall goal and indicator prescribed in the PDM are shown below.

Overall Goal

Environmental management capabilities are strengthened in each Governorate by enhancement of the capabilities for implementing inspection and pollution sources management of DFEA.

Indicator

1) The number of enforcement based on the inspection in Governorates is increased.

The concrete figure in the indicator in PDM for measuring the achievement of overall goal will not be realized at the time of the Project termination, as observation period is limited within a few years. However, the enforcement cases in 2008 and 2009 in all of 14 DFEAs were 67, and increased to 137 in 2010. This tendency implies that the Project would be on track towards the realization of the overall goal with the consistent commitment of MSEA/ DFEAs to continuously exert efforts in the long term.

2.9.3 Evaluation of Achievement of the Project and Joint Evaluation with C/Ps

Evaluations on achievements of the project compared with PDM indicators as of March 2012 are summarized in the following table.

Due to the unexpected situation of Syria, the project has been interrupted since the end of April 2011.

JET had not been able to exchange views directly with the C/Ps with respect to progress and achievement of the project till November 2011. However, during the C/Ps training in Japan, held 10 to 19 December 2011, JET could conduct a joint evaluation of the progress and achievement of the project fortunately. C/Ps and JET could exchange opinions and share the recognition of the achievement of indicators for goals and outputs of the Project, because a Syrian project manager attended the training.

As a result, it was confirmed that there is no significant gaps of opinion between C/Ps and JET with respect to the evaluation of progress and achievement of the Project, including whether the indicators of each outputs were achieved or not. The detailed results of joint evaluation are also shown below.

Evaluation of Indicator (as of March 2012) and Joint Evaluation with C/Ps (as of December 2011)

Overall Goal/ Project Purpose/Outputs	Objectively Verifiable Indicators	Evaluation of indicators by Expert team (as of March 2012)	Evaluation of indicators by C/Ps (as of December 2011)	Issues and Recommendations Based on the discussion
Overall Goal (3 to 5 years after project) Environmental management capabilities are strengthened in each Governorate by enhancement of the capabilities for implementing inspection and pollution sources management of DFEA.	1. The number of enforcement based on the inspection in Governorates is increased.	1. Achievement of the overall goal is not clear at this stage. However, the number of detected violations of the wastewater discharge was 67 in 2008, 67 in 2009, 137 in 2010 as total of all DFEA for example. it suggests the achievement of the overall goal begin to be obtained.		- C/Ps requested to hold training in Japan. But JET replied that it is impossible because the project will be terminated in Mid-March. - It is recommended to attend group training and area specific training in relating fields.
Project Purpose Capabilities of the DFEAs for implementing inspection and environmental monitoring concerning the water and air pollution sources are strengthened under the management by MSEA	1. The number of the qualified inspector of the laboratory staff is increased. 2. The number of the inspection case is increased. 3. The number of the monitoring item is increased.	1. [Going to be achieved] Number of qualified inspectors was 108 in 2009 and 145 in 2010. The number is increasing. 2. [Going to be achieved] The number of inspection in all DFEA. As for waste water, 550 in the year 2008, 1005 in 2009, 1183 in 2010. As for air, 133 in the year 2009, 177 in 2010. 3. [Going to be achieved] As for Analysis of Heavy metals and oil. It is possible to analyze in many DFEAs.	1. In fact, the inspectors consist of EIA/Inspection staffs as well as the laboratory staffs. It is not realistic that indicator shows only “The number of the qualified inspector of the laboratory staff”. - The number of inspector increased from 8 to13 in DAMR, from 19 to 28/30 in HOM, if you compare it in 2008 and 2011, - Because there is a five-year work experience rule in the certification standards of the inspector, it is reasonable to increase the number as year goes by. - The number of inspection is nearly 400 at DAMR in 2011. - It is delayed to issue the certificate of inspector signed by the Minister. The main reason is personality of person in charge. 2. Although the number of inspection has increased in 2011, the growth rate is less than in 2010. 3. The analysis of heavy metals was enabled in DFEAs which have AAS (atomic absorption), the number of the monitoring item was increased including the oil analysis.	- It is a time to get not only the quantitative goal such as the number of inspector, the number of inspection and the number of monitoring item but also the qualitative goal such as the capability/experience of inspector, the technology level of inspection, the improvement of accuracy. - It is recommended to conduct further capacity development of C/Ps through OJT and/or direct training of each output. - Regarding above mentioned capacity development of C/Ps, it will be possible to conduct for output 3 and 4 by human resources in Syria. For output 1, 2, 5, 6 and 7, it is essential to conduct technical guidance such as technology transfer and OJT from the outside of Syria, including Japan. For the future, it is required to study the style and program of training.
Output 1 Capabilities for preparing pollution sources inventory are strengthened.	1-1 The proper Pollution Sources Inventory is prepared.	1. [Not achieved completely yet]. The specification of the PSI has been developed, but its preparation has not been completed yet. PSI is being prepared in most DFEA, but the mumber of listed factories and enterd item are not enough. - -.Water pollution source inventory is in the process in most of DFEA. Listing is almost completed. - As for Air pollution source inventory, 18 factories were recorded among 31 first priority factories. In total 40 factories were recorded. - JET had planned to visit 14 DFEAs and conduct direct guidance and OJT in order to improve each PSI.	1. There was no progress for Water PSI since April 2011. - Regarding water PSI, 85% of target factories have been listed, the name of factory and the amount of discharged water. - Regarding Air PSI, 18 factories were recorded among 31 first priority factories. It is about 60 %.	1. Regarding water PSI, - It is necessary to determine concrete item to input and then input full data to Excel sheet. - In the next step, the practical application such as pollution control in the river basin and improving the ability of C/Ps through OJT are recommended. 2. Rgarding Air PSI, - It is necessary to input the data of measurement of flue gas concentration along with the progress of the activities of Output 5. - It is recommended to review the current emission standard which is not practical, in other word too strict, through accumulating the inventory of air pollution sources (including air pollutant concentration data).
Output 2 Capabilities for implementing inspection are strengthened.	2-1 A revision of “Industrial Facilities Inspection Guideline” is prepared.	1. [Almost achieved] “Practical Guidelines for Industrial Facilities Inspection” passed the legal wording process and was approved by Minister in February 2012. It is issued with the preface by Minister. JET had planned to visit 14 DFEAs and conduct OJT on site in order to conduct inspection by using ”Practical Guideline” effectively, although the indicator is almost achieved.	1. “Practical Guidelines for Industrial Facilities Inspection” is a revision of “Industrial Facilities Inspection Guideline”, substantially - Only legal wording process is remained for the revised draft of -“Practical Guidelines for Industrial Facilities Inspection”.	- In order to conduct practical inspection on site using “practical guideline”, it is recommended to have more OJT to adjust actual situation of the individual plant.

Overall Goal/ Project Purpose/Outputs	Objectively Verifiable Indicators	Evaluation of indicators by Expert team (as of March 2012)	Evaluation of indicators by C/Ps (as of December 2011)	Issues and Recommendations Based on the discussion
Output 3 Necessary sampling skills for inspection for water effluent are strengthened.	3-1 SOP for water effluent sampling is prepared in more than 11 DFEAs. 3-2 More than 60% of the staff, who got the training, are able to conduct the water effluent sampling based on the SOP.	1. [Achieved] SOPs for water sampling were prepared in 14 DFEAs. 2. [Achieved] Basically more than 60% of the staff that got the training can conduct the water effluent sampling based on SOP. In the future, it is necessary to strengthen other field work on-site, such as pretreatment of the sample, measuring the amount of wastewater.	1. SOP for water sampling is developed in 14DFEA and it is actually utilized, it has been achieved. 2. Many staff can conduct waste water sampling in accordance with SOP, it has been achieved.	- It is recommended to promote the consolidation of capability of C/Ps through OJT in other outputs.
Output 4 Capabilities concerning water quality analysis for water effluent and surface water are improved.	4-1 SOP for water quality analysis is prepared in more than 7 DFEAs of the 9 DFEAs, except Damascus DFEA, which possess AAS. 4-2 A (Acceptable) grade of the AEC Program is obtained for at least 6 parameters in each DFEA. 4-3 The number of possible analytical parameter is increased by 8 different parameters more on average in 9 DFEA, which possess AAS. 4-4 Water quality analyses with preparation of reagent are able to conduct for at least 1 parameter in more than 11 DFEAs.	1. [Going to be achieved] SOP for COD, NO3-N, Oil, and heavy metal analysis was prepared in 13 DFEA which possess AAS 2. [Not achieved yet]. Regarding AEC program: 6 DFEAs obtained 6 parameters of which rate of A-grade are more than 50% in 2008, 4 DFEAs in 2009, and 10 DFEA in 2010. - Most of DFEAs which did not get A-grade have not participated in the AEC program for heavy metal which was trained in the Project. It is recommendable for DFEAs to try heavy metal in AEC program. 3. [Going to be achieved] Among DFEAs which have AAS, the calibration curve was prepared for 15 parameters in average. 4. [Going to be achieved] Through the analysis of Oil, NO3-N, COD, and heavy metal analysis, most of DFEAs are able to dilute acids and measure the weight of chemicals.	1. SOP for COD, NO3-N, Oil, and heavy metal analysis was prepared in 13 DFEA, it has been achieved. 2. It is not achieved for all DFEAs to get A grade for six or more parameters, it was 10 DFEA in 2010. Towards the A grade of nitrate-nitrogen, we are striving. 3. The number of possible analytical parameter was increased by 7 to 10 parameters in average. 4. Although only one problem remains for analysis by standard methods of nitrate analysis, the indicator has been achieved..	- Regarding indicator 1 and 4, it is recommended to promote the consolidation of capability of C/Ps. - Regarding indicator 2 and 3, it is necessary for DFEAs to participate in the AEC program of heavy metals as a first step in order to get A grade on more than 6 parameters. As the second step, it is also necessary for C/Ps to improve skills and technology for basic parameters and heavy metals. However, it is essential for C/Ps to have the direct guidance by experts.
Output 5 Capabilities concerning measurement of stack emissions (gases and particulate matter) are strengthened.	5-1 SOP for stack emissions is prepared in more than 5 DFEAs. 5-2 More than 60% of the staff, who got the training, is able to conduct the stack emissions measurement based on the SOP for stack emissions. 5-3 The number of possible analytical parameter for stack emissions is increased by 3 different parameters more.	1. [Going to be achieved] SOP of stack emission measurement was prepared. Revision of SOP was completed and the revised version was already translated to Arabic too. 2. [Not achieved yet]. It is still difficult for C/Ps to conduct measurement with high accuracy without the aid of experts, although. C/Ps participated in the training energetically. 3. [Going to be achieved].In ALP, DAMR, TAR and DRZ, analysis of NO, NO2, CO, SO2 became possible now. The measurement training of emission in the stack such as dust and gaseous matters (NO, NO2, CO, SO2) was in the process.	1. MSEA asked the DFEAs to review the draft of the SOP, it is under reviewing. 2. As of March 2011, the amount of training on stack emission measurement was not enough. It has not been achieved yet 3. Regarding the equipment for gas measuring measurement, TESTO350 made in Germany which MSEA procured in 2005, the measurement of NO, NO2, CO, SO2 became possible. It has been achieved. However, regarding the equipment for dust measurement, Dustac made in Japan, training was not completed in the project.	- In order to establish the practical technology of stack emission measurement, only one way is accumulating experience through OJT in actual factory. - It is essential for C/Ps to have more OJT by expert on the field, in order to conduct qualified stack emission measurement by using provided Dust equipment. - It is essential to support the selection of an intermediary supplier between the C/Ps and the manufacturer for the sustainability of the equipment provided, because the manufacturer does not have a branch and/or authorized supplier in Syria.
Output 6 Capabilities concerning evaluation of present conditions of water and air quality in each governorate are strengthened.	6-1 A report, which includes water pollution situations and water pollution maps on the governorate level is prepared in more than 11 DFEAs. 6-2 A report, which includes air pollution situations and air pollution maps on the governorate level is prepared in at least 5 selected DFEAs. 6-3 A report, which includes the workshops mentioned in Activity 6-8 to share the present situations for water and air quality among DFEAs and other relevant authorities, is prepared by MSEA.	1. [Going to be achieved] DAM, DAMR, HOM, LTK, DRZ, HSK, DAR, ALP, HAM, TAR and QNT DFEA submitted the reports at the beginning of March and April 2011. However, some reports do not contain a map of pollution sources, it is necessary for DFEA to have the guidance from MSEA and JET. 2. [Not achieved yet]. QNT sent a repot for air to JET in July 2010. It is preliminary one. It was planned to make a report by around September 2011. 3. [Not achieved yet].The workshop could not be held in December 2011 or January 2012.	1. Although the report was submitted from DFEA improvement is still necessary. 2. The report for air pollution has not been created. 3. The workshop is no longer likely to be held, it has not achieved.	- The training for air and water reporting was held in March 2012, using the TV conference system of JICA. - However, the available result of measurement from output 5 is very limited.
Output 7 Capabilities concerning formulation and implementation of environmental monitoring plan are strengthened.	7-1 The environmental monitoring plan is developed and implemented in 14 DFEAs.	1. [Not achieved yet]. JET had been conducting the training on the purpose of monitoring and selection of target. It was scheduled to conduct training on revision of the monitoring plan from April 2011. JET prepared the guideline for designing water quality monitoring system at environmental water, instead of the remaining training. Self-learning by C/Ps is necessary to achieve the goal.	1. It has not been achieved.	- The guideline for designing water quality monitoring system at environmental water was prepared by JET. - The training for monitoring plan including selection of location, parameter and frequency, and data evaluation was held in March 2012, using the TV conference system of JICA. - Self-learning by themselves is necessary from now on.

CHAPTER 3 ACTUAL INPUTS

3.1 Inputs by the Japanese Side

The JET confirmed that the Project has mostly accomplished the following inputs along with the plan stated in the R/D and PDM.

3.1.1 Dispatch of JICA Expert Team

Seven experts were dispatched by the Japanese side in various fields over the cooperation period as shown in the table below. The total man-months (MM) of the experts at the end of the Project accumulated to 62.1 MM, including the works done in Japan. The details of input records are enumerated in Attachment - 3.

List of Members of JICA Expert Team

	Expert Name	Expertise
1	Norihiko INOUE	Chief Advisor/ Environmental Analysis and Management
2	Keiichi TAKAHASHI	Deputy Chief Advisor/ Inspection-1/ Pollution Inventory-1/ Data Interpretation-1
3	Ryunan MATSUE	Deputy Chief Advisor/ Inspection-2
4	Shinsuke SATO	Pollution Inventory-2/ Monitoring
5	Kouji KIMURA	Water Analysis-1 (AAS)
6	Yoshiki YAMAMOTO	Water Analysis-2/ Data Interpretation-2/ Equipment/ Coordinator
7	Minoru HIRAO	Stack Emission Measurement

3.1.2 Training in Japan

In 2010, a total of 21 counterparts participated to training in Japan. Their names and course titles are listed in the tables below. Record details of their training are presented in Attachment-4 as well as in the Annex.

List of Counterpart Participants to Training in Japan (1-Air)

Title: Managing Air Pollution Sources (Inspection) and Experience of Japan

Duration: May 22, 2010 – June 11, 2010

	Name	Organization	Position
1	Mr. Yasin Moa'alla	MSEA	Project manager, Director of Laboratory Division
2	Ms. Layla Al Durra	Damascus DFEA	Staff of the Laboratory Division.
3	Mr. Nader Taim	Rural Damascus DFEA	Staff of the Laboratory Division.
4	Ms. Rawdah Kal	Aleppo DFEA	Staff of the Laboratory Division.
5	Mr. Mahmoud Al yousef.	Homs DFEA	Chief of the Air Quality Laboratory Division.
6	Mr. Oussama Ali	Tartous DFEA	Staff of the Laboratory Division.
7	Mr. Samer Al-Maghoot	Hama DFEA	Head of Inspection Division. of outside Hama City
8	Ms. Layla Al-Qentar	Sweida DFEA	Staff of Air Safety Division

List of Counterpart Participants to Training in Japan (1-Water)

Title: Industrial Wastewater Inspection and Water Quality Analysis

Duration: July 18, 2010 – August 7, 2010

	Name	Organization	Position
1	Mr. Bashar Al Nabki	MSEA	Staff of EIA & Inspection Division.
2	Mr. Ali Shouwish	Rural Damascus DFEA	Staff of the Laboratory Division.
3	Mr. Ahmed Moalla Ahmed	Aleppo DFEA	Chief of the Laboratory Division.
4	Ms. Sana Mansour	Homs DFEA	Chief of the Laboratory Division.
5	Ms. Rudiana Al Ali	Tartous DFEA	Chief of the Laboratory Division.
6	Mr. Yamin Soleman	Lattakia DFEA	Chief of the Laboratory Division.
7	Mr. Zaher Sabuha	Hama DFEA	Staff of the Laboratory Division.
8	Mr. Mahmoud Tamer	Idleb DFEA	Chief of the Laboratory Division.
9	Mr. Saher Abdullah	Deir Ezzor DFEA	Chief of the Laboratory Division.
10	Mr. Diaa Din Shubut	Dara'a DFEA	Staff of EIA & Inspection Division.
11	Mr. Nawaf Othman	Hasakeh DFEA	Chief of the Laboratory Division.
12	Mr. Hassan Okura	Raqqa DFEA	Chief of the Laboratory Division.
13	Ms. Sana'a Al-Mnizel	Quneitra DFEA	Chief of the Laboratory Division.

In 2011, five counterparts participated to training in Japan. Their names and course titles are listed in the table below. Record details of their training are presented in Attachment-4 as well as in the Annex.

List of Counterpart Participants to Training in Japan (2)

Title: Environmental management on air and water pollution control for sustainability of the Project

Duration: December 10, 2011 – December 19, 2011

No.	Name	Organization	Position
1	Dr. Wareef Al Yazgy	MSEA	Director of Laboratory Dept.
2	Mr. Bachar Aldayea	MSEA	Staff of EIA and Inspection Dept.
3	Ms. Mouna Jomaa	Rural Damascus DFEA	Laboratory chief
4	Mr. Malek Solaiman	Rural Damascus DFEA	Deputy chief of laboratory and inspection section
5	Mr. Iyad Allouch	Homs DFEA	Deputy director of DFEA/ Head of EIA/Inspection Dept

3.1.3 Provision of Equipment

Various equipment were provided by JICA for the implementation of the Project such as stack-gas measurement equipment, water quality monitoring and analysis equipment, and other office equipment. The total cost of the provisions sums up to approximately 53.91 million yen. Attachment-5 shows the list of equipment provided under the Project, while Attachment-6 shows the list of equipment accompanied with JET.

3.1.4 Other Inputs

The total operational cost supported by the Japanese side was approximately 31.201 million yen as shown in the table below.

Project Implementation Expenses Provided by the Japanese Side

Japanese Fiscal Year	Expenses (in thousand yen)	Major Usages
1st year (Mar. 2009 – Mar. 2010)	9771	Daily project operation, 1st Work shop
2nd year (Apr. 2010 – Nov. 2010)	11996	Daily project operation
3rd year (Dec. 2010 – Aug. 2011)	5871	Daily project operation, 2nd Workshop
4th year (Sep. 2011 – Mar. 2012)	3564	Daily project operation

3.2 Input by the Syrian Side

3.2.1 Appointment of Counterpart Personnel

A total of around 300 counterpart personnel have been assigned to the Project; nine from MSEA and around 300 from DFEA. The names of the Project's main counterparts and titles are listed in the table below.

Assignment of Counterpart Personnel as of April 2011

	Name	Position	Project Responsibility
MSEA			
1	Mr. Suleman Kalou	General Director	Project Director
2	Dr. Wareef Al Yazgy	Director of Laboratory Division	Project Manager
3	Ms. Samah Rislan	EIA Department	Chief counterpart for Output 1
4	Mr. Bashar Daie'	EIA Department	Chief counterpart for Output 2
5	Ms. Samar Al-Chami	Water Safety Division	Chief counterpart for Output 3
6	Ms. Heba Salim Ms. Amal Al Sahammas	Laboratory Division	Chief counterpart for Output 4
7	Ms. Hakima Hawash	Air Quality Division	Chief counterpart for Output 5
8	Ms. Safaa Naffaa	EIA Division	Chief counterpart for Output 6
9	Mr. Ali Salameh	Laboratory Division	Chief counterpart for Output 7
DFEAs			
1	Dr. Maher Bouzo	Director, Damascus DFEA	
2	Ms. Reem Sadreddin	Laboratory Chief, Damascus DFEA	
3	Mr. Thaer Al-Deif	Director, Rural Damascus DFEA	
4	Ms. Mona Al-Jomaa	Laboratory Chief, Rural Damascus DFEA	
5	Mr. Mohammad Said Naffous	Director, Aleppo DFEA	
6	Mr. Zakarya Al-Eisa	Laboratory Chief, Aleppo DFEA	
7	Mr. Adnan Al-Natour	Director, Homs DFEA	
8	Ms. Sana Mansour	Laboratory Chief, Homs DFEA	
9	Mr. Ali Al-Jouaied	Director Hama DFEA	
10	Mr. Samer Al-Maghoot	Laboratory Chief, Hama DFEA	
11	Ms. Lama Ahmad	Director, Lattakia DFEA	
12	Mr. Yamen Suleiman	Laboratory Chief, Lattakia DFEA	
13	Mr. Mohammad Amin Ramadan	Director, Deir Ezzor DFEA	
14	Mr. Saher Abdollaha	Laboratory Chief, Deir Ezzor DFEA	
15	Mr. Jomanah Hassan	Director, Idleb DFEA	
16	Mr. Mahmoud Tamer	Laboratory Chief, Idleb DFEA	
17	Ms. Ra'eefah Esber	Director, Hasakeh DFEA	
18	Mr. Nawaf Othman	Laboratory Chief, Hasakeh DFEA	
19	Ms. Shamseh Al-Jassem	Director, Raqqa DFEA	
20	Mr. Hassan Okula	Laboratory Chief, Raqqa DFEA	
21	Mr. Mo'tasem Al-Abed	Director, Sweida DFEA	
22	Ms. Omayma Al-Sha'ar	Laboratory Chief, Sweida DFEA	
23	Mr. Ahmad Kablawi	Director, Dara'a DFEA	
24	Mr. Mohammad Al-Hariri	Laboratory Chief, Dara'a DFEA	
25	Mr. Hassan Morjan	Director, Tartous DFEA	
26	Ms. Rodayna Al-Ali	Laboratory Chief, Tartous DFEA	
27	Mr. Hmza Suleiman	Director, Quneitra DFEA	
28	Ms. Thanaa Al-Mnizel	Laboratory Chief, Quneitra DFEA	

3.2.2 Provision of Facilities

The Syrian side has provided the following facilities:

- Land, office space, and other necessary facilities for the project office in MSEA
- Facilities necessary to conduct water quality monitoring analysis in DFEA

- Electricity, water supply and telecommunication services in MSEA

3.2.3 Budget Allocation

The Syrian side provided part of the operational expenses from the government budget allocated to MSEA and DFEAs.

CHAPTER 4 RECOMMENDATIONS AND LESSONS LEARNED FOR FUTURE SUSTAINABILITY IN POST PROJECT

4.1 Recommendations for the Post Project

(1) Self-reliance Capacity Development

Some of the Project activities, including the trainings, have not been completed due to unexpected situation in Syria. However, the instructions, SOPs, guidelines, and technical materials have been generated through the Project activities which are basic and effective tools for pollution control and environmental monitoring. Technical trainings and OJTs have also been conducted by using the equipment provided through the Project. The skills and experiences gained from these trainings are indispensable in fulfilling the mandates of MSEA/DFEAs.

These are the essential elements for building the capability of the nation's environmental authority. Its capacity cannot be maintained and polished without the continuous efforts to cultivate the capacity obtained. Therefore, it is recommended for MSEA/DFEAs to promote self-reliant capacity development by feeding the outcomes and achievements of the Project into the daily duties and activities with proper managerial standpoint such as human resources and budget arrangement.

(2) Sustainable Human Resources Management in MSEA/DFEAs

An apparent number of trained and experienced counterparts being replaced were observed in the course of the Project implementation. Although the gap/ loss of these counterparts were somewhat replaced, the trainings and skills acquired by the previous counterpart were not transferred to the succeeding counterpart due to insufficient measures of succession.

Human resource availability is one of the crucial factors in accomplishing capacity development. The developed skills and gained experiences should be retained and improved not only in the individual level but also in the organizational level. Therefore, newly mobilized staffs are to be natured through i) instructing/coaching from senior/experienced staff; and, ii) inter-departmental dissemination of knowledge and know-how. Such approaches on human resources management are recommended to maintain the proficiency level of technical skills and experiences within the organization, such as DFEAs. Moreover, it is recommended for MSEA/DFEAs to prepare and practice the programs and/or manuals for training the newly-assigned staff by making the best use of the outcomes of the Project.

(3) Enhancement of Collaboration with External Partners

In the course of the Project implementation, MSEA requested the Ministry of Electricity, Ministry of Oil and Natural Resources, and Ministry of Industry to cooperate with DFEAs for the preparation of training on flue gas measurement as one of Output 5's activities. Under the authorization of MSEA as well as the concurrence of related ministries, DFEAs would receive cooperative responses from factories, refineries, power plants, etc. to commence the preparation for the training on flue gas measurement, such as checking the conditions of stacks and flanges, accessibility to the stack, and laying ducts/pipes.

On the other hand, MSEA has been trying to initiate a cooperation scheme with the Higher Institute of Science and Technology under the Ministry of Higher Education in order to realize the sustainability of equipment maintenance of DFEAs' laboratories. Seizing the first opportunity, MSEA visited the institute to inquire for a possible cooperation to calibrate the TESTOs (equipment for stack emission measurement) which needed to be shipped to Europe currently for calibration. MSEA intended to expand the possible cooperation with the institute through a basic agreement between the two authorities for covering the overall maintenance requirements of laboratory equipments.

Such initiation of partnership development with external bodies would imply the contribution to sustainability of the Project as well as the fulfillment of mandates of MSEA/DFEAs in the future.

(4) Effective Utilization of the Project Outcomes

Although the trainings and technical transfer have not been completed compared with the PDM and PO, the Project generated various products, including technical assets such as training materials and equipment. In addition, intangible outcomes were also obtained through the Project activities, such as inter-departmental communication, mechanism potential on inter-DFEA communication by a series of regional training. Therefore, the recommendation is for MSEA/DFEAs to utilize effectively these outcomes in the course of environmental administration afterward in national and regional levels. Whenever necessary, MSEA/DFEAs are recommended to upgrade or renew these assets and outcomes to cope with trends of environmental issues that had to be tackled in future. The conceivable setups for upgrading/renewing the Project outcomes are i) regular session among MSEA and DFEAs for sharing the experiences gained and solution adopted through tackling the environmental issues, ii) frequent challenges to AEC program, iii) enhancement of communications with the environmental research institutes as well as industrial/ private sectors for obtaining and cultivating the most up-to-date pollution abatement technology, etc.

(5) Tackling Region-Specific Environmental Issues

Basic technical skills and knowledge, which are essential in pollution sources control and environmental management in Syria, have been developed in MSEA/DFEAs through Phase 1 and Phase 2 projects. The two-phase projects have been distributed evenly on each of the 14 DFEAs to maximize their fundamental skills and assets (e.g. laboratory equipment). However, the environmental issues to be tackled and pollution sources to be controlled differ much from every DFEA based on the background environment condition and industrial status in its jurisdiction. For example, a DFEA has the priority to control the chemical industries and oil-related industries, whereas another DFEA encounters issues in food industries and many small-scale industrial activities. Therefore, the capacity development as the post-project challenge is suggested to steer MSEA/DFEAs to the direction of tackling region-specific environmental issues through expansion of the two-phase projects' outcomes. In this regard, development of system and networks among MSEA and DFEAs, such as appointment of core/leading DFEA(s) for tackling the specific environmental issues, would be contributory for realizing the effective solution in region basis.

(6) Recommendations on Priority Actions Based on the Project Outcomes

MSEA and DFEAs have gained the various capability and skills through the Project activities and seven Outputs in Phase 2. However, some of the activities and/or the indicators have not been yet achieved as mentioned in Chapter 2. In order to aim at accomplishing the goal defined in PDM continuously afterward, the following are recommendable for MSEA and DFEAs, as the priority actions selectively by utilizing the outcomes gained in Phase 2.

a) First of all, it is indispensable to continuously enhance the capacity development on inspections to factories and other pollution source, which has a direct bearing to the Project purpose. Moreover, the skills for effective communication with representatives of industrial facilities should be also increased in parallel. Therefore, according to the inspection guidelines concurred by the Minister of MSEA, the on-site practices of inspection activities are recommendable for DFEAs to be done over again, in order to cultivate the technical skills of inspection as well as communication skills with factories.

b) It is essential to develop and continuous renew the PSI, which should be a base for effective and practical activities of inspection to pollution sources. Although the PSI have not been developed

completely in Phase 2 unfortunately, the frameworks and formats has been prepared. Also the methodology and OJT to complete the PSI were provided and shared through the Project activities. Consequently it is now practicable for DFEAs to complete the PSI by utilizing such knowledge and knowhow. Continuous efforts to complete the PSI are recommendable for MSEA and DFEAs.

c) Especially on PSI development for air, it is important to enhance the capacity development on stack emission measurement under Output 5. Phase 2 has limitedly achieved equipment provision, SOP preparation and basic trainings of measurement at the regional five selected DFEAs unfortunately. It is recommendable to continue the enhancement of technical skills for measurement by using the outcomes obtained in the selected five DFEAs so far, and to expand/spread the skills and experiences to the other DFEAs afterward. In addition, since the sustainability of measurement equipment provided through the Project would be a crucial issue in the future, it is indispensable to find/select a capable supplier in Syria who can provide the services for equipment maintenance and spare parts by bridging with the equipment manufacturer.

d) The technical skills and capability on effluent sampling and water quality analysis have been developed through Phase 2. It is recommendable for MSEA and DFEAs to continuously polish up the gained skills/ capability by applying actively to AEC program.

e) In order to realize the above aims, it is also essential to establish and/or improve the mechanism which will support the said priority actions. As mentioned in Chapter 2, the various mechanism to be established/ improved necessary for supporting the priority actions have been identified through the Phase 2 activities. Among others, the following are the recommendable for supportive mechanism development.

- Promotion of communication among MSEA and DFEAs. And promotion of communication between DFEAs (sharing and mutual trainings from the 5 selected DFEAs to the other DFEAs which have been fostered through regional training system employed in Phase 2.)
- Promotion of collaboration mechanism with the external partners in order to maintain and renew the technical skills and knowhow gained as well as to supplement the technical skills which could not be achieved in Phase 2. Whenever possible, it will be also contributory to seek the chance of receiving the technical transfer and colleting the technical knowledge from abroad.
- Effective utilization of GPS including the elimination of restriction of using GPS in Syria, enhancement of computer operation skills (especially on MS excel), improvement of internet conditions in MSEA and DFEAs.

(7) Other Recommendations

As depicted in the following section, it is recommended for MSEA and DFEAs i) to establish the technical committee on industrial wastewater treatment, and ii) realize the budgetary stabilization for ensuring the sustainable administration on environmental management.

(8) Draft Proposal for the Future Possible Follow-Up Cooperation

The Project has been completed without accomplishing some of the designed activities and indicators as mentioned in Chapter 2.

The implementation of the following activities and supports to MSEA/DFEA below would contribute to achieving the Project purpose and Outputs.

a) Utilization of the national resources of Syria (Related to Output 4)

Water quality analysis (heavy metals) by AAS is being conducted in several universities as well as AEC in Syria. If the experts in these organizations would provide the trainings to the laboratories' staff of DFEAs, the technical skills for wastewater quality analysis are expected to be enhanced especially on heavy metals. The universities in Syria which are conducting the heavy metal analysis by AAS include Damascus Univ., Allepo Univ., Lattakia Univ., etc. However, the detail information on possible personnel(s) as a trainer and contact windows in universities/ AEC are unclear unfortunately, since the Phase 2 did not intend to involve the national resources into the Project in terms of technical transfer and trainings. Said training is considered to be effective to achieve the indicators of Output 4.

b) Training in the Third Countries (Related to Output 2 and 4)

Egyptian Environmental Affairs Agency (EEAA) and its Regional Branch Offices (RBOs) would be one of the organizations of the training in the third country for Syrian C/Ps.

EEAA and RBOs received twice the Syrian C/Ps during the Phase 1 project, as the trainings in the third country under supports by JICA. EEAA implemented the projects with JICA for 10 years, including technical cooperation, grant aid for laboratory equipment, etc. Such cooperation was being implemented during the period of the Phase 1 Project of Syria, thus the third-country trainings in Egypt were realized smoothly. The JICA cooperation for EEAA/ RBOs were completed in 2009, meaning that it would be comparatively difficult to resume the third-country trainings for Syrian C/Ps. However, due to the similar status and sources of environmental pollutions between Syria and Egypt, it is considered to be possible to facilitate the third-country trainings especially on the themes of water quality analysis and factory inspection.

c) JICA Training (Related to Output 2, 3, 4, 5, 6 and 7)

JICA training courses on environmental management, pollution control, monitoring of air/ water quality, etc. will be contributory for Syrian C/Ps to enhance their capacity. Although some of training courses have conditions such as country-focusing program, the following are examples which will be effective for MSEA/ DFEAs from the viewpoint of their topics and curriculums.

- Courses planned in 2012: i) Air Quality Management Policy (related to Output 5), ii) Water Environmental Monitoring (related to Output 3, 4, 6 and 7), iii) Industrial Pollution Control Management (related to Output 2), iv) Industrial Wastewater Treatment Techniques (related to Output 2), etc.
  - Courses conducted in 2011: i) 1184286, Air Pollution Source Management, ii) 1180113, Pollution Control and Local Environmental Management, etc.

  However, it should be noted that the staff of MSEA/ DFEAs having enough capability for English are much limited, and that the Syrian C/Ps qualified to participate in the JICA trainings would be fixated. If the Arabic interpretation is facilitated in JICA training courses motioned above, staff of MSEA/ DFEAs can receive more beneficial outcomes from the courses.

However, in case of sufficient effects are not observed for the above activities and supports, as the readiness for the case of resuming the cooperation with and JET dispatch to Syria in near future, a draft framework for the possible follow-up cooperation was examined and is proposed below. The following draft proposal was prepared based on the Project purpose, Outputs, and activities defined in the current PDM and PO, as well as on the premises that i) the institutional situation and mandates of MSEA/ DFEAs would not be drastically changed from the current ones, ii) major/ key C/Ps who received the technical cooperation in the Phase 1 and Phase 2 projects would be almost same at the

time of the follow-up cooperation, and iii) the equipment provided through the Project would be almost functionable and workable at the time of follow-up cooperation. Besides, the following framework mainly focuses on the technical instruction and trainings which could directly contribute to achieving the Project outputs and activities with excluding a kind of administrative performance of MSEA/ DFEAs and JET members, such as S/C, T/C, domestic workshops, progress report preparation, etc.

When the follow-up cooperation would be decided to provide, it is necessary in advance to confirm the conditions and situation for revising or updating the following framework flexibly.

Draft Framework Proposed for Future Possible Follow-up Cooperation

Project Outputs/ Indicators	Not-accomplished Indicators/ Activities	Necessary Cooperation for Accomplishment	Expert Dispatch[1]	Remarks and other available scheme[2]
Output 1: Strengthening capabilities for preparing pollution sources inventory	1-1. List up of wastewater sources (approx. 15% remained) and completion of wastewater PSI. 1-2. Completion of air PSI (approx. 40% remained).	1-1. OJT as follows. - Collecting and upgrading the data of water pollution sources. - Data entry to PSI. - Instruction on renewing and improving the water PSI data. 1-2. OJT as follows. - Collecting and upgrading the data of air pollution sources - Instruction on renewing and improving the air PSI data.	Expert on PSI (air and water). - Four times. - 4.0 MM in total.	-
Output 2: Strengthening capabilities for implementing inspection	2-1. Accumulation of experiences of inspection at the actual factories considering the pollution status.	2-1. OJT as follows. - Practice of inspection at the factories. - Communicating and negotiating the pollution issues with factory staff in charge. - Instructing the factories to improve inappropriate operation or maintenance of pollution abatement facilities.	Expert on Inspection (air and water). - Three times. - 3.0 MM in total.	b), c)
Output 3: Strengthening sampling skills for inspection for water effluent	3-1. (to be covered in Output 2 activities)	3-1. Stabilizing and improving the skills through OJT in Output 2.	-	c)
Output 4: Strengthening capabilities for water quality analysis	4-1. Improvement of analysis accuracy (increasing A grade of AEC program).	4-1. OJT as follows. - Stabilizing the skills for water quality analysis based on SOP, especially on NO3-N and heavy metals. - Continuance of training for heavy metal analysis (practical analysis using the actual samples from factories).	Expert on Water Quality Analysis. - Four times. - 4.0 MM in total.	Consumables necessary for analysis would be needed to provide. a), b), c)
Output 5: Strengthening capabilities for stack emission measurement	5-1. Trainings on dust measurement. 5-2. Actual measurement activities at the factories linking with Outputs 1 & 2.	5-1. Completeness of a series of training for dust measurement based on SOP. 5-2 OJT as follows on gas and dust measurement. - Practice of measurement at the actual factories. - Practice of linkage with inventory and inspection activities.	Expert on Stack Emission Measurement. - Two times. - 3.5 MM in total.	Support to MSEA/ DFEAs would be necessary to develop the cooperation scheme with a reliable supplier for sustainable maintenance of dust samplers (spare parts and consumables procurement, etc.). c)

[1] Dispatch of chief adviser would be planned for 1.0 MM in total, in addition to the MM proposed in the table. 18.5 MM as grand total would be necessary for follow-up cooperation.

[2] a),b) and c) in the table mean a) Utilization of the national resources of Syria, b) Training in the Third Countries, c) JICA Training.

Project Outputs/ Indicators	Not-accomplished Indicators/ Activities	Necessary Cooperation for Accomplishment	Expert Dispatch[1]	Remarks and other available scheme[2]
trengthening capabilities for evaluation of water and air quality	ing the water quality status reports in DFEAs. ation and finalization of air quality status reports in DFEAs. g workshops in regional DFEAs.	cal instruction for finalization of water quality status report. follows. ness of a series of trainings for preparation of air quality status report. instruction for finalization of air quality status report. t for holding a series of sharing workshops.	Data Interpretation (air and water). s. n total	expenses to MSEA/ DFEAs would be necessary to hold a series of sharing workshops. c)
Output 7: Strengthening capabilities for formulation and implementation of monitoring plan	7-1. Revising the monitoring plan. 7-2 Implementation of monitoring based on revised plan.	7-1. OJT for revising monitoring plan based on the monitoring guidelines. 7-2 Technical instruction and OJT for practice the monitoring activities based on revised plan.	Expert on Monitoring Plan - One time. - 1.0 MM in total	c)

4.2 Lessons Learned

(1) Enforcement for Non-Compliance Cases

Until now, there are no clear and unified enforcement procedures about non-compliance cases. In addition, inspectors and DFEA do not have the right to take enforcement actions on non-compliance cases. Actually, all enforcement actions are decided by the governorate. It is recommended for MSEA to formulate unified enforcement procedures for non-compliance cases, including clear criteria on fines/penalties.

(2) Establishment of Technical Committee on Industrial Wastewater Treatment

There are many factories in Syria which are facing difficulties for dealing with the troubles of wastewater treatment plant operation, which may result in an unintentional violation (i.e., treated wastewater did not meet the standard quality due to technical reasons). However, it is difficult for inspectors to give appropriate technical guidance and advice on the improvement of wastewater treatment plant operation due to the limited capability of inspectors. The recommendation is for MSEA to establish a technical committee in collaboration with the external partners on industrial wastewater treatment and provide appropriate technical guidance and advice to factories which are facing some technical difficulties with their wastewater treatment plants.

(3) Stability of Budgetary System

Both MSEA/DFEAs and JET were mutually devoting their effort on the acceleration of the Project activities to successfully achieve the objectives of the Project. Unfortunately, some obstacles due to insufficient budget were often observed, which affected negatively the Project implementation and progress, such as travel cost insufficiency for the regional trainings, deficit of fuel for mobilizing inspections to the factories, etc. The daily operational tasks and duties of DFEAs out of the Project scope also faced similar obstacles.

Along with the Project progress, the MSEA had been trying to allocate the appropriate budget to DFEAs for Project operations, including the Minister's decision for additional allocation. Thus, the Project operation had been gradually improved, and the achievements of the Project activities were remarkably attained.

Appropriate budget planning and allocation is indispensable in sustaining not only the Project outcomes but also in the fulfillment of daily duties of DFEAs. Stabilization of the budgetary system is essential for enhancement by the National Environmental Authority. For such purpose, not only the

annual budget plan but also mid/long-term strategy for budget planning is recommended to be initiated in MSEA and DFEAs.

(4) Effectiveness of Regular Meetings

During the Project period, weekly/monthly meetings were regularly held. These regular meetings contributed significantly to the improvement of Project operations for sharing the track, and to the progress of a series of regional trainings, OJTs, and project activities among the chief C/Ps, project administrative C/Ps and JET. Issues and obstacles prohibiting smooth Project implementation were also discussed, and solutions by both MSEA/DFEAs and JET were materialized. In addition, the meetings functioned as part of training sessions for chief C/Ps and other officials of MSEA, which were attained by duplicating and summarizing the regional training conducted. This function stimulated positive behavior from the chief C/Ps to even learn environmental managerial topics out of the Project scope, thus, as a result, special sessions for training and consultation on these aspects were organized more frequently between MSEA and JET.

In order not only to promote the Project achievements, but also to nurture the Project ownership among the C/Ps and Japanese side, regular meetings involving the key project members, which were found to be effective, are suggested.

(5) Regional Training Approach

The Project was designed applying the approach of the regional trainings mentioned in Chapter 1. This approach was efficiently working in the conduct of lecture trainings and general technical trainings, as well as group consultations in the common topics such as inventory policy and contents.

However, MSEA/DFEAs should have borne the cost for C/Ps' trips to the selected five or six DFEAs, and it was often observed that there was difficulty for C/Ps to participate in the regional trainings due to insufficient travel budgets. In some ways, this brought about issues on continuity and sustainability of the trainings. On the other hand, the JET should have gradually employed round-trip training for each of 14 DFEAs due to the differences of model/manufacturer of analysis devices to be trained, the differences of type and category of factories for inspection OJTs, etc.

In this regard, the Project operation, including the training approach, should be flexible in terms of the budget arrangement as well as time schedule according to the situation and progress of the activities. Besides, a well-balanced load for undertakings for each side of the Project executer should be examined, not only during Project design stage but also at implementation stage, as one of the flexible features of the Project.

CHAPTER 5 REVISION OF PDM

5.1 PDM and PO at the Project Preparation

The original PDM and PO (called PDM_0 and PO_0) were formulated at the signing of the R/D between GOS and GOJ in November 2008 before the commencement of the Project (see Attachment-7).

5.2 PO revised at the Inception Stage of the Project

The PO_0 was revised as PO_1 at the first Steering Committee (S/C) meeting held on the 13th of April 2009. In the S/C, the PO of the Project was discussed from the perspective of reducing the whole project schedule to achieve the Project purpose more effectively (see Attachment-8).

5.3 PDM and PO revised at the Mid Term Review Stage of the Project

The PDM_0 was revised as PDM_2 at the mid-term review of the Project performed from the 19th to the 22nd of July 2010, especially on activities and indicators of Output 6 (see Attachment-9). The revised activities and indicators in Output 6 are shown in the table below.

Revised Activities of Output 6

	Before Revision	After Revision
Activity 6.1	GCEA prepares a training plan of water quality interpretation/report preparation and interpretation of stationary emission sources of air pollution/report preparation, and manages the implementations.	**MSEA** prepares a training plan of water quality interpretation/report preparation and interpretation of stationary emission sources of air pollution/report preparation, and manages the implementations.
Activity 6.8	Materials for public awareness based on the present situations for water and air quality are developed.	**Workshops are held by MSEA to share the present situations for water and air quality for DFEAs and other relevant authorities.**

Revised Indicators of Output 6

	Before Revision	After Revision
Indicator 6-2	A report, which includes air pollution situations and air pollution maps on the governorate level, is prepared in more than 11 DFEAs	A report, which includes air pollution situations and air pollution maps on the governorate level, is prepared in **at least 5 selected** DFEAs.
Indicator 6-3	Materials for public awareness based on the present situations for water and air quality is prepared in more than 11 DFEAs.	**A report, which includes the workshop mentioned in Activity 6-8 to share the present situations for water and air quality among DFEAs and other relevant authorities, is prepared by MSEA.**

CHAPTER 6 RECORDS OF STEERING COMMITTEE AND TECHNICAL COMMITTEE MEETINGS

6.1 Steering Committee

The Steering Committee (S/C) meetings chaired by the minister of MSEA and the project director when the minister was not available were held three times in total for the final decision and authorization of direction and framework of the Project, as shown below. The 4th S/C meeting was planned to be held in April 2011, however, it was postponed because the government was in a state of disorder at that period. Minutes of each S/C meeting is shown in Attachment-1.

Record of Steering Committee Meetings

No.	Date	Major Discussion Points
1st S/C	13th Apr. 2009	- Overall explanation of Project design and Inception Report. - Confirmation of members of S/C, T/C and Chief C/Ps. - Confirmation of equipment procurement. - Discussion on specific issues, such as i) enhancement of motivation of staff of MSEA & DFEAs, ii) possibility of shortening the Project schedule, iii) method of south regional training, iv) ERC involvement, and v) other logistic matters
2nd S/C	12th Aug. 2009	- Achievements of the Phase 1 Project and design of the Phase 2. - Activities and achievements of Phase 2 up to August 2009. - Sharing the findings and confirmation of further schedule. - Discussion on specific topics such as inspection activities, necessary facilitation and coordination for better project implementation, etc.
3rd S/C	22nd Jul. 2010	- Project achievements at midterm as of July 2010. - Result of Mid-term Evaluation of the Project. - Discussion on specific topics such as awareness activities, classification of industries, inspection activities, mandate of inspection, establishment for the committee relating inspection work, and allocation for the training budget to DFEAs.

6.2 Technical Committee

The meetings of the Technical Committees (T/C) chaired by the project director were held four times in total to share the project goals and current achievements, and to discuss specific topics that occurred throughout the Project activities. Minutes of each T/C meeting is shown in Attachment-1.

Record of Technical Committee Meetings

No.	Date	Major Discussion Points
1st T/C	11th Aug. 2009	- Sharing the Project design and overall schedule of Phase 2. - Presentation of the Project activities and related topics from 14 DFEAs. - Overall progress and further schedule of the Phase 2. - Confirmation of equipment procurement plan and revised PO. - Discussion on specific topics such as project administration and facilitation, participation in AEC, operation on regional training, preparedness for installing wastewater treatment facility in HOM DFEA, etc.
2nd T/C	15th Mar. 2010	- Sharing overall goal and plan for the next stage of the Project. - Presentation of the Project activities and related topics from five south region DFEAs. - Recommendations from JET - Discussion on specific topics such as budgetary matter, enhancing self-training, human resource. etc.
3rd T/C	18th Oct. 2010	- Sharing project outlines, achievements as of October 2010, plan for the next stage, and recommendations. - Presentation of the Project activities and related topics from two central region DFEAs and 2 coastal region DFEAs. - Topics offered by JET on pollution control and environmental management. - Discussion on specific topics/issues including i) equipment operation and maintenance such as GPS, draft chamber, TESTO, wastewater treatment

No.	Date	Major Discussion Points
		facility, etc. ii) importance of sharing the knowledge obtained through Training in Japan, iii) visions and road map for fruitful achievements of the Project, iv) more involvement of chief C/Ps into the Project activities, v) cooperation with factories, Ministry of Industry, and Chamber of Industry, and vi) budgetary matters, and equipment allocation matters, etc.
4th T/C	28th Mar. 2011	- Sharing project outline, achievements as of March 2011, plans for the next stage, and recommendations. - Presentation of the Project activities and related topics from two north region DFEAs and three northeast region DFEAs. - Specific topics, such as inspection activities and practical inspection guidelines.