

Chapter 2 Summary of Study Results

2.1 General

Table 2.1 gives summarized results of the study items in the Follow-up Study. Chapter 3 describes changes in three years of the power industry and others in Iran. Chapter 4 and 5 present descriptions of each study items of the Follow-up Study.

Table 2.1 Summarized Results of the Follow-up Study

E: Esfahan, T: Tabriz

No	Recommended in M/P	Purposes	No	Recommended Subitems	Current Statuses (Nov. - Dec./2002)	Follow-up Recommendation
1	Maintenance & Management of Power Plant	Improvement of power generation efficiency and prevention of air pollution	-1	Holding Vacuum of Condenser at Design Value	[E] Confirmed the efficiency recover by repair of cooling towers of U1,2,3. U4 cooling tower was under repair block by block after 22 years in use. Vacuum was mal at U4, because of steam leak in U4 Turbine. [T] Vacuum is good in winter. Repairing cooling towers once in two years.	[E] Suggested to contact the turbine vender and inspect the internals. [T] --
			-2	Management of Stack Gas Temperature	[E,T] Temperatures are higher than the ones in M/P. [E] Temperature difference between right and left ducts of U5 can be controlled by controlling air flow rate.	[E][T] Must be better by 100% gas use. Suggested to control carefully.
			-3	Control of O ₂ % at Exit of Economizer	[E,T] O ₂ panel analysers are all in operation, except [E] U5. [E] Buying new one for U5.	Recommended to cultivate specialists and to keep better communication between groups of operation and maintenance
			-4	Realization of Air Heater Efficiency	[E] Twice washing in a year is not effective. [T] Washing is effective here.	[E] Suggested to have shorter period until element replacement. [E, T] Probably no more problem after 100% gas use.
			-5	Maintenance of Operational Instrument	[E,T] Seem working normally, because of better maintenance.	Recommended to have instrument specialist in each power plant.
2	Improvement of Turbine Eff.	To improve 2% efficiency by replacing rotor & packings in [T] U2	-1	Replacement of High Press Rotor and Packings in [T] U2	[E] Possible leakage in U5 [T] U2 in operation without vibration. No progress of the previous recommendation due to fund problem.	[E] Suggested to contact vender. [T] Suggested to contact vender for step-by-step repair within the limit of fund.
3	Environmental Control Organization in MOE	Capacity-up of Environmental Department in MOE and installment of Department in each power plant	-1	MOE	Materializing the capacity-up. A part of an implementing group would be moved into Tavanir organization.	--
			-2	Power Plant	Installed Environmental Department in larger steam power plants.	Suggested to publish correct data to outside.
4	Plant Operator Training	More understanding of pollution causes and countermeasures in engineers and operators of power plants	-1	Education in School and in Demonstration Unit	Carried out education through Environmental Department of both plants and once a year seminar in Terah by Tavanir.	[E,T] Both wanted training by JICA. Revealed a group training courses in Japan. Suggested to have regular columns in periodicals published by each plant or by Tavanir, for topics on pollutions.
5	Stack Gas Monitoring	Periodical monitoring to accumulate data of emissions with boiler operating conditions.	-1	Regular Monitoring at Each Power Plant	Tavanir: Planned to have a demonstration plant of monitorment without success due to fund problem. [E] Regularly monitoring with a portable analyser. Planning to purchase a continuous analyser. [T] Very limited data. Expecting monitoring by local Environmental Agency.	Suggested to MOE to monitor at least once a year plants still burning fuel oil. [E,T] No additional suggestion due to close to 100% natural gas burning.
6	Fuel Oil Balance Study	To find feasible way to solve excess fuel oil issue caused by gas conversion in power plants.	-1	(as given in the Purpose)	The result of the discussion of MOE and Ministry of Oil: There would be no excess fuel oil in Iran current and in future due to good export markets.	--
7	SPM Monitoring and Source Identification	To plan to reduce excess SPM in [E]	-1	Chemical Mass Balance analyses after monitoring in [E] area.	Municipality and Environmental Agency in [E] have no interest. [E] Power Plant would have no relation with the excess SPM due to gas conversion.	--
8	Improvement of Simulation Model	To establish comprehensive control plans	-1	Input of more accurate local data of emission sources for more accurate model construction.	No action on this recommendation, as no reaction from other responsible agencies.	--
					MOE had questions of detail of the models to use in other applications.	Suggested to contact directly to the member in charge during the M/P study. Also suggested to treat the new plant as the single source if it will be located in sparsely populated area.

Table 2.1 continuing

	Requested in 2000			Statuses in 1999	Current Statuses (Nov. - Dec./2002)	Recommendation
9	Improvement of Cooling Sustain		-1	Formation of clouds by steam condensates from cooling towers	[E,T] No care of cloud formation [E] Repaired cooling towers of U1,2,3号. Started repair of U4 after 22 years in use. Repair of U5 in two years later. [T] Cooling towers are in good conditions due to repair partially in two years.	--
10	Improvement of Wastewater System		-1	[E] Discharge to river after treatment	[E] According to analyses results by local environment agency, the plant revised its boiler washwater treatment system.	--
			-2	[T] Discharge to river without treatment	[T] Discharging with checking electro-conductivity. Expanding Settling Pond to reduce vanadium in chemical wash water of boilers.	--

	Added by MOE in 2002	Purposes	No		Current Statuses (Nov. - Dec./2002)	Recommendation
11	Handling of PCB Waste	To learn Japanese handling and disposal methods.	-1	---	[E] Studying to make harmless by solidifying. [T] Stored PCB waste in a vessel placed in an open underground pit, after removal from transformers.	Introduced handling and decomposition carried out by Tokyo Electric Power Company.
12	Estimation of Social Cost	To meet increasing interest of renewal energy	-1	---	MOE requests JICA's assistance with experience in Japan.	Presentation of easily understandable TOR through the official route. The JICA Headquarters will decide whether to adopt it or not.

2.2 Minutes of Meetings

Signed Minutes of Meetings are attached on following pages as listed below.

Signed Date	Place	Purpose	Signer	Page
Nov. 23	Tehran	Inception of Follow-up Study	Mohsen Bakhtiar	2-3
Dec. 1	Tabriz	Study in Tabriz P/P	Naser Farbudi	2-9
Dec. 4	Esfahan	Study in Esfahan P/P	Mohsen Eftekhari	2-12
Dec. 10	Tehran	Conclusion of Follow-up Study	Mohsen Bakhtiar	2-15

2.3 Statements of JICA Team Leader

- (1) The Follow-up Study had been carried out smoothly because of the following reasons.
 - 1) Many counterparts and cooperative people of the Master Plan Study remained in their positions as before, with their experiences on the M/P Study and their understandings of the previous results.
 - 2) One of the JICA Team members was the one of the previous Team member and he had good relation with the Iranian counterparts, et al.
 - 3) The Embassy of Japan in Iran gave various conveniences for the Study. Especially Mr. K. Moriyasu, the second secretary, visited with the Team to Esfahan and Mr. I. Tanaka, Iran Aid Specialist of the Embassy, did to Esfahan and Tabriz in order to support activities of the Team.
- (2) I was impressed through the discussions and the field surveys by that MOE and Tavanir were materializing the recommendations of the M/P Study as much as possible within the limit of budgets and that also they were considering highly about the environmental preservation in the power generation sector, for example, by installation of an environmental department in a steam power plant.
 - 1) The Iran side was using the JICA Equipment of the M/P Study for projects of power plants other than the previous target plants. The said equipments were ambient air monitoring, stack gas analyzers, simulation models, etc., except the upper layer observation equipments.
 - 2) Both power plants were improving cooling and wastewater treatment systems by themselves. There were misunderstandings between MOE and the power plants on this matter.
 - 3) General impressions I had from the power plants were attentions on environmental preservation and steady progresses of the preservation steps, such as fuel conversion to natural gas, improvement of wastewater treatment, efforts to obtain ISO14000 certificates, tree-planting campaign, etc.
 - 4) The Iran side had expected eagerly a donation of equipments such as continuous stack gas monitoring analyzers through this Follow-up Study. However, they resigned their expectation because of my explanation on the nature of the Study.
- (3) The results of the Follow-up Study were described in another chapters. I wish that the recommendations and suggestions of the Study would help Iranian power plants for generation efficiency increment and pollutant emission reduction.

2.4 Principal Personnel Interviewed

- (1) Embassy of Japan in Iran
 - Mr. Yukihiro Nikaido Minister Counsellor
 - Mr. Kunihiro Moriyasu Second Secretary
 - Mr. Izumi Tanaka Iran Aid Specialist
- (2) Energy Planning Bureau, Ministry of Energy
 - Mr. Mohsen Bakhtiar Director General
- (3) Environmental Group, Ministry of Energy
 - Dr. Abdol Reza Karbassi Manager
 - Mr. Reza Samadi Engineer
 - Ms. Nastaran Rahimi Engineer
- (4) Iran Energy Efficiency Organization, Ministry of Energy
 - Dr. Abdol Reza Karbassi Managing Director (concurrent holding)
- (5) Iran Power Generation & Transmission Co. (Tavanir), Ministry of Energy
 - Mr. Jalil Manafi Head of Environmental Division
- (6) Esfahan Power Plant
 - Mr. Mohsen Eftekhari Director Manager
 - Mr. Mohammad Reza Jebeli Department of Safety
 - Mr. Alani Department of Power Generation
 - Mr. Haji Mohammadi Department of Planning
 - Mr. E'temadi Department of Environment
 - Mr. Satar Goodarzy ditto and Department of Chemistry
 - Dr. Gholam Reza Fooladi Department of Technology
 - Mr. M. Ghorbani Department of Chemistry
 - Mr. Abdol Reza Jafari Chief of Shift Operators
 - Mr. Honarfar Public Relation
- (7) Tabriz Power Plant
 - Mr. Bahari Vand General Manager
 - Mr. Naser Farbudi Assistant General Manager
 - Mr. Mohsen Shadravan Chemical Department
 - Mr. Jafar Najafzadeh Environmental Department
 - Mr. Mehrad Baibordi Chemical Department
 - Mr. Zahed Chief of Plant Shift Operators
 - Mr. Vadoodi Plant Maintenance