No.

Ministry of Industry and Minerals

Preliminary Feasibility Study Report on Mining and Industrial Sector in Mid-Western, Iraq

Final Report

April, 2010

Japan International Cooperation Agency (JICA)

UNICO International Corporation
MITSUI & Co., LTD.
Toyo Engineering Corporation

MEE
JR
10-003

Preface

Japan International Cooperation Agency (JICA) conducted “The Preliminary Feasibility Study on Mining and Industrial Sector in Midwestern Iraq.”

JICA sent the study team to Amman and Beirut three times from December 19 for 10 days, from January 22 for 9 days and from March 23 for 6 days, respectively to grasp the actual situation of the main industrial sectors in Midwestern Iraq and to examine a scenario of future development.

The team held discussions with the officials concerned of the Government of Iraq, and conducted a field study at the study area. After the team returned to Japan, further studies were carried out. Then, a mission was sent to Beirut in Lebanon in order to discuss the draft outline, and based on this result, the present report was finalized.

This Preliminary Feasibility Study report will be referred when Iraq and Japan consider the further cooperation on Mining and Industrial Sector in Midwestern Iraq.

April, 2010

Letter of Transmittal

We are pleased to submit to you the Preliminary Feasibility Study Report on Mining and Industrial Sector in Mid-Western region of Iraq.

This survey was conducted by the Consortium of UNICO International Corporation, MITSUI Co., Ltd. and Toyo Engineering Corporation, under a contract to JICA, during the period from November, 2009 to April 2010. In conducting the survey, the study team collected the data and information of Mining and Industrial Sector to examine the feasibility and rationale of the project with due consideration of the present situation of Iraq and formulated the most appropriate outline design for the development of Mining and Industrial Sector.

The Study team (Consortium of UNICO International Corporation, Mitsui Co. Ltd. and Toyo Engineering Corporation) made the best efforts to contribute to both Governments.

We hope that the Study Report would be quite helpful and effective when both Governments will consider the feasibility of the project in future in more detail.

Very truly yours,

Isao Kawabata
Project manager,
Preliminary Feasibility Study Team for
Mining and Industrial Sector in Mid-Western in Iraq
The Consortium of
UNICO International Corporation,
Mitsui Co., Ltd. and
Toyo Engineering Corporation

MAP of the Iraq

Contents of Final Report

Page

Chapter 4 Current Status of and Development Strategies for the Industry and Minerals Sector in Iraq

Appendix

Contents of Table

Contents of Figure

Abbreviations

Approx.	Approximately
Ave.	Average
BOD	Biological oxygen demand
C.Water	Cooling Water
Capa	Capacity
CO_2	Carbon Dioxide
COD	Chemical oxygen demand
CPA	Coalition Provisional Authority
DAP	Di-ammonium Phosphate
DCS	Distributed Control System
DDT/Org.Chlorides	Dichlorodiphenyltrichloroethane per organic chlorides
DIA	Diameter
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
El	Electricity
EMP	Environmental Management Plan
EQ	Equipment
F/S	Feasibility Study
FAO	United Nations Food and Agriculture Organization
FEED	Front End Engineering and Design
FOB	Free On Board
FSU	Former Soviet Union
FY	Fiscal Year
GAP	Southeastern Anatolia Project
GDP	Gross Domestic Product
GDP (PPP)	GDP (Purchasing Power Parity)
ha	Hectare
I.Air	Instrument Air
ID	Iraqi Dinar
ID/ton	Iraqi Dinar per ton
IFC	International Finance Corporation
IG	Inspector General

JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
K_2O	Potassium Oxide
KCL	Potassium Chloride
kg/ha	kilo-grams per hectare
km^2	Square meters
km^3	Cubic meters
L.P.Steam	Low Pressure Steam
M.P.Steam	Middle Pressure Steam
M^3/d	Cubic meters per day
m^3/s	Cubic meters per second
MAP	Monoammonium Phosphate
mg/l	Milli-gram per liter
MIM	Ministry of Industry and Minerals
Mkm^2	Million square meters
MOA	Ministry of Agriculture
MPDC	Ministry of Planning and Development Cooperation
MST	Ministry of Science and Technology
MW	Megawatts
N.C.S. America	North, Central and South America
N.Gas	Natural Gas
NDS	National Development Strategy
NGO	Non-governmental Organization
NIC	National Investment Commission
No	Number
NP	Compound Fertilizer Nitrogen & Phosphate
NPK	Compound Fertilizer Nitrogen, Phosphate and Potassium
ODA	Official Development Assistance
Ope	Operation
OSHA	US Occupational Safety & Health Association
P. Air	Plant Water
PH	Potential of hydrogen
PM	Particulate Matter
PS	Private Sectors
S/P	Spare parts

SCGC	State Company for Glass & Ceramic Industry
SCP	State Company for Phosphate
SOE	State Owned Enterprises
SSP	Single Super Phosphate
T.R.Water	Treated Water
t/d	ton per day
t/y	ton per year
tCO_2/Capita・y	Annual Tons of CO_2 per person
tons/ha	Tons per hectare
TSP	Triple Super Phosphate
UK	United Kingdom
UN	United Nations
UNDP	United Nations Development Program
UNIDO	United Nations Industrial Development Organization
USD	United States Dollars
WHO	World Health Organization
Yr	Year
$/ton	Dollars per ton

Summary

Summary

1. From the viewpoint of the reserves of oil and natural gas, Iraq is supposed to be one of the world biggest countries and majority of national revenues are generated by the exportation of crude oil and gas related products. However, oil production has recently been stagnant due to the long-lasting wars and economic sanctions, which brought about the shortage of the needed investment, feasible management and maintenance activities.

   In the case of Iraqi Industry and Minerals sector formed by manufacturing, construction and engineering industries, contributing far less ratio to the Iraqi national GDP, they are suffering under more serious situation. It can be envisaged that the Industry and Minerals sector has not received sufficient financial support from the government or international organizations because of their lower priority for the national reconstruction process.

   However, it is considered that the sector will play a significant role in Iraq which intends to depart from excessive dependence on oil and gas sector toward industry diversification. There are about seventy state-owned companies with a total of 180,000 employees in the Industry and Minerals sector. Vitalization of the sector also has a significant meaning in terms of creation of employment.

   Therefore, the reconstruction and development of the Industry and Minerals sector is an urgent task especially for Mid-western regions including three governorates such as Anbar, Najaf and Karbala with little oil and natural gas resources. The study focused on chemical fertilizer sector in the Industry and Minerals sector in such region to examine a scenario of future development of the industry based on various conditions and make a proposal to a project under planning for the Government of Japan to use the study results in the examination of a future ODA loan project for the Industry and Minerals sector.

   During the study, meetings with concerned parties and representatives of the Ministry and Al-Anbar Governorate were held three times, actually two times in Amman and one time in Beirut within five-months (for the first, second at Amman and the third meeting at Beirut , 4, 5 and 2 days were appropriated respectively). During these meetings, study team obtained data and information from Iraqi side.

   Furthermore, the local partners (companies formed by former industry executives and government officers in Iraq) were appointed by the Japanese consortium and they were engaged in such activities as collecting the needed information, visiting the plants, keeping the records, taking photographs, and holding interviews with key persons in Iraq, which enhanced the scope of the study.

2. The Mid-Western Iraq, consists of three governorates, is the focal region of the study. As shown in the following table, Al-Anbar governorate is far bigger than the other two, although the majority area consists of the Syria Desert, with limited residential areas and hence a low population density.

Table 1: Basic data of Iraq

	Iraq	Al-Anbar	Karbala	An Najaf	Mid-Western total
Land area (units of 10,000km^2)	43.74	13.82	0.5	2.9	17.2
Land ratio%	100	32	1.2	7	39
Population (units of 10,000 persons)	2,895	149	57	93	299
Population ratio%	100	5	2	3	10
Population density (persons/km^2)	66.2	10.8	114	32.1	17.4
Population density indicator	1.0	0.16	1.7	0.5	0.26

(Source: UN Statistics 2008)

It has been considered that there is a few possibilities of oil and gas reserves in Al- Anbar. On the contrary it is rich in phosphate rock. The existence of at least 500 million tons of phosphate rock has been proven and the State Company for Phosphate (SCP) produces phosphate fertilizers by utilizing the resources to satisfy domestic demand. In other words, it is the sole producer of phosphate fertilizers in Iraq. However, for the last two decades, the actual operation ratio of the facility has stayed very low, ranging from 15 to 20 % because of many troubles. Furthermore, imports from neighboring countries such as Jordan have been suspended due to a foreign currency shortage. Accordingly, it is easily considered that Iraqi agriculture has suffered from the shortage of the important fertilizers.

However, phosphate fertilizers are necessary for main crops such as dates, a staple in Iraq and (there are reportedly around 2.5 million date trees in Al-Anbar.) and a shortage of phosphate fertilizers is also fatal for other crops (wheat, potatoes, barley, corn, etc.) Under these conditions, Iraq has been obliged to rely on food aid from international organizations.

The Mid-Western Iraq is mostly covered by steppe and desert soil and there are only limited kinds of crops.

Under these circumstances, water and fertilizers play critical roles. From the view point of water intake, Al-Anbar is located in the beneficial area because it is relatively close to the Euphrates. However, the operation rate of the fertilizer plant has been poor, ranging from only 15 to 20% of capacity for various reasons.

The SCP Complex (Akashat Phosphate Rock Mine and Al-Qaim Chemical Fertilizer Complex Plants), which is a key industrial production base in Al-Anbar, is expected to recover its production capacity very soon.

3. There are 68 state-owned companies under MIM management. These include food, textile, chemical, ceramics, construction and engineering sectors.
   The state companies and industries in the following governorates are expected to be recovered their production capacity sooner than others:

   (1) Basrah Province (Kohr Al-Zubair) - steelmaking plant
   (State Company for Iron & Steel)

   (2) Anbar Province (Ramadi) – glass and ceramic factory
   (State Company for Glass & Ceramic Industry)

   (3) Maysan Province/Ninavah Province (Mousl) – sugar factory
   (State Company for Sugar Industry)

   (4) Baghdad, etc. – tobacco factory
   (State Company for Tobaccos & Cigarettes)

   (5) Ninavah Province (Mishraq) - sulfur compound plant
   (Mishraq Sulphur State Company)

   (6) Anbar (Al-Qaim) - phosphate fertilizer plant
   (State Company for Phosphate)

   (7) Qadisiya Province (Diwanyia) – rubber and tire product factory
   (State Company for Rubber Industries)

   (8) Najaf Province (Haidariyah) – tire product factory
   (State Company for Tire Industries)

   (9) Basrah Province/Maysan Province – paper product factory
   (State Company for Paper Industries)

   (10) Babil Province – dry cell factory
   (State Company for Batteries Industries)

   (11) Textile factory

   (12) Cooking oil factory

4. It is repeatedly stated in The National Development Strategy (2007-2010)[1] that the mining and industrial sector is vital next to of oil and gas and that its recovery is very critical for the country. Following countermeasures are shown in the strategy of MIM.

   Revitalizing the private sector is the important issue for the reconstruction and development of Iraq. With this importance in mind, the government of Iraq is striving to create a condition and framework which facilitate private sector to participate, more specifically, the government is tackling efforts to improve security, establish legal systems, and improve the remittance scheme and other aspects of the financial sector.

   As previously described, the mining and manufacturing sector has many State-owned Enterprises (SOEs.) Because they are moderate in size and often in relatively downstream industries, they can be operated independently. Thus, the barrier for private capital to participate is fairly low. In fact, the Ministry of Industry and Minerals has launched a policy to maximally tap private capital in reconstructing and developing the mining and manufacturing sector. Again, the sector will play a vital role in this aspect as well.

   As shown in the following table, when calculated based on the viewpoint of "fulfilling the basic needs of the Iraqi people", the required investment amounts for the Mining and Manufacturing sector were under-estimated in 2002. The lower priority given to the mining and manufacturing sector, however, does not mean that the sector was considered insignificant. On the contrary, its importance is expected to heighten as the country's economy regains its footing for reconstruction. The following provides the rationales for this interpretation, as seen in the National Development Plan:

Table 2: Estimated Amount of Investment Needed by Sector (calculated as of 2002)

(billion U.S. dollars)

Sector	2007	2008	2009	2010	Four-year total
Oil and gas	8.4	8.7	9.3	9.6	36.0
Electricity	6.0	4.4	3.5	2.6	16.5
Water resources	1.0	1.5	1.5	1.2	5.2
Agriculture	1.1	1.0	1.0	1.0	4.1
Industry (and mining & manufacturing)	0.3	0.2	0.2	0.1	0.8
Transport	7.5	7.5	7.5	7.5	30.0
Construction	1.5	1.5	1.5	1.5	6.0
Housing	10.0	12.0	15.0	15.0	52.0
Insurance	2.5	3.3	4.4	4.5	14.7
Education	0.6	0.6	0.6	0.6	2.4
Communications	0.3	0.3	0.2	0.2	1.0
Public sanitation	1.4	1.9	2.0	2.7	8.0
Regional development	2.5	2.5	3.0	3.0	11.0
All sectors	43.1	45.4	49.7	49.5	187.7

(Source: "The National Development Strategy (2007-2010)" released by the Government of Iraq)

[1] Republic of Iraq, Ministry of Planning and Development Cooperation

5. The following directions for reconstruction policies for the Mining and Manufacturing sectors beyond 2010:
   - Reconstruct SOEs by laying new production lines and thereby improving productivity.
   - Reconstruct companies and plants in accordance with the market principles.
   - Expand the scope of roles to be assumed by the private sector in developing the national economy and allow the private sector to lead the Mining and Manufacturing sector to a high-value added industry.
   - Enact the provision of soft loans to foster small- and medium-scale industries, develop industrial zones and cities, and projects under planning.
   - Introduce modern technologies into the Mining and Manufacturing sector by partnering with global corporations employing cutting-edge technologies.
   - Improve and expand research facilities and institutes in collaboration with the Ministry of Science and Technology.
   - Intensify geographical and mineral resources surveys to identify the available natural resources.
   - Identify high-value added and competitive industries and attract investment from within and outside the country.
   - Create “investment maps” based on available natural resources and competitive advantages, in collaboration with local governments, thus promoting the establishment of new industries by harnessing domestic and foreign investors’ funds.
   - To arrange the laws to realize an investment climate appropriate for domestic and foreign investors as well as laws on consumer protection and antimonopoly.

6. The following is an overview of the mining and manufacturing sector in Mid-Western Iraq:

   As for the mining resources, Al-Anbar Governorate has very little production of such resources as crude oil and natural gas that are abundantly yielded in the country. Recently, however, natural gas reserves are confirmed in the Akaz region located near Al-Qaim in the province.

   At present, major minerals yielded in the Mid-Western Iraq, mainly in Al-Anbar Governorate, are abundant phosphate rocks that mostly concentrate in Akashat and silica sand, limestone, argil and clay that are produced in the desert area. In Al-Anbar Governorate, these resources are utilized as raw materials as follows: the former for phosphate fertilizers and the latter for cement, glass and ceramic industries.

The phosphate fertilizer and glass production in the Governorate are highly valuable because they are the only production site in the country. However, the mining and manufacturing sector in the Mid-western region accounts for a very small portion of all industries in Iraq.

The following is an overview of the current conditions of the major industries described above.

The state-run glass and ceramic company in An-Anbar Province totally dominates the glass industry in Iraq. An overview of the company and its equipment and products are described below.

Company name : State Company For Glass & Ceramic Industry (hereafter SCGC.)
Location : Al-Anbar, Ramadi Beside Warar Bridge
No. of employees : 2,387 as of 2006 (including 2,162 and 225 in the production and administration segments respectively.)
2,905 as of 2009
History : Since being founded as a flat glass producer in 1970, SCGC has been expanding its business to include floor tiles, sanitary ware and other ceramics, glass bottles and tableware glass.

(1) Current operational status

1) Facility currently under operation : Equipment for floor tiles, sanitary ware
2) Facility slated to begin operation soon : Equipment for wall tiles, glass panes for windows, and glass bottles for medicine
3) Facility whose operation is discontinued due to ageing:
Equipment for glass bottles, glass jars, tableware glass, and sodium silicate

(2) Plant overview

1) Floor tile plant:

① New plant that began operation in 2002. The floor area is 35,000 m^2.

② Built by an Italian construction company.

③ The current production capacity is 1,000,000 m^2 per year, which can be increased with slight modification.

④ Produces 30-centimer square floor tiles in various shapes and colors.

⑤ 100 percent of argil used as a raw material is domestically procured.

2) Sanitary ware plant:

① A new plant that began operation in 2002. The floor area is 35,000 m^2.

② Built by an Italian construction company.

③ The current production capacity is 5,000 tons per year, which can be increased with slight modification.

④ Produces toilet bowls and cesspits in various shapes and colors

⑤ 40 percent of argil used as raw materials is domestically procured.

3) Wall tile plant:

① Currently being reconstructed under the leadership of a Lebanese company. The operational launch is slated for 2007. The floor area is 35,000 m^2.

② The planned production capacity is 1,250,000 m^2.

③ 100 percent of argil used as raw materials is domestically procured.

4) Sheet glass plant:

① Currently being reconstructed under the leadership of three Italian companies. Machines and materials for the works are from Europe. The floor area is 25,000 m^2.

② The planned daily production of transparent and figured sheet glass is 120 tons.

③ Approximately 2.2 billion Iraqi Dinars (approximately 15 million dollars) is needed.

5) Medical glass bottle plant:

① Currently under restoration. The major equipment necessary for the works, including heat-resistant fusing furnace and others, is from Italy or India.

② Because high profitability is anticipated, there are hopes for an operational relaunch.

③ The production capacity is 40,000 m^2. Medical bottles are produced by modifying regular glass bottles (for which special equipment is required.)

④ Major customers are pharmaceutical companies.

6) Tableware glass plant:

① Production has been suspended since 2003 due to the ageing of equipment. The facility needs to be replaced and repaired to restart operation. The company hopes to restore the plant.

② There are four fusing furnaces, each of which has a daily production capacity of 35 to 45 tons. The floor area is 25,000 m^2.

③ Products produced here include flat-bottom water cups, tea cups, plates, saucers, big salad bowls and ash trays.

7) Glass bottle and jar plant:

① The production has been suspended since 2003 due to the ageing of equipment. The fusing furnaces of all lines must be replaced and repaired to restart operation. The company hopes to restore the plant.

② There are four fusing furnaces, each of which has a daily production capacity of 55 to 85 tons. The floor area is 70,000 m^2.

③ The products produced here include various wide- and small-mouth glass bottles.

8) Sodium silicate plant:

① Production has been suspended since 2003 due to the ageing of equipment. The fusing furnaces of lines need to be replaced and repaired to restart operation. The company hopes to restore the plant.

② There is one fusing furnace, with a daily production capacity of 30 tons. The floor area is 10,000 m^2.

③ Products produced here include solid and liquid sodium silicate.

(3) Advantages of SCCG

① Domestic and overseas demand can be expected.

② The production cost is reasonable because approximately 80 percent of raw materials can be obtained from the Anbar Desert.

③ There is good water transportation as it is located near the Euphrates.

④ A location near Jordan, Saudi Arabia and Syria means it is close to markets.

(4) SCGC's project plans

SCGC intends to implement the following major facility investment projects:

Table 3: Glass Sector Project

Project name	Estimated investment	Installation capacity	Ratio of domestically-procured raw materials	Estimated no. of employees
	million dollars	tons/day	%	
Sheet glass	150	450	80	600
Lead crystal glass	15	6	65	100

(Source: SCGC document)

Table 4: Ceramic Sector Project

Project name	Estimated investment	Installation capacity	Ratio of domestically-procured raw materials	Estimated no. of employees
	million dollars	tons/day	%	
Ceramic tableware	7	15	60	150
Red bricks	10	30	100	100
Ceramic insulator	10	2	60	80
Glaze for ceramics	7	18	60	100
Kaoline	7	40	100	100

(Source: SCGC document)

Cement Industry

There are three cement companies in Iraq. There are also two other companies that deal with construction materials such as refractory bricks and gravel with properties similar to cement.

(1) Iraqi State Company for Cement

1) History, etc.:

① It was established in 1936 in Baghdad and production began with a wet kiln in 1949. As of 1995, there were four plants.

② Employment: 2,867 (2,300 in production and 567 in administration)

③ Products: regular cement, acid-proof cement, white cement

2) Plant overview

Table 5: Facility of the Iraqi State Company for Cement

Plant name	Product	Design capacity (ton/year)	Actual capacity (ton/year)	Others
Kubaisa	Regular cement	2,000,000	1,500,000	Located in eastern end of Al-Anbar
Kirkuk	Regular cement	2,000,000	1,500,000	
Al-Qaim	Acid-proof cement	500,000	500,000	Located in western end of Al-Anbar
Falluja	White cement	290,000	218,000	
Kubaisa paer sacks		30 million sacks	not available	
Kirkuk paer sacks		30 million sacks	not available	
Bagdad paer sacks		15 million sacks	not available	

(Source: 2006 document of the Iraqi Ministry of Industry and Minerals)

The Kubaisa plant (west of the provincial capital of Ramadi and Heet) was built in 1981 by Kawasaki Heavy Industries. It has an annual production capacity of two million tons, the largest in Iraq. Although it is still operational, there are management, technical and maintenance problems.

The Al-Qaim plant was built in 1981 with Rumanian know-how and machinery. The plant has various technical problems and the Ministry of Industry and Minerals is leasing the facility to a private investor.

3) Current problems

The operation rate in 2002 was as low as 48%, due to management, technical and maintenance problems, the ageing facility and a lack of major parts. There is awareness of the need for overall rehabilitation. An estimated total exceeding one million dollars is needed to regain the original design capacity.

(2) Iraqi State Company for Northern Cement

1) History, etc.:

① It was established as Al Rafideen Cement Company in 1953 in Badoosh in northern Iraq. It later merged with the Hammam Alalil Cement Company in 1964 to form the Mosul Cement Company, the predecessor to the present-day SOE. Although the scope expanded to operate 10 plants by 1984, only seven are operational today.

② Products: regular cement, acid-proof cement, etc.

2) Plant overview

Table 6: Facility of State Company for Northern Cement

Plant name	Product	Design capacity (ton/year)	Actual capacity (ton/year)	Others
Badoosh (phase 1)	Regular cement	192,000	not available	
Badoosh (phase 2)	Regular cement	690,000	not available	
Badoosh (phase 3)	Regular cement	960,000	not available	
Sinjar	Regular cement	1,152,000	not available	
Hammam Al-Alil (phase 1)	Regular cement	218,000	not available	
Hammam Al-Alil (phase 2)	Regular cement	367,000	not available	
total		3,579,000		

(Source: 2006 document of Iraqi Ministry of Industry and Minerals)

(3) Iraq State Company for Southern Cement

1) History, etc.:

① It was established in 1995 in Al-Ashraaf in Najaf Province in southern Iraq. It has eight plants. The major market is southern Iraq.

② Employment: 5,793 (4,528 in production and 1,265 in administration)

③ Products: regular cement, acid-proof cement, etc.

2) Plant overview

Table 7: Facility of State Company for Southern Cement

Plant name	Product	Design capacity (ton/year)	Actual capacity (ton/year)	Others
Kufa (New)	Regular cement	1,800,000	not available	
Karbala	Regular cement	2,000,000	not available	
Muthana	Regular cement	2,000,000	not available	
South Cement	Regular cement	450,000	not available	
Om Qaser	Regular cement	400,000	not available	
Najaf	Regular cement	208,000	not available	
Al Sada	Regular cement	200,000	not available	
Al Semawa	Regular cement	450,000	not available	
Al Noora	Regular cement	200,000	not available	
Total		7,708,000		

(Source: 2006 document of Iraqi Ministry of Industry and Minerals)

Details of current company operations are unknown. According to the corporation's information, overall rehabilitation and staff training are needed to regain the original

design capacity of the plants.

(4) Iraq State Company for Refractoriness Industry

1) History, etc.:

① It was established in 1994 in Falluja near Baghdad to produce refractory bricks and other refractory products.

② Employment: 696 (596 in production and 100 in administration)

③ Products: refractory bricks and other refractory products

Chemical fertilizer industry

The only phosphate fertilizer production base in Iraq is located in one of the three governorates in Mid-Western Iraq.

SCP is the only fertilizer production base in the three governorates and thus vital for their regional economy and society. The production site is also crucial as the sole supplier of phosphate fertilizers in Iraq. However, the company is facing problems mainly due to the extended period of wartime and the feasibility of SCP recovery is another main issue in the study.

7. The current circumstances of the three major industries in Mid-Western Iraq, mainly Al-Anbar, are described above. Meanwhile, the supply-demand situation for chemical fertilizers, which is a major focus of the Preliminary Feasibility Study, is described below.

A market analysis of the chemical fertilizer industry in Iraq was implemented as a cornerstone of the Preliminary Feasibility Study. The following is a summary of the results:

1) Production Trend

Table 8: Production Trend of Chemical Fertilizer Industry in Iraq (Ammonia, Urea)

Location, Time of Establishment	Design Production Capacity	Major Raw Materials	Operation Trend
(Ammonia, urea)			
Plant No. 1 Basra (Abu-Al-Khaseeb) 1969	Ammonia: 200 t/d (66,000 t/y) Urea: 160 t/d (52,800 t/y) Ammonium sulfate: 420 t/d (138,599 t/y)	Natural gas is supplied from North Rumaila Oil Field via a pipeline.	In 1980, the Iran-Iraq War broke out and it caused serious damage to production facilities. The opeation has been competely suspended since 1980. Parts that can be used elsewhere were supplied for Machine No. 3.
Plant No. 2 Basra (Abu-Al-Khaseeb) 1978	Ammonia: 800 t/d (264,000 t/y) Urea: 1,300t/d (429,000t/y)	Same as above	Same as above
Plant No. 3 Basra (Khur Al-Zubair) 1978	Ammonia: 1,000 t/d 2 lines (660,0000 t/y) Urea: 1,600 t/d 2lines (1,056,000 t/y)	Natural gas is supplied from South and North Rumaila Oil Fields via a pipeline.	In 1980, the Iran-Iraq War broke out and it caused serious damage to production facilities. The opeation was suspended after the outbreak. Production resumed in March 1988 immediately after the end of the war. Although Gulf War II and later wars did not cause serious damage, operation rate is low due to shortages of parts and catalysts, at around 28 percent in the case of urea, for example.
Plant No. 4 Baiji 1987	Ammonia: 1,000 t/d (330,000 t/y) Urea: 1,750 t/d (577,500 t/y)	Natural gas is supplied from Kirkuk Oil Field via a pipeline.	It is hard to conduct stable operation due to shortages of natural gas and electricity. This has resulted in suspension of operation since April 2003.
Note Urea: Total of design production capacity 2,115,300 t/y Production volume in 2009 307,400 t/y (14.5 %)			

(Source: Compiled by the Study Team based on various materials)

Table 9: Production Trend of Chemical Fertilizer Industry in Iraq (Phosphate fertilizer)

Location, Time of Establishment	Design Production Capacity	Major Raw Materials	Operation Trend
(Phosphate fertilizer)			
Plant No. 1 Al-Qaim Akashat 1976	Phosphate rocks: 3.4 Million t/y (22% P_2O_5) TSP: 600,000 t/y (45% P_2O_5) MAP: 280,000 t/y Chemical fertilizer: NP 655,000 t/y Ammonia: 50,000 t/y	Phosphate rocks are transported by rail from Akashat Mines 170 kilometers to the west. Sulfur is transported from Mishaqyori Sulfur Mine and oil refineries in the country. Natural gas to produce ammonia is supplied from Kirkuk Oil Field via a pipeline. However, the ammonia plant has completed closed since 1990 and liquefied ammonia is transported from a fertilizer plant in Baiji by tank truck.	Although the Iran-Iraq War did not cause much damage, furious airstrikes by allied forces in Gulf War II caused tremendous damage to the production facility. After that, it reduced the operation rate drastically. Furthermore, Gulf War III in 2003 also caused more damage and currently it hardly functions as a production plant. It is inevitably in a situation where it needs to plan and examine the rehabilitation.

(Source: Compiled by the Study Team based on various materials)

- ＊ The chemical fertilizer plants constructed in Iraq are shown in the above table. All the production facilities are owned by state-run companies.
- ＊ Use of ammonia:

  World supply-demand balance: Approx. 80% for fertilizers and 20% for other industrial uses

  Iraq: Mostly for fertilizers. Both Basra and Baiji plants consume most of the ammonia they produce for the production of urea. Although ammonium sulfate was produced with Machine No. 1 at Basra, the operation has been completely suspended. Although the Al-Qaim plant used to produce ammonia for MAP production, the production is now completely suspended. Ammonia is now transported from the Khor Al-Zubair plant in a special container (tank truck-type cargo).

2) Operation of Iraqi fertilizer plants:

As for production, the Khur Al Zubair plant in Basra manages to maintain 30% level of operation rate. However, the rate of the Baiji plant in the northern part dropped sharply in 2003 (67.7% in 2002 to 16.2% in 2003) and has been zero since 2007. This is mainly because the gas pipeline was frequently damaged and caused shortages of supply of natural gas that is a raw material of the fertilizers. In 2005, it had no supply of natural gas for eight and nine months. Furthermore, there is a power supply problem, which has led to zero production since 2007.

Table 10: Production and Demand Balance of Urea in Iraq

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
(Production)												
Baiji Factory	209,299	252,256	235,214	203,594	392,200	93,881	76,121	58,149	10,795	0	0	0
(Capa;579,000 tons) Ope Rate%	36.1	43.6	40.6	35.2	67.7	16.2	13.1	10.0	1.9	0.0	0.0	0.0
Basra Factory(Khur Al Zubair)	388,503	454,308	454,701	554,811	597,661	99,167	262,713	226,744	300,907	232,253	300,235	307,409
(Capa;1,056,000 tons) Ope Rate%	37	43	43	53	57	9	25	21	28	22	28	29
Total	597,838	706,608	689,956	758,440	989,929	193,064	338,847	284,903	311,704	232,253	300,235	307,409
(Total Capacity 1,635,000 tons)												
Total Operation Rate%	36.6	43.2	42.2	46.4	60.5	11.8	20.7	17.4	19.1	14.2	18.4	18.8
(Sales)												
Baiji Factory	190,427	223,635	268,373	183,992	369,900	161,895	53,551	70,468	18,299	4,171	0	0
Basra Factory (Khur Al Zubair)	414,025	449,015	384,601	658,610	572,307	134,208	225,130	258,196	302,602	220,554	311,662	293,040
Total	604,452	672,650	652,974	842,602	942,207	296,104	278,680	328,664	320,902	224,725	311,662	293,040
(Breakdown of the Sales)												
1) Sales to MOA												
From Baiji Factory	159,428	144,360	64,506	109,855	185,855	40,876	38,984	58,468	7,777	3,200	0	0
From Basra (Khur Al Zubair)	335,061	298,549	73,881	216,888	353,533	82,496	190,192	246,677	299,698	220,001	302,900	267,091
Total	494,489	442,908	138,387	326,743	539,388	123,371	229,176	305,145	307,474	223,201	302,900	267,091
2) Sales to PS												
From Baiji Factory	7,231	16,837	46,908	3,670	13,438	108,055	5,933	0	0	0	0	0
From Basra (Khur Al Zubair)	3,240	33,638	116,773	100,491	18,207	30,115	32,665	710	0	400	0	0
Total	10,471	50,474	163,680	104,161	31,645	138,170	38,597	710	0	400	0	0
3) Sales for Export												
From Baiji Factory	6,942	7,359	51,796	20,351	86,386	10,614	0	0	0	0	0	0
From Basra (Khur Al Zubair)	13,782	68,221	135,039	253,140	116,759	6,491	453	0	0	0	3,328	0
Total	20,724	75,580	186,835	273,491	203,145	17,104	453	0	0	0	3,328	0
4) Sales to SCP												
From Baiji Factory	12,411	20,378	16,049	9,981	34,464	884	321	10,312	10,523	971	0	0
From Basra (Khur Al Zubair)	58,749	46,192	55,622	84,612	81,109	15,107	0	0	2,855	89	5,000	25,904
Total	71,160	66,569	71,671	94,593	115,573	15,992	321	10,312	13,378	1,060	5,000	25,904
5) Sales to Others												
From Baiji Factory	4,415	34,702	89,114	40,136	49,757	1,466	8,313	1,687	0	0	0	0
From Basra (Khur Al Zubair)	3,193	2,417	3,286	3,479	2,700	0	1,820	10,810	50	64	434	45
Total	7,608	37,119	92,400	43,615	52,457	1,466	10,133	12,497	50	64	434	45

(Source: Compiled by Study Team based on document of Ministry of Industry and Minerals)

The above table is also shown in the figures below to facilitate understanding.

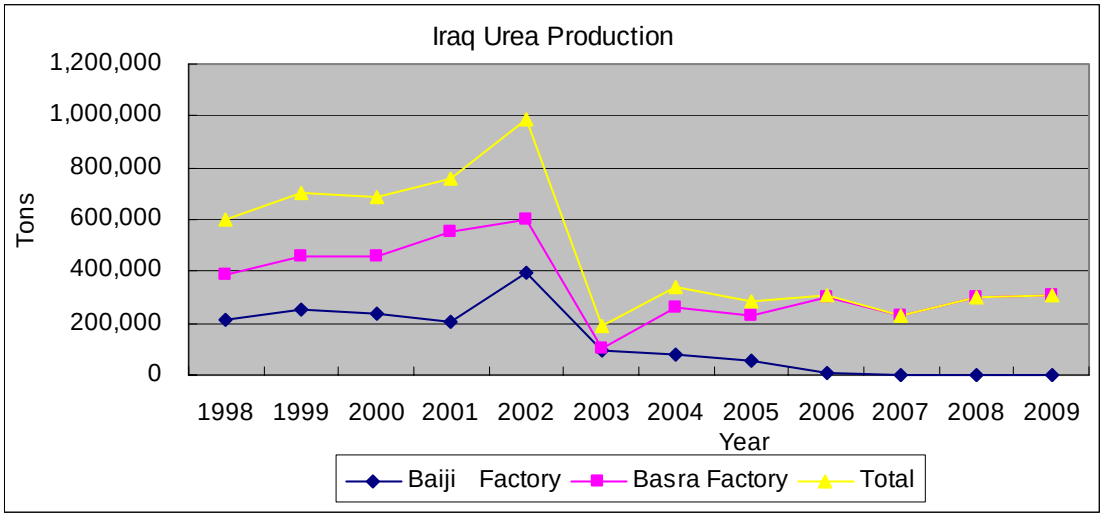


Figure 1: Trend of Urea Production by Plant in Iraq

(Source: Compiled by Study Team based on document of Ministry of Industry and Minerals)

3) Phosphate fertilizer demand

-1. General remarks

For the cultivation of the crops, nitrogen, phosphate and potassium are considered as the most important nutrients. Each nutrient has its own characteristics and uses. Quantitatively, phosphate fertilizer is the second largest fertilizer next to nitrogen.

As for the uses and the effectiveness of phosphate fertilizers manufactured by SCP, including Triple Super Phosphate (TSP), Mono-ammonium Phosphate (MAP) and NP (Compound fertilizer), are as follows;

TSP is suitable for acid soil, volcanic ash soil and soil improvement of poor soil. It dissolves and is absorbed in the organic acid in root crop. It has a slow-acting effect.

Mix ratio of nitrogen and phosphorus in MAP is excellent and it is an essential fertilizer for the growth in the early stage of various crops. It is also frequently used as the intermediate as raw materials of compound fertilizers.

NP is suitable as base fertilizers for long-term crops (fruit vegetables, root vegetables and flowers) and so on.

-2. Iraqi phosphate fertilizer plants

The Government of Iraq began the production of phosphate fertilizers at the Al-Qaim plant in 1976. It is undoubtable that the government made the decision because a large volume of phosphate rocks used as raw materials for the fertilizers can be produced in Akashat approximately 170 kilometers southwest of Al-Qaim.

-3. Demand forecast of phosphate fertilizers in Iraq by accumulation method

It is not so easy to identify the demand of phosphate fertilizers in Iraq, because there are many uncertainties, thus it requires the examination of various issues—correct understanding of soil quality of cultivated land in Iraq, understanding of a careful plan of what type of crop is produced where, consideration of alternatives to other types of fertilizers, and demand for export in some cases. In this survey, as for these important factors Study Team could not find effective data. Accordingly, it is very hard to obtain a feasible demand forecast of Iraqi phosphate fertilizer based on such an accumulation method.

-4. Demand forecast of phosphate fertilizers in Iraq by inductive method

Generally speaking, as shown in the table 5.2-3, it is experientially recognized that the consumption ratio of three basic fertilizers has some specific relation. It is roughly

estimated that consumption ratio of phosphate fertilizer against nitrogen fertilizer ranges from 30 to 40 %.

However, in the case of Iraq, phosphate fertilizer consumption ratio, actually 25% against nitrogen fertilizer consumption, is lower than most other regions and countries. Considering the similar weather and soil situations, Iraq's figure should be closer to the figures of total Middle East of 37% and Iran of 42%. Based on such inductive method, it will be persuasive that Iraq will have to raise the consumption ratio of phosphate fertilizers in future.

-5. SCP design capacity

The following shows the figures of SCP phosphate fertilizer design capacity and it has probably been considered that these design capacity are roughly equal to the Iraqi domestic demand because the Iraqi Government might have considered that the local demand should be fulfilled by the local products. Actually, however, because of many troubles, real production volumes were far below than these design capacity:

	(Design Capacity)	(Converted volume into P_2O_5)
TSP	600,000 tons (45% P_2O_5)	270,000 tons
MAP	280,000 tons (52% P_2O_5)	145,600
NP	655,000 tons (27% P_2O_5)	176,850
	Total	592,450

-6. SCP operation results

Phosphate fertilizer production at the Al-Qaim plant was close to zero from around 2004 to 2006. Specifically, production of TSP and MAP was zero and NP was about 80,000 tons (around 12% of design capacity) during the period. The shortage cannot be offset by the importation mainly because of the shortage of foreign currency and the governmental policy not to rely on the foreign products. .

The reality in recent years is that there was absolute produceable volume first and then demand could not exceed it. This idea is clearly stated about urea fertilizers and it is fair to say that the government took the same approach for phosphate fertilizers because there was no importation of phosphate fertilizers recently.

4) Restoration of Al-Qaim complex v.s. New construction

What are the prevailing conditions of restoring Al-Qaim Complex over building new complex at other location?

-1. Economical condition:
Judging that restoring is more economical than new building.

-2. Existing utility supply facility availability (Water/Electricity/etc.):
So far meets the demand of plants and new power generation units are under placing order

-3. Existing wastes handling facility availability (Gypsum/Waste water/etc.)
From Anti-pollution point of view, the currently applicable countermeasures are still effective.

-4. Existing infra-structure (Road/Railway/etc.)
Not serious and those are still workable.

-5. Work force availability (for operation/maintenance)
SCP Al-Qaim has kept enough manpower to execute the project. If in other location it is more difficult to obtain workforce and it will be more costly.

-6. Feedstock delivery conditions (other than phosphate rock)
So far there is no significant difference due to the availability of rail and road.

-7. Other conditions / restrictions, if any.
Difficulties of relocation of housing complex and not better life conditions.

Accordingly to the above clarification it was recognized that SCP in Al-Qaim has taken the possible maintenance actions at minimum level in the way of national budget allocation, then they have considered that the rehabilitation of the existing facilities is the shortest way to materialize the restoration of production capacity.

8. The SCP Complex consists of the Akashat Phosphate Rock Mine and the Chemical Fertilizers Complex in Al-Qaim. The following is an overview:

(1) Current SCP Status

SCP is a state-owned company that was established in 1976 with a capital of 3.5 million Iraq dinars (approx. 2.8 million yen at current exchange rates). It has been managing phosphate rocks in Akashat and a phosphate fertilizer complex in Al-Qaim. The company's products (including intermediate products) include sulfuric acid, phosphoric acid, and phosphate fertilizers such as TSP (Triple Super Phosphate) and MAP (Mono-Ammonium Phosphate), chemical fertilizers (NP and NPK). Fluorine salt is also produced as a by-product. A basic

overview of SCP is as follows:

Establishment: 1976
Commencement of commercial operation: 1983

Initial self-owned capital	:	350 million Iraq dinars (approx. 28 million yen at current exchange rates)
Authorized capital	:	7,358 million Iraq dinars (approx. 600 million yen at current exchange rates, as of 2006)
Number of employees	:	2,916 as of 2006
Business contents	:	Production of phosphate rocks in Akashat Production of chemical fertilizers and intermediate products in Al-Qaim Complex
Turnover (of 2009)	:	29,961 million Iraq dinars (approx. 2,400 million yen at current exchange rates)

(2) Overview of SCP Facilities

1) Phosphate rock (Unit-900): Annual production 3.4 million tons
(Concentration is 22% of P_2O_5. Phosphate rock is mined in Akashat, 170 km west-southwest of Al-Qaim. The proven reserves of phosphate rock are approx. 0.5-0.7 billion tons and the estimated reserves are approx. 3-4 billion tons. All phosphate rock are transported to the Al-Qaim plant by rail.)

2) Beneficiation unit (Unit-100): Annual production 1.7 million tons, 2 lines
(The concentration of P_2O_5 delivered from Akashat is enriched from 22% to 30%. This process and all processes after this are carried out in Al-Qaim.)

3) Sulfuric acid production plant (Unit-200):
98.5% sulfuric acid, annual production 1.5 million tons
(Has a daily production capacity of 1,500 tons with 3 lines. Sulfur used for production is delivered from Mishraq Sulfur Mine in Mousel and oil refineries in the country.)

4) Phosphoric acid production plant (Unit-300):
Liquid phosphate of 54% P_2O_5, annual production 0.83 million tons

(Has a daily production of 1,260 tons with 2 lines. Materials are phosphate rock and sulfuric acid.)

5) Ammonia production plant (Unit-451): Annual production 50,000 tons

(Natural gas used for this production is supplied via a pipeline from Kirkuk, in the north of Iraq. However, the plant has been shut down since 1990 and thus liquid ammonia is currently transported by tank truck from a fertilizer plant in Baiji.)

・Fertilizer production plant:

- TSP (Triple Super Phosphate)

Total annual production of 600,000 tons (45% P_2O_5 concentration) with 2 lines

- MAP (Monoammonium Phosphate)

Annual production of 280,000 tons with 1 line (52% P_2O_5 concentration, 11% nitrogen concentration)

- Compound fertilizer (NP and NPK)

NP and NPK: Annual production of 655,000 tons with 2 lines

Because potassium fertilizers are rarely needed due to the properties of the Iraq soil, the plant mainly produces NP.

・Sodium fluorine production plant: By adding and reacting aluminum hydroxide with fluorosilicate that is a byproduct of phosphoric acid produces sodium fluorine. The product is used as an alternative to zeolite, mainly for detergent manufacturing. However, the plant is hardly operated due to manufacturing technical problems.

・Utility infrastructure: Power generator - design capacity 34.8MW (2 diesel power generators, 2 steam turbine generators; currently only 1 diesel generator is operated.)

Water intake facility -180,000M^3/d. (from the Euphrates)

Compressed air -144,000 M^3/d. Wastewater treatment installation

3) Production Trend

The production trend of the last 27 years from initial operation to the 2009 SCP is shown in the following figure:

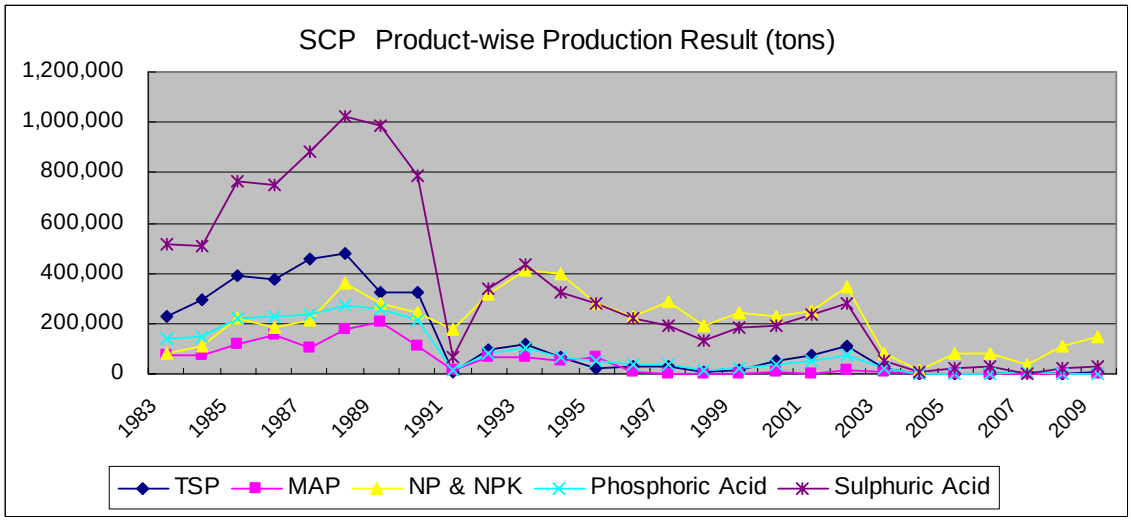


Figure 2: Trend of SCP Production Volume by Product

(Source: Compiled by Study Team based on SCP document)

Table 11: SCP Activities

		Average of production and sales volumes for 27 years (ton/year)	Average of production and sales volumes for 27 years Ratio of design capacity
TSP (Design capacity 600,000 tons)	Production volume	130,713	21.8%
	Sales volume	131,714	22.0%
MAP (Design capacity 280,000 tons)	Production volume	48,846	17.4%
	Sales volume	11,604	4.1%
NP&NPK (Design capacity 655,000 tons)	Production volume	207,391	31.7%
	Sales volume	194,119	29.6%
Phosphoric Acid (Design capacity 400,000 tons)	Production volume	86,839	21.7%
	Sales volume		
Sulphuric Acid (Design capacity 1,500,000 tons)	Production volume	342,165	22.8%
	Sales volume		

(Source: Compiled by Study Team based on SCP document)

4) The figure below shows the overall production process of the SCP Complex.

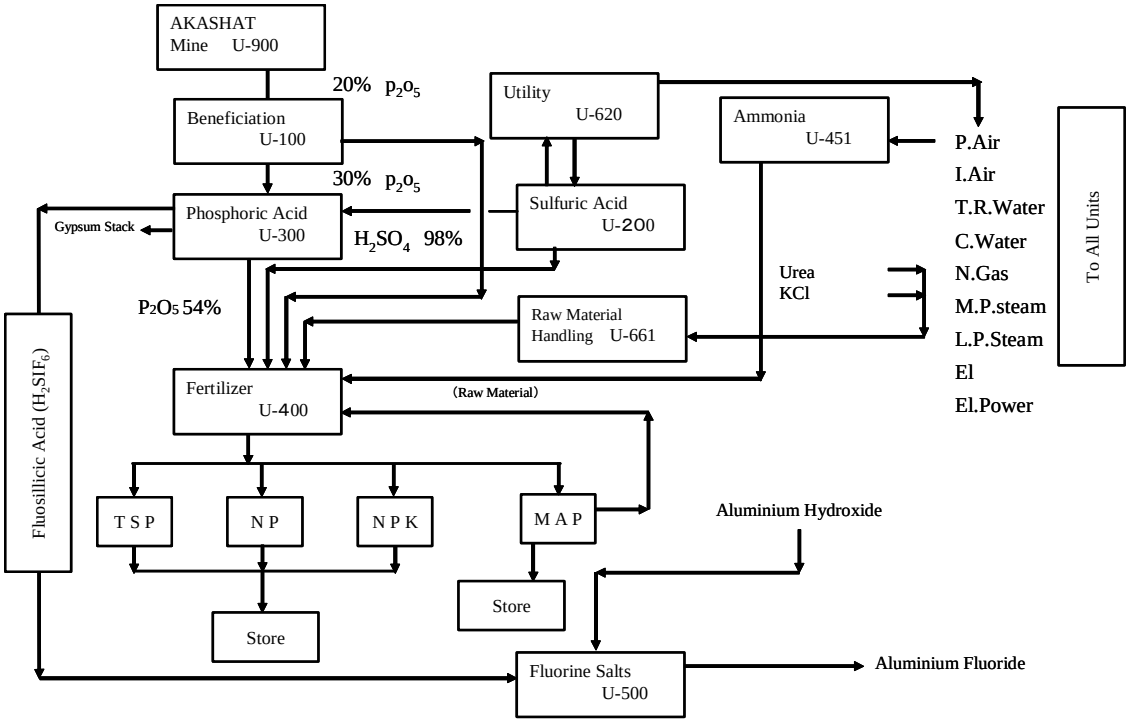


Figure 3: Overall Process Flow of Al-Qaim Phosphate Fertilizer Complex

(Source: Compiled by the Study Team based on SCP data)

5) The expected scale of the rehabilitation plan of SCP's Al-Qaim plant is shown in the following table.

Table 12: SCP's Rehabilitation Goal

Product	Design production capacity (ton/year)	Production target (ton/year)
TSP	600,000	540,000 (90%)
NP	655,000	589,500 (90%)
MAP (interim product)	280,000	252,000 (90%)
Total	1,255,000	1,129,500 (90%)

(Source: Investment File by SCP)

9. SCP's rehabilitation plan was objectively examined from the standpoint of private investors. The following points were identified as possible obstacles.

(1) Public safety in Iraq

Public safety in Iraq is yet to be satisfactory enough for many private companies to participate in project in the country. Further improvement of public safety is a minimum

condition to be met for overseas private investors to participate in projects in Iraq.

(2) Technical difficulty of rehabilitation plan

As mentioned in Chapter 6.2, Al-Qaim Complex has not performed sufficient maintenance due to lack of spare parts and funds for a long time and facilities are seriously damaged. The rehabilitation project with maintaining the current facilities as much as possible is predicted to be very difficult technically and there will not be many contractors that will perform the duty on site.

(3) High production target of rehabilitation plan

Although the operation rate of Al-Qaim Complex was once somewhere between 85 and 89% around 1989, it has been low since then. Investors are committed to recovering the rate to 90%, which is a very ambitious goal.

(4) Huge investment

Partly because many facilities need to be replaced or repaired, the rehabilitation of the complex requires a huge fund. The quotation SCP produced by itself is based on a quotation by a supplier around 2007. The amount needs to be reexamined.

(5) Commitment during project term

The operator needs to commit itself during the term until the operation rate reaches the target level of 90%. It is difficult to estimate how long the rehabilitation project will require for various reasons. If a penalty is imposed when the project cannot be completed within the period, this is a severe condition for investors.

(6) Unstable domestic market

SCP products are purchased at a stable price with the subsidy from the Ministry of Agriculture. Investors are very interested in whether the subsidy program will be applied and whether the subsidy program may be revised at some point.

(7) Difficulty in product exportation

Exportation of products of Al-Qaim Complex has a disadvantage of transportation cost because it is located inland. Competition with neighboring countries with phosphate rocks is also a matter of concern.

Taking these obstacles into consideration, it must be noted that it is fairly difficult for SCP to

attract private investment based on this Investment File.

10. Social and environmental impacts

It is said that the land area of Iraq can be roughly divided into four major geographical zones as follows.

-Desert plateau: It locates on Mid-Western Iraq to occupy about 40% of Iraqi territory.
-Northeastern highlands: It occupies about 20% of the country territory.
-Northwest upland region: About 10% of Iraq territory
-Alluvial plain: Deltas of the Tigris and Euphrates Rivers to occupy 30% of Iraq

The major part of land area of 3 Governorates in Mid-Western of Iraq, where the possibility of industrial rehabilitation project is surveyed, consists of both side of the Euphrates River and huge area of desert plateau geography at west of the Euphrates River. The most of inhabitants live on the banks of the Euphrates River. The desert plateau in this region consists of a broad, stony plain with scattered stretches of sand, and sparsely inhabited by pastoral nomads. A network of seasonal watercourses, so called wadis, runs from the country's western borders towards the Euphrates River. The density of industrial activities in this region is not so high that the environmental issues brought by industries might be rather mild.

However, virtually new units are likely to be built as part of the Al-Qaim rehabilitation project. Damage to the current plant caused considerable leakage of sulfuric acid and phosphate liquid, resulting in soil contamination. It is considered that the plant will have to be relocated within the Al-Qaim Complex site.
Careful examination is needed in accordance with the environmental guidelines.

11. Study team's considerations on rehabilitation project derived from the Preliminary Feasibility Study are summarized as below:

With regard to the production facilities at SCP, most of them were heavily damaged or deteriorated by aging, which brought about the lost of the production capability. However, for the Iraqi agriculture in future, the importance of compound fertilizers together with the improvement of irrigation systems is seriously recognized. Accordingly, the reconstruction of Al-Qaim compound fertilizer facilities, the only production site of Iraqi phosphate fertilizers, is considered as the most urgent project in the country.

As a conclusion, the Study Team considers that the rehabilitation of the existing facilities will be more realistic rather than building new facilities through assessing the advantages and disadvantages of each method. Actually, however, for the realization of the rehabilitation, more detailed scope assessment will become necessitated because foreign corporations are not be able to directly enter the country yet.

Therefore, under such situation, actual foreign activities will be limited in supplying main production units, hardware and software of production management systems and training of the workforce. As for existing maintenance staff amounting up to 800 persons, they should be utilized for the actual execution of the rehabilitation project.

12. Discussion matters requested for the future Feasibility Study of the project

In order to bring about more effective results of the Feasibility Study of the project in future, following issues should be made clear:

1) Data covering Iraqi fertilizer export and import figures in the past and forecast in future
2) Information on the alternative supply ability through import for Iraqi phosphate fertilizer demand
3) Information on Iraqi Government agricultural policy in future(including the policies of Ministry of Agriculture and Ministry of Water Resources)
4) Information on soil quality of cultivated land in Iraq
5) Information on crops cultivated in Iraq
6) More detailed information on demand forecast of phosphate fertilizer in Iraq
7) Information on the action plan compiled by MIM for the rehabilitation of SCP facilities
8) Possibility of installing the new phosphate fertilizer plant inside or outside Al-Qaim site
9) Information on the equipments urgently needed for the replacement in the case of rehabilitation of SCP facilities
10) Accuracy of the investment cost already estimated by SCP in the case of rehabilitation of SCP facilities
11) Necessity of technological cooperation

Accordingly, considering the above mentioned issues, it will urgently become important to discuss more practical rehabilitation plan and set up realistic execution schemes.

Chapter 1

Background of the Project

Chapter 1 Background of the Project

1.1 Purpose of the Study

Iraq is one of the countries with biggest oil and natural gas reserves in the world. Generally speaking, about 92 % of national revenues are generated by exportation of crude oil and gas and their related products. However, oil production that once exceeded 3 million barrels per day has been stagnant for recent years due to long-lasting wars and economic sanctions. Oil and natural gas sectors are economic foundation of Iraqi economy and various efforts for their recovery have been made rapidly after the end of the massive battle in Iraq War in May 2003. National fund benefited from crude oil price increase and assistance from international organizations are utilized for the recovery. Funds are distributed preferentially to the rehabilitation and development of oil and natural gas sectors together with the restoration of social infrastructure as priority issues.

Meanwhile, it can be envisaged that the Industry and Minerals sector formed by manufacturing, construction and engineering industries has not received sufficient financial support from the government or international organizations and the reconstruction process has just begun. Having mentioned that, the sector consists of a variety of industries including construction, engineering, petrochemical, textile, food and pharmaceuticals and industrial services and it is believed to play a significant role in Iraq that intends to depart from excessive dependence on oil and gas sector toward industry diversification. There are about 70 state-owned companies with a total of 180,000 employees in the Industry and Minerals sector. Vitalization of the sector also has a significant meaning in terms of creation of employment.

Thus, the reconstruction and development of Industry and Minerals sector is an urgent task especially in regions with little crude oil and gas resources. The three governorates of Anbar, Najaf and Karbala in Mid-Western Iraq are one of such regions. The study focused on chemical fertilizer sector in the Industry and Minerals sector in Mid-Western Iraq mainly in Anbar Governorate to examine a scenario of future development of the industry based on various conditions and make proposals to a project under planning for the Government of Japan to use it in the examination of a future ODA loan project for the Industry and Minerals sector in the region.

1.2 Contents and Method of the Study

The study contains the following items based on the purpose in 1.1:

- Overview of Industry and Minerals sector in Iraq and confirmation of its standing in the national development plan

- Understanding of current conditions of Industry and Minerals sector, especially chemical fertilizer sector, in Mid-Western Iraq mainly in Anbar Governorate
- Market trend of chemical fertilizers and other major Industry and Minerals sector products and development scenario of the sector in Mid-Western Iraq based on international market trend
- Analysis of operation and problems of the Al-Qaim plant for phosphate fertiliers, a major industry in Anbar Governorate
- Proposals to the project under planning by the State Company for Phosphate
- Confirmation of challenges related to environmental and social considerations that may arise if a project is implemented in Mid-Western Iraq
- Reference to possobility of future ODA loan project based on the above

Many of the study contents require information from the Iraqi side and sufficient discussions with Iraqi concerned organizations and state-owned companies were needed for the study. However, because it was difficult for the Japanese study team to enter the country due to the public safety problem in the unstable condition in Iraq, Iraqi counterparts were invited to neighboring country of Jordan and Lebanon for discussions. A local partner that can enter the country were hired for the field study of existing plants that require entry in the country. They conducted interviews and took photos and videos while exercising sufficient caution about safety.

1.3 Study Structure

Three Japanese companies formed a joint study team: Unico International Corp. with abundant experiences in sector study all over the world, Mitsui & Co., Ltd. that conducts overseas project development and marketing and investment activities in fertilizers and other chemical products, and Toyo Engineering Corp. with abundant experiences in chemical plants construction overseas, especially abundant experiences and expertise in chemical fertilizer plants.

Because public safety in Iraq is yet to be ensured and thus it was difficult for the Japanese study team to visit the existing chemical fertilizer plant that is one of the study items, Study Team outsourced the task to a local partner with approval from the Japan International Corporation Agency.

Iraqi counterparts are mainly formed by the section in charge of chemical industry sector in the Ministry of Industry and Minerals, State Company for Phosphate that is a major target site of the study, and the Anbar regional council. One official each of the Ministry of Planning

and Development Corporation and the Ministry of Finance also attended workshop meetings. Iraqi counterparts are as follows:

(Ministry of Industry and Minerals)
Mr. Ali Mohammed Dhahir Head of Chemical Sector
Mr. Moyad Akif Hamad Expert in Chemical Industry
(State Company for Phosphate)
Mr. Riyadh Azeez Jasim Director General
Mr. Sumer Salman Shareef Rehabilitation Manager
(Anbar regional assembly)
Mr. Fezea Zaidan Khalaf Representative of Anbar Council
(Ministry of Planning and Development Corporation)
Ms. Elaf Dhia Al-Deen Industrial Planning Directorate
(Ministry of Finance)
Ms. Amal Jirjees Ahmed Chief of Borrowing Section, Public Debt Directorate 500

Figure 1.1-1 below shows the study structure of the Japanese study team and Iraqi counterparts.

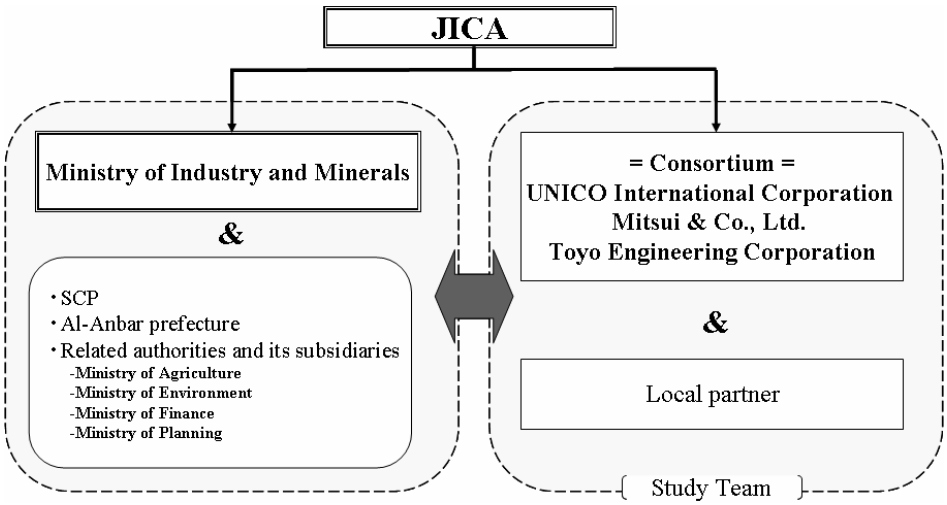


Figure 1.1-1: Study Structure

(Source: Compiled by the Study Team based on JICA data)

1.4 Study Schedule and Overview of Study Trip

1.4.1 Study Schedule

The study was conducted based on a business contract commissioned by the Japan International Cooperation Agency on November 27, 2009. The schedule is shown in Figure 1.1-2 below.

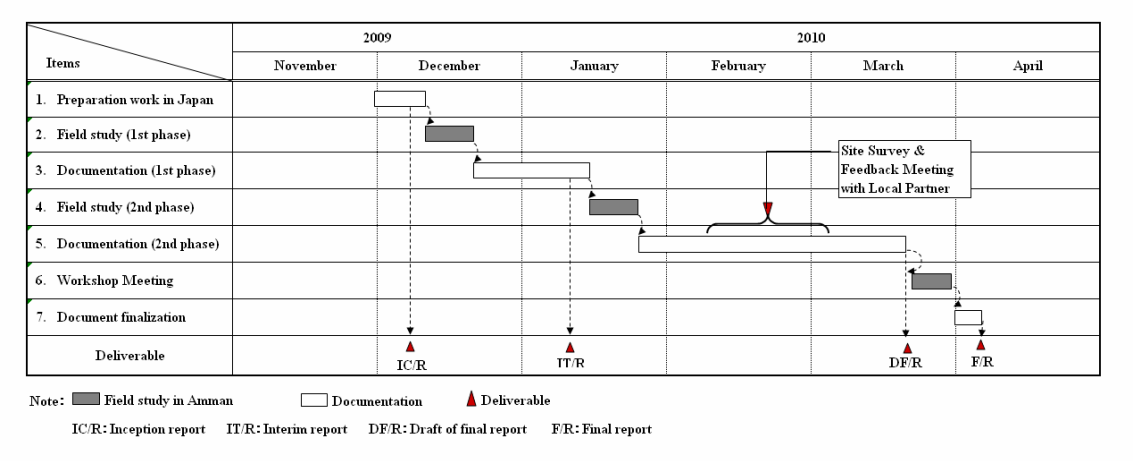


Figure 1.1-2: Study Schedule

(Source: Compiled by the Study Team based on JICA data)

Because public safety remains a concern in Iraq, the study team did not carry out the field survey in the country. Instead of that, Iraqi counterparts were invited to neighboring countries of Jordan and Lebanon to have meetings. As mentioned earlier, because Stud Team hired a local partner to conduct the field survey that requires entry into Iraq, a meeting to report the field survey result that was not originally planned was held after the second meeting as an alternative to the field survey.

1.4.2 Overview of Study Trip

Four study trips were made for the study including the participation in the workshop meeting. Each study trip is summarized below.

(1) 1st meeting as an alternative to the field survey

The 1st meeting as an alternative to the field survey was held at Crown Plaza Hotel in Amman, Jordan, for four days from the 21st to 24th of December 2009. All the 8 members of the study team and 5 Iraqi counterparts attended the meeting where the study team introduced the purpose of the study and study structure to the counterparts and requested them for cooperation in the study.

Iraqi counterparts gave an overview of Iraq and the Industry and Minerals sector in Mid-Western Iraq and explanations in response to the questionnaire sent earlier by the study team. They also explained about the current condition and problems of the phosphate fertilizer plant in Al-Qaim that is a major target site of the study. The study team sorted out the basic information and requested Iraqi counterparts to provide local information, drawings, operation

conditions and statistic data of existing facilities several weeks before the second meeting as an alternative to the field survey.

A meeting was also held with a local consultant that was the prime candidate in the result of the bidding for selecting the local partner on the 25th of December 2009 at Mitsui & Co., Middle East Ltd. in Dubai, United Arab Emirates to reconfirm the purpose and structure of the study and negotiate terms and conditions of the contract.

(Photo: a scene of 1st meeting as alternative to field survey)

(2) 2nd meeting as an alternative to the field survey

Prior to the 2nd meeting as an alternative to the field survey, a preliminary meeting was held with the local partner at Four Points Hotel in Beirut, Lebanon, on the 23rd and 24th of January 2010. The local partner explained about the structure of the field survey and Stud Team confirmed the contents of the survey Stud Team commissioned to the local partner based on the information in the 1st meeting and information added by the Iraqi counterparts after the meeting.

The 2nd meeting as an alternative to the field survey was held at Crown Plaza Hotel in Amman, Jordan, for five days from the 25th to 29th of January 2010 attended by 7 study team members and one observer from Tokyo Engineering Corp. from Japan side and 5 members who attended the 1st meeting as Iraqi counterparts as well as one observer/interpreter from the local partner.

In the meeting, an interim study report was given based on the 1st meeting results in December, following assignment work in Japan and additional information provided by the Iraqi counterparts, which was followed by exchange of views on the phosphate fertilizer plant in Al-Qaim, phosphate rocks in Akshat and their surrounding infrastructure. Statistic and other data yet to be confirmed in the 2 meetings but necessary to produce a final report was sorted out in a list and the study team requested the Iraqi counterparts to provide additional information.

(Photo: a scene of 2nd meeting as alternative to field

(3) Feedback meeting of field survey by local partner

The field survey of the Al-Qaim phosphate fertilizer plant and Akshat phosphate rocks mine was conducted by the local partner in early February after the 2nd meeting as an alternative to the field survey, because it took relatively longer time to arrange the schedule of the recipient of State Company for Phosphate and the local partner and obtaining permission for the visit. A debrief meeting was held on the 1st and 2nd of March in Beirut, Lebanon, for the study team to obtain feedback of the field survey from the local partner. The meeting was attended by 2 members of the study team and 7 members of the local partner.

In the meeting, the field survey result was confirmed with photos and videos and the local partner reported the result of simple examination of each unit. The study team again requested for urgent provision of additional information it had requested the Iraqi counterparts and the local partner in the 2nd meeting.

(4) Workshop meeting

A workshop meeting was held on the 25th and 26th of March 2010 in Beirut, Lebanon, to explain about the study result and discuss the future course of the development of chemical fertilizer sector in Mid-Western Iraq based on the result. The meeting was attended by 5 study team members, 4 Iraqi counterparts who had attended the 1st and 2nd sessions as alternative to the field survey and one each from the Ministry of Finance and the Ministry of Planning and Development Cooperation. Five members of the local partner also participated as observers.

The study team gave a presentation based on the study result and participants discussed the chemical fertilizer sector in Iraq based on current and predicted future world market of the sector. The process to examine the project currently under planning as a candidate of an ODA loan project was also confirmed.

Chapter 2

General Information of Iraq and the Project Site

Chapter 2 General Information of Iraq and the Project Site

2.1 General Information of Iraq

Basic data of Iraq

(1) Capital City : Baghdad (Population; about 5-6 million)

(2) Area : 438,317 km^2 (About 1.2 times larger than Japan)

(3) Population : 27,100 thousand people (Based on World Bank estimation in 2004)

(4) Languages : Arabic, Kurdish (Both are official languages)

(5) Races : Arabic (Shiite is about 60% of the total population. Sunnis, about 20%. Kurdish, about 20%), Minors (Turkmen, Assyria)

(6) Religions : Islam (Shiite, Sunnis), Christianity, Others

(7) Political System : Republican Government

(8) President : Jalal Talabani (Elected on April 6, 2005)

(9) Government : The Second General Election of the National Diet was carried out on Dec 15, 2005 and the new government started on May 20, 2006 including 40 ministers headed by the new prime minister Nouri al-Maliki. On March 7, 2010, The Third General Election of the National Diet was carried out and at present, the final result has been counted.

(10) GDP : 70,100 million U.S.Dollars (Based on IMF estimation in 2009)

(11) GDP per-capita : 2,245 U.S. Dollars (Based on IMF estimation in 2009)

(12) Proved oil reserves : 115 billion barrels (Based on BP statistics in 2006. The third largest in the world)

2.2 Al-Anbar Governorate

2.2.1 General Information

The outline of the Al Anbar Governorate is summarized as follows Stud Team our reference and proper understanding:

- Capital : Ar Ramadi
- Other major cities : Fallujah and Haditha
- Land Area : Total 137,808 km^2
- Population : Approximately 1,230,000 in 2003
- Al Anbar is the geographically largest governorate among 18 governorates in Iraq, and encompasses the most of the country's western territory with sharing borders with Syria, Jordan and Saudi Arabia.
- Governorate name was changed like the following:

~ 1962	Dulaim
1962 ~ 1976	Ramadi
1976 ~	Al Anbar

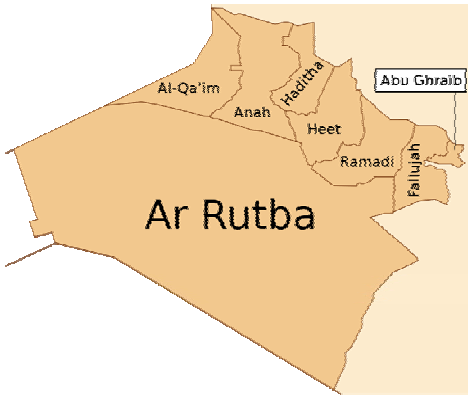
2.2.2 Geography

Anbar Governorate spans the Syrian Desert and the most of land is a combination of steppe and true desert characterized by desert climate, such as:

- Loss rainfall
- High variation heat between day and night
- Summer season rises to 42 °C and winter come down to 9 °C in ambient temperature.
- Wind direction : North-west is summer and sometimes South-west with the maximum wind velocity of 21 m/sec.
- Average rainfall : 115 mm in winter
- Agricultural Products : Wheat, Potatoes, Barely, Maize and Vegetables Plus Fodder and Palm trees of around 2.5 million trees
- River "Euphrates" cross diagonally in Anbar province from the north to the southeast, passing through six of the sever districts.

  Al-Qaim district
  Anbar district
  Haditha district
  Hit district
  Ramadi district
  Fallujah district

The Ar Rutbah district is the longest district, occupying the majority of the Governorate and includes the large desert area in the southwest.



(South: Wikipedia)

2.2.3 MIM Sector in Iraq

(1) General Statement of Iraqi Industry

The Iraqi Industry had shown a great surge and developments after the nationalization of the Oil Production in the Country.

Some of the major industries that were established are:

- Fertilizer Industry
- Steel Industry
- Petrochemical Industry
- Engineering Industries
- Food Processing Industries

And many other small & medium Supporting Industries

One of the major industries, as indicated above was the Fertilizer Industry which depends on natural gas availability in many regions (South & North) of Iraq. Also a major development took place in West Iraq which is the Phosphate Fertilizer Complex in Al- Qaim. The Phosphate mine is in Akashat which is about 120km from Al-Qaim Town.

The Anbar province did not have a good share of the Iraqi Industry although there is a big glass factory in Ramadi City and a two million ton Cement Plant built by Kawasaki Heavy

Industries, Ltd., Japan.

In the 1980s, the industry did flourish although Iraq had a great conflict with Iran as everybody knows which is called the Iraqi Iran War which lasted 8 years. Such war affected the economy a great deal and Iraq had to finance many projects during that period. Such financial problems had its shadow on the growth of the industry but industrial progress was maintained steadily until the First Gulf War. The industry in total suffered heavily during the 1990s and up to the Second Gulf War.

Iraq has always maintained good human resources capabilities since thousand of Engineers and technicians have studied and trained in many developing countries.

The future of the Iraqi Industry in all sectors seems to be promising.

(2) Main Industries in Anbar Governorate

There are three main industries in Anbar Province:

- Cement Industry
- Phosphate Fertilizer Industry
- Glass & Ceramic Industries

＊ Cement Industries:

There are two plants for the production of ordinary Portland Cement & Sulfate resistant Cement. Al-Qaim plant was built by installing of machines exported from Romania in 1981 with a capacity of one million ton per annum. Since it was based on Romanian Know-How, the plant faced many technical problems. Ministry of Industry is leasing it for private investors.

The Kubaisa Cement Plant which was built in 1981 also with a capacity of two million tons per annum by Kawasaki proved to be one of the best plants in Iraq. It is still in production but it lacks the good management, the technical support & also the spare parts.

＊ Phosphate Fertilizer Complex:

This complex with the phosphate mine in Akashat was built in 1976 and completed in 1983 by a Belgium Consortium. It started production in 1983. It consists of seven plants among them are:

1- Akashat Mine

2- Beneficiation Plant Benefaction
3- Sulfuric Acid Plant
4- Phosphoric Acid Plant
5- Triple Super Phosphate Plant
6- Mono fertilizer Plant
7- Compound Fertilizer Plant (NP or NPK)

The design capacity of the complex is 600,000 tons/Annum but they really never attained more than 68 % production. It has a total employment of 3942 but only 373 in administration. In 2007, utilization factor was only 32% of the total capacity. The complex lacked good management, technical back up & rehabilitation.

* Glass & Ceramic Factory:

Established in 1970 and started production at early stage. It was actually built by FSU technology through political & industrial agreement between Iraq & FSU. Later on many production lines were changed to Japanese or Western Equipment and Know-How.

It consists of two main plants with seven production lines. The production items are:

1- All kinds of Bottles
2- Production of Sheet Glass
3- Ceramics Tiles for Walls & Floors
4- Sanitary Ware
5- Sodium Silicate (Solid & Liquid)
6- Glass table ware.

The Factory employees are about 3,200 among them 225 for administration.

Capacity Utilization was checked last in 2002 and it was only 29%. The factory uses very little raw materials imported from outside Iraq and the factory mainly depends on the extracted deposits in Anbar Province.

Chapter 3

Overview of Industry and Minerals Sector in Iraq

Chapter 3 Overview of Industry and Minerals Sector in Iraq

3.1 Overview of Industry and Minerals Sector

The sector the Ministry of Industry and Minerals has jurisdiction over consists of the following 6 industry sub-sectors.

1) Construction Industries

2) Engineering Industries

3) Textile Industries

4) Food and Pharmaceuticals Industries

5) Petro-Chemical Industries

6) Industrial Services

A chief is appointed for each industry sub-sector who supervises the state-owned companies that belong to the sub-sector. The overview of each industry sub-sector is as follows. (The statistical values come from the materials obtained from Stud Team Iraqi Counterpart after the 2nd meeting in Amman in January, 2010 and are as of the year 2009.

1) Construction Industries

This industry sub-sector focuses on manufacturing of materials such as cement, glass and plastic as well as furniture. 8 state-owned companies belong to this industry sub-sector. There are approximately 33,000 employees in total. With total sales of approximately 350 billion Iraq dinars (approximately 30 billion yen), this is the biggest sub-sector in the Industry and Minerals sector in terms of sales amount.

2) Engineering Industries

This industry sub-sector deals with electricity, plant equipments, steel products, industrial machinery and various engineering services. With 21 state-owned companies, this is the biggest industry sub-sector in the Industry and Minerals sector in terms of the number of companies and employees. The total number of employees is approximately 54,000 and the total sales are approximately 140 billion Iraq dinars (approximately 11 billion yen).

3) Textile Industries

This sub-sector deals with manufacturing and distribution of textile materials, clothing items, carpets and house furniture. 8 state-owned companies belong to this sub-sector and the total

number of employee is approximately 34,000. The total sales of the sub-sector are approximately 50 billion Iraq dinars (approximately 4 billion yen). The number of employees is large, so this sub-sector has the potential to create more employment.

4) Food and Pharmaceuticals Industries

This sub-sector deals with production of dairy products, sugar, food oil, non-food oil, tobaccos and medical products. There are 6 state-owned companies and approximately 22,000 employees in the sub-sector. The total sales are approximately 50 billion Iraq dinars (approximately 4 billion yen). Dealing with products familiar with the public, this sub-sector receives a large portion of the aid from the United Nations Industrial Development Organization (UNIDO), which will be mentioned in Chapter 3.

5) Petro-Chemical Industries

This sub-sector manufactures and distributes chemicals, tires, batteries and paper from abundant natural resources of Iraq. The chemical fertilizer industry, the target industry of this survey, belongs to this industry sub-sector. The number of state-owned companies in this sub-sector is 15, the second largest after the engineering industries. With approximately 30,000 employees in total, the sub-sector has sales of approximately 175 billion Iraq dinars (approximately 14 billion yen). This sub-sector is the second most important to the development of the Iraqi economy after the Oil and Gas sector and has a great potential for growth.

6) Industrial Services

This sub-sector conducts information system management, designing and various surveys on contract. It is a relatively small industry sub-sector with 10 state-owned companies and approximately 3,700 employees.

3.2 History and Organization of the Ministry of Industry and Minerals

3.2.1 History of the Ministry of Industry and Minerals

The official website of the Ministry of Industry and Minerals refers to its history since the establishment. It is useful to know the history of the ministry so that we can understand what place and role the mining and manufacturing sector has been occupying and playing in the country.

(1959) The Ministry of Industry was established to replace the Ministry of Construction. Officials mainly from the former Ministry of Construction and also from other

ministries assumed responsibility for the industrialization of both public and private sectors in Iraq at that time.

(1970) The law of Ministry of Industry's state-owned companies came into effect, which expanded the scope of the ministry's jurisdiction. Many state-owned companies were founded around the same time.

(1974) The name of the ministry was changed from the Ministry of Industry to the Ministry of Industry and Minerals.

(1982) The Ministry of Light Industries was founded as a separate ministry. An administrative structure for the both ministries was established.

(1987) All the state owned companies that belonged to the Ministry of Industry and Minerals and the Ministry of Light Industries were canceled and their authorities and obligations were transferred to the succeeding institutes. The Ministers and the Director Generals of the two ministries were given extensive authority at that time.
In the same year, the names of the Ministry of Light Industries and the Ministry of Industry and Minerals were changed to the Ministry of Industry and the Ministry of Heavy Industries, respectively.

(1988) The Ministry of Industry and the Ministry of Heavy Industries were joined together under the name of the Ministry of Industry and Minerals. Around the same time, the state companies under the umbrella of the former Ministry of Light Industries announced the sale of a number of factories to the private sector. 82 factories were sold to the private sector in a little over two years.
In the same year, the Military Industries Commission joined the Ministry of Industry and Minerals, and the ministry name became the Ministry of Industry and Military Industries.

(1991) The ministry name became the Ministry of Industry and Minerals once again.

(1991) All state-owned companies that dealt with the production and distribution of electric power were transferred from the Ministry of Industry and Minerals to the Commission of Electricity when it was established.

Although the above-described history of the ministry shows that there were some twists and turns before the ministry became what it is now, it also shows that the ministry has been having contact with the private sector and always playing an important role in the industrial

development in Iraq.

3.2.2 Organization of the Ministry of Industry and Minerals

The current organization of the Ministry of Industry and Minerals is shown in Figure 2.2-1. Three deputy ministers, appointed under the minister, are in charge of central government activities, oversight of state companies under its jurisdiction, and the development of the sector, respectively.

3.2.3 Outline of State Owned Companies in Industry and Minerals Sector

As described in 3.2.1, this sector has a very broad base with 68 state companies and approximately 180,000 employees. The list of state companies of each industry sub-sector is attached to the end of this chapter. The figures in the above explanation and the list at the end of this chapter are as of the year 2009 and do not include the state companies in the military industry that were recently transferred to the Ministry of Industry and Minerals. The figures are used without any modification although some are slightly different from the statistical figures from other data sources.

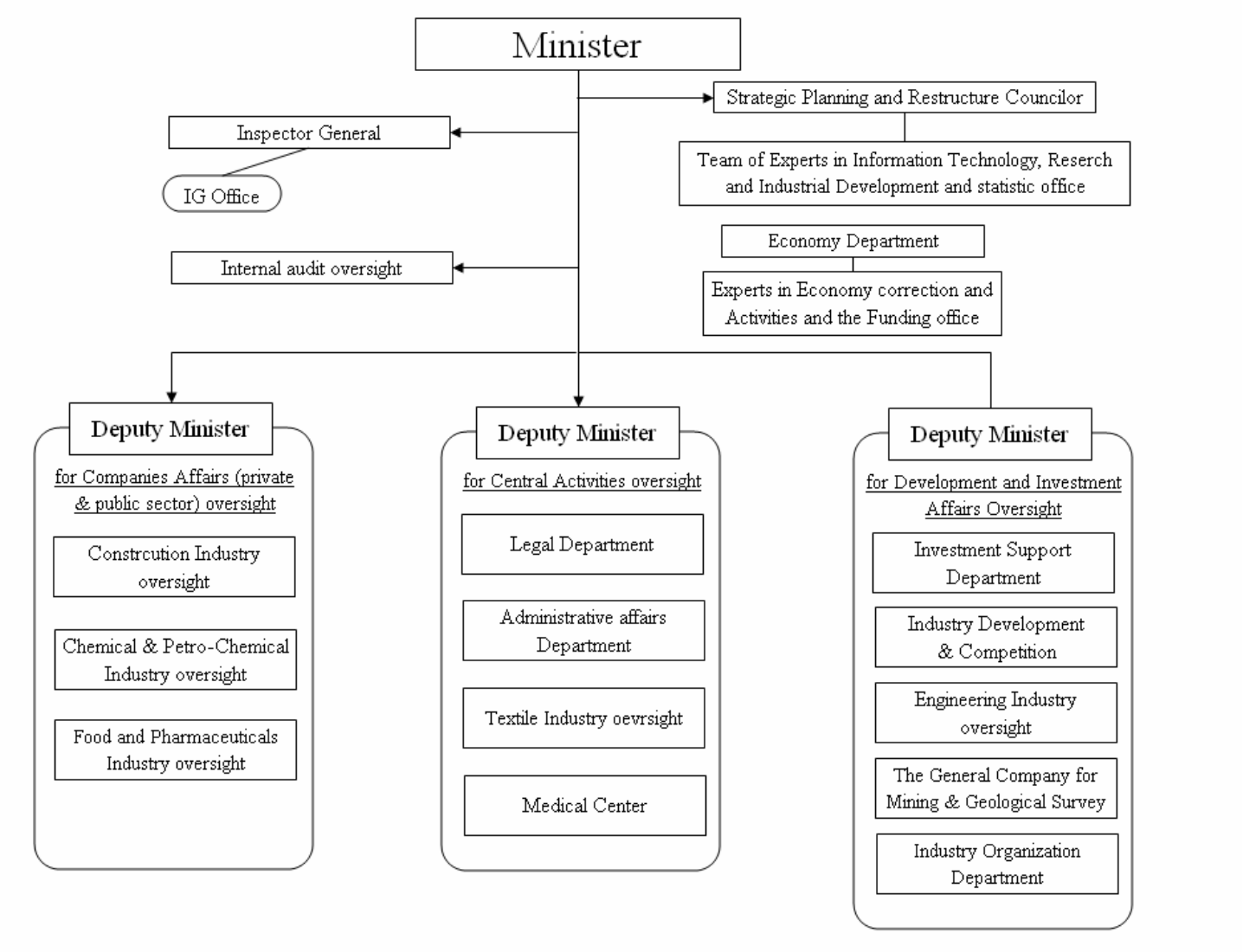


Figure 3.2-1: Organization of the Ministry of Industry and Minerals of Iraq

(Source: Created by the study team based on Materials obtained from Iraqi counterpart)

Table 3.2-2: State Owned Companies Controlled by the Ministry of Industry and Minerals (Construction Industries)

	Company Name	Type of Operation	Year of Establishment	Address of Head Office	Turnover (Million Dinar)	Number of Employees
1-1	State Company for Geological Survey & Minin	Survey of geology, water, etc. and survey and exploration of mineral resources in Iraq	1969	Baghdad	4,737	1442
1-2	State Company for Construction Industries	Production and distribution of construction materials	1987	Baghdad	2,755	7741
1-3	State Company for Glass & Ceramic Industry	Production and distribution of glass and ceramic products	1970	Ramadi/Anbar	547	2905
1-4	Iraqi State Company for Cement	Production and distribution of cement products	1936	Baghdad	69,323	4820
1-5	State Company for Northern Cement	Production and distribution of cement products	1953	Mosul/Ninavah	96,798	5779
1-6	State Company for Refractoriness Industry	Production and distribution of fireproof bricks and other products	1994	Baghdad	2,003	806
1-7	State Company for Southern Cement	Production and distribution of cement products	1995	Kufa/Najaf	174,572	8731
1-8	Al-Nouman State Company	Production of trickle irrigation systems and related products	1985	Baghdad	249	844

Table 3.2-3: State Owned Companies Controlled by the Ministry of Industry and Minerals (Textile Industries)

	Company Name	Type of Operation	Year of Establishment	Address of Head Office	Turnover (Million Dinar)	Number of Employees
3-1	Baghdada Factory for Furniture	Production of furniture	1995	Baghdad	499	181
3-2	State Company for Cotton Industries	Production of cotton products	1945	Baghdad	4,979	3899
3-3	State Company for Handmade Carpets	Production of handmade carpets	1993	Baghdad	1,067	886
3-4	State Company for Leather Industries	Production of leather products	1931	Baghdad	7,450	4460
3-5	State Company for Ready Made Wear Industries	Production of clothes and clothing materials	1988	Mosul/Ninavah	2,067	5268
3-6	State Company for Textile Industries (Hilla)	Production of cotton materials, viscose rayon and other materials	1967	Hilla/Najaf	19,682	9015
3-7	Wasit State Company for Textile Industries	Production of cotton materials, synthetic fabric and other materials	1969	Kut/Wasit	4,049	5047
3-8	State Company for Woolen Industries	Production of wool materials and products	1926	Baghdad	9,377	5206

Table 3.2-4: State Owned Companies Controlled by the Ministry of Industry and Minerals (Engineering Industries)

	Company Name	Type of Operation	Year of Establishment	Address of Head Office	Turnover (Million Dinar)	Number of Employees
2-1	Al-Faris State Company	Production of various plant equipments	1988	Baghdad	6,937	1480
2-2	Al-Ikhaa State Company	Production of spare parts for companies mainly in the cement industry that are related to the Ministry of Industry and Minerals	1984	Falluja/Anbar	5,857	3815
2-3	Al-Mansour State Company	Production of electronic parts, solar cells, industrial gas, etc.	1975	Baghdad	521	812
2-4	Al-Sumood State Company for Steel Industries	Production of electrodes, forging steels, steel frames, etc.	1989	Baghdad	6,972	1879
2-5	Al-Shaheed State Company	Metallurgy	1980	(Unknown)	1,284	1519
2-6	Al-Tahaddi State Company	Electric equipment work	1993	Baghdad	14,338	644
2-7	Al-Zawraa State Company	Production of electric equipments	1988	Baghdad	—	922
2-8	Diala State Company for Electrical Industries	Production of electric equipments	1978	Baqubah/Diala	23,118	3349
2-9	State Company for Electrical Industries	Production of machinery and electric equipments	1965	Baghdad	5,477	5573
2-10	Ibn Majed State Co. for Heavy Engineering & Marine Industries	Production and installation of heat exchangers, storage tanks, steel frames, etc.	2001	Zubair/Basrah	6,903	1570
2-11	State Company for Iron & Steel	Production of steel products including steel pipes	(Unknown)	Basrah	5,335	6303
2-12	State Company for Mechanical Industries	Production of agricultural machinery	1968	Iskandariyah/Babil	5,477	5573
2-13	State Company for Heavy Engineering Equipment	Production and installation of various plant equipments	1963	Baghdad	8,754	2725
2-14	Nassr State Company for Mechanical Industries	Production of steel frames and other materials	1981	Baghdad	9,850	4179
2-15	Specialized Institute for Engineering Industries	Engineering consulting, etc.	1972	Baghdad	—	537
2-16	Ur State Company for Engineering Industries	Production of electric cables, aluminum foil, etc.	1988	Nassiriyah/ThiQar	12,450	4993
2-17	State Company for Vehicles Industries	Assembly of transportation equipments including trucks	1976	Baghdad	18,776	3669
2-18	Al-Fedha State Company	(Unknown)	(Unknown)		5,168	1242
2-19	Al-Ezz State Company	(Unknown)	(Unknown)		—	1122
2-20	Salah Al-Deen State Company	(Unknown)	(Unknown)		—	2170
2-21	Ibn Al-Waleed State Company	(Unknown)	(Unknown)		—	1542

Table 3.2-5: State Owned Companies Controlled by the Ministry of Industry and Minerals (Food and Pharmaceuticals Industries)

	Company Name	Type of Operation	Year of Establishment	Address of Head Office	Turnover (Million Dinar)	Number of Employees
4-1	State Company for Dairy Products	Production of dairy products	1956	Baghdad	401	6781
4-2	S.C. for Drugs & Medical Supply Industry (Ninawa)	Production of medical products and appliances	2002	Telkeef/Ninawa	17,012	2157
4-3	S.C. for Drugs & Medical Supply Industry (Sammara)	Production of medical and cosmetic products	1962	Sammara	23,741	4171
4-4	State Company for Sugar Industry	Production of white sugar ,etc.	1957	Mosul/Ninavah	2,290	2092
4-5	State Company for Tobaccos & Cigarettes	Production of tobacco and matches	1963	Baghdad	72	2488
4-6	State Co. for Vegetable Oils Industry	Production of food oil, soap, detergent, etc.	1970	Sammara	6,741	5039

Table 3.2-6: State Owned Companies Controlled by the Ministry of Industry and Minerals (Industrial Services)

	Company Name	Type of Operation	Year of Establishment	Address of Head Office	Turnover (Million Dinar)	Number of Employees
6-1	Al-Kindy State Company	(Unknown)	(Unknown)		—	776
6-2	General Systems Company	Information and telecommunications system and IT service	(Unknown)		—	882
6-3	State Co. for Industrial Designs and Construction	F/S and engineering	(Unknown)		—	522
6-4	State Co. for Industrial Designs and Consultation (SIDCCO)	Engineering	(Unknown)		—	856
6-5	State Company for Information Systems	Information and telecommunications system and IT service	(Unknown)		—	173
6-6	Development & Arrangement Industrial		(Unknown)		—	—
6-7	Training & Apprenticeship	Training of government agencies	(Unknown)		—	244
6-8	Training & Rehabilitation	(Unknown)	(Unknown)		—	29
6-9	Industrial Development	(Unknown)	(Unknown)		—	251
6-10	Al-Karama State Company	(Unknown)	(Unknown)		—	—

Table 3.2-7: State Owned Companies Controlled by the Ministry of Industry and Minerals (Petro-Chemical Industries)

	Company Name	Type of Operation	Year of Establishment	Address of Head Office	Turnover (Million Dinar)	Number of Employees
5-1	Al-Furat State Co. for Chemical Industries	Production of vitriolic acid, caustic soda and other chemical products	1968	Hindiyah/Babil	9,567	2206
5-2	Al-Sawary State Co. for Chemical Industries	Production of plastic, asbestos, ink, etc.	1994	Al-Taji	675	1077
5-3	State Company for Batteries Industries	Production of lead accumulators, dry batteries, etc.	1975	Baghdad	218	2296
5-4	Ibn Sina State Company	Research and development of fine chemicals	1992	Baghdad	665	707
5-5	Mishraq Sulphur State Company	Production of sulfur compounds	1969	Mosul/Ninavah	34,756	1685
5-6	State Company for Northern Fertilizer	Production of ammonia and urea	1987	Beiji/Salah Al-Deen	—	1513
5-7	State Company for Paper Industries	Production of paper products	1970	Basrah	367	4694
5-8	State Company for Petrochemical Industries	Production of olefin, caustic soda, etc.	1977	Zubair/Basrah	9,329	1303
5-9	State Company for Phosphate	Production of phosphoric fertilizers	1976	Al-Qaim/Anbar	29,961	3885
5-10	State Company for Rubber Industries	Production of tire products	1989	Dewanyia	6	1840
5-11	State Company for Southern Fertilizer	Production of ammonia and urea	1975	Zubair/Basrah	88,581	3347
5-12	State Company for Tires Industries	Production of tire products	1989	Haidariyah/Najaf	777	3172
5-13	Tariq State Company	(Unknown)	(Unknown)		—	851
5-14	Al-Hadher State Company	Electrical instrumentation	(Unknown)		—	545
5-15	Mining and Isolation State Company	(Unknown)	(Unknown)		—	593

(Source for Tables3.2-2 to 3.2-7: Materials obtained from Iraqi counterpart)

Chapter 4

Current Status of and Development Strategies for the Industry and Minerals Sector in Iraq

Chapter 4 Current Status of and Development Strategies for the Industry and Minerals Sector in Iraq

4.1 Current Status and Issues of the Industry and Minerals Sector in Iraq

4.1.1 Current Status

The Industry and Minerals sector in Iraq is extremely stagnant today as a result of the protracted war and associated economic sanctions. According to a document released by the Ministry of Planning and Development Cooperation of Iraq in August 2009, the sectors under the jurisdiction of the Ministry of Industry and Minerals accounted for 13.9% of the country's gross domestic product (GDP) in 1988 but the ratio sharply declined to 3.8% in 1990 and 1.5% in 2001. Even in 2007, which saw steady progress in post-war reconstruction efforts, it remained at a level of 1.9%.

Main causes of this economic turmoil include the security problem, delay in developing laws, shortage in power and raw material gas supplies, damaged and superannuated production facilities, and diminished production capacity due to insufficient fund to repair those facilities. Additionally, the inflow of inexpensive imports has been undermining the competitiveness of Iraqi products. On the other hand, the labour force in the country is on the rise as the Iraqi population has been growing and many who fled abroad during the tyrannical era are returning home. The Industry and Minerals sector is not an exception. The increased number of workers accelerates the exacerbation of labour productivity in the sector.

Table 4.1-1 shows the number of employees and labour cost in each sub-sector of the Industry and Minerals sector in 2008, excluding the four military related companies that newly joined that year. According to this data, the total number of employees sector-wide was above 180,000 and the monthly wage per capita was approximately 540,000 Iraqi dinars, or 43,000 Japanese yen, in 2008. Considering that the total number of employees in the oil and gas sector is roughly 100,000, the Industry and Minerals sector evidently plays an important role as an employer in the country.

Table 4.1-1: Number of Employees and Per-capita Monthly Wage in the Industry and Minerals Sector by Sub-sector

Sub-sector	No. of employees	Annual gross wage (million Dinar)	Per-capita monthly wage (thousand Dinar)
Construction	31,481	254,180	672
Engineering	52,411 (56,217)	314,888	501
Textile	34,935	168,311	401
Food and pharmaceutica	23,717	140,660	494
Petrochemistry	33,009	259,289	655
Industrial services	3,054 (6,243)	22,676	619
Total	185,602	1,160,004	541

(The figures in parenthesis indicate the total number of employees when combined with the armament industry that was included in the umbrella of the Ministry of Industry and Minerals in 2008.)

(Source: "*Industrial Sector Paper*" published by the Ministry of Planning and Development Cooperation in August 2009)

Table 4.1-2 shows the sales, expenses, and loss-and-profit balance as to each sub-sector from 2006 to 2008. The table suggests that all the sub-sectors, except for the engineering sub-sector, recorded a loss, especially for year 2008. A closer examination on the gross sales figures reveals that the expenses increases outpaced the stagnant sales growth in these deficit sub-sectors. Possible factors behind this trend include the rising number of employees, as described earlier, and cost increases in conjunction with companies' efforts to rehabilitate their own plants.

Table 4.1-2: Gross Sales, Expenses, and Loss-Profit Balance in the Mining and Manufacturing Sector by Sub-sector (2006 to 2008)

(million dinars)

Sub-sector	2006			2007			2008		
	Gross sales	Expenses	Loss-Profit Balanace	Gross sales	Expenses	Loss-Profit Balanace	Gross sales	Expenses	Loss-Profit Balanace
Construction	412,155	297,970	114,185	411,135	338,331	72,804	459,718	493,463	-33,745
Engineering	210,881	210,808	73	226,264	221,566	4,698	248,232	440,498	-192,266
Textile	91,071	112,149	-21,078	115,710	124,574	-8,864	115,696	239,549	-123,853
Food and pharmaceuticals	120,523	112,556	7,967	104,996	106,424	-1,428	79,606	184,656	-105,050
Petrochemistry	189,642	188,318	1,324	175,393	193,454	-18,061	403,140	378,927	24,213
Industrial services	54,316	48,273	6,043	65,516	62,878	2,638	78,824	81,104	-2,280
Total	1,078,588	970,074	108,514	1,099,014	1,047,227	51,787	1,385,216	1,818,197	-432,981

(Source: "*Industrial Sector Paper*" published by the Ministry of Planning and Development Cooperation in August 2009)

4.1.2 Issues

The above-mentioned *Industrial Sector Paper* released by the Ministry of Planning and Development Cooperation in August 2009 points out the following as the issues faced by the Industry and Minerals sector in Iraq.

- Developing a legal framework to reinforce the authority of the Ministry of Industry and Minerals.
- Developing a legal framework, strengthening the tarrif system, and standardizing quality control to address the degrading competitiveness of domestic products caused by inexpensive, low-quality imports
- Promoting domestic industries by requiring all the ministries and agencies to use made-in-Iraq products in place of imported goods.
- Banking system reform to support operating capital of corporations.
- Legislation to address the increasing number of employees resulting from the return of citizens to workforce since 2003.
- Rehabilitating the current obsolete production equipment and implementing most-advanced technologies.
- Addressing the unstable power supply and its adverse impact on production capacity.
- Addressing the shortfall in gas to be suppied to plants that use gas as a raw material.
- Addressing the swelling production costs caused by the high standards of petroleum product prices and electricity bills.

During the first meeting in Amman, the Iraqi counterpart listed up specific examples of factories and plants needing immediate restoration of production capacity that are owned by state-owned companies in the Industry and Minerals sector as follows:

<Factories and plants that need immediate restoration of production capacity>

(1) Basrah Governorate (Kohr Al-Zubair) - steelmaking plant
(State Company for Iron & Steel)

(2) Anbar Governorate (Ramadi) – glass and ceramic factory
(State Company for Glass & Ceramic Industry)

(3) Maysan Governorate/Ninavah governorate (Mousl) – sugar factory
(State Company for Sugar Industry)

(4) Baghdad, etc. – tobacco factory
(State Company for Tobaccos & Cigarettes)

(5) Ninavah Governorate (Mishraq) - sulfur compound plant
(Mishraq Sulphur State Company)

(6) Anbar Governorate (Al-Qaim) - phosphate fertilizer plant
(State Company for Phosphate)

(7) Qadisiya Governorate (Diwanyia) – rubber and tyre product factory
(State Company for Rubber Industries)

(8) Najaf Governorate (Haidariyah) – tyre product factory
(State Company for Tyres Industries)

(9) Basrah Governorate/Maysan Governorate – paper product factory
(State Company for Paper Industries)

(10) Babil Governorate – dry cell factory
(State Company for Batteries Industries)

(11) Textile factory

(12) Cooking oil factory

4.2 National Development Strategy and Positioning of the Industry and Minerals Sector

4.2.1 Overview of the National Development Strategy of Iraq

In March 2007, the Government of Iraq hammered out a National Development Strategy (NDS) for 2007-2010. The NDS sets forth the government's policies for reconstructing the economy, which had lost vitality due to the maladministration by the longstanding dictatorship, and replaces the National Development Strategy (2005-2007) launched in June 2005.

In the Strategy, the democratically-elected government of Iraq puts up a reconstruction vision "Transform Iraq into a peaceful, unified democracy and a prosperous, market-oriented economic powerhouse that is fully integrated into the global economy." It also states that this goal can only be achieved by a market-oriented economy driven by the ingenuity and creativity of private enterprises, founded on the rule of law and led by a democratic and transparent government.

The NDS represents a comprehensive framework for the Iraqi population to understand the Iraqi government's reconstruction and development plans. It specifies policies according to the following four pillars in order to accomplish the vision held up by the government, i.e., to establish concrete measures needed to make the vision a reality.

① Strengthening the foundations of economic growth

② Revitalizing the private sector

③ Improving the quality of life

④ Strengthening good governance and security

The concrete policies for each pillar are summarized hereunder:

① Strengthening the foundations of economic growth

The policies for strengthening the foundations of economic growth emphasize the importance of financial and monetary measures in realizing a stable macro-economic environment. They include a commitment to fortify the oil and gas sector, which is responsible for approximately 60 percent of the GDP and about 95 percent of foreign currency earnings, through legislation, partnerships with foreign companies, slashing subsidies, and various other measures. In the meantime, the Strategy sheds light on the necessity to alleviate the current excessive dependence on the oil and gas sector alone, and points at the strengthening of the agricultural sector and the tourism sector as a means of industrial diversification.

② Revitalizing the private sector

The document discusses the important of revitalizing the private sector as the engine of the nation's economic growth and employment facilitation. It sets out objectives for achieving this goal as improving the financial system, solidifying the electricity, transport, communications, and other basic infrastructure, and privatizing more than 200 state-owned enterprises (SOEs) in a phased manner.

③ Improving the quality of life

The NDS cites "improving the quality of life" of the nationals, or providing better water supply and sewerage systems, sanitary and medical services, and housing environment, as one of the basic rights of all Iraqis. As a matter of fact, a large portion of government revenue and assistance provided by international aid agencies is spent to this end.

④ Strengthening good governance and security

The policies for this aspect emphasize the significance of enhancing good governance, eradicating political corruption, and stabilizing security, in order to realize a democratic state.

4.2.2 Positioning of the Oil and Gas Industry

As described above, a strengthened foundation for Iraq's economic growth indisputably requires a priority reconstruction and development of the oil and gas industry, which is of

primary importance to the national economy. It is predictable that the government's revenues from the reconstruction and development of the sector will be allocated first to "Improving the quality of life" fields, out of the four pillars of the national development. Table 4.2-1 below details the amounts of investment needed between 2007 and 2010, estimated as of 2007 when the National Development Strategy was formulated.

Table 4.2-1: Estimated Amounts of Investment Needed in the Oil and Gas Sector (calculated as of 2002)

(billion U.S. dollars)

Segment	2007	2008	2009	2010
Crude oil production	4.70	4.80	5.20	5.30
Gas field development	0.45	0.50	0.55	0.50
Gas processing	0.50	0.50	0.50	0.50
Oil refineries	1.25	1.35	1.40	1.50
Pipelines	0.70	0.70	0.80	0.80
Maintaining production in existing oil fields	0.50	0.50	0.50	0.50
Maintaining production at relevant installations	0.20	0.25	0.25	0.30
Exploration of new oil fields	0.10	0.10	0.10	0.10
Total	8.40	8.70	9.30	9.50

(Source: *The National Development Strategy* (2007-2010) published by the Iraqi Government)

4.2.3 Positioning of the Industry and Minerals Sector

The National Development Strategy also estimates needed investments for other sectors than the oil and gas sector mentioned in Section 4.2.2 above. The investments needed (minimum requirement for fulfilling the basic needs of the Iraqi people) for individual sectors were estimated by the Iraqi Government as given in Table 4.2-2. Incidentally, these figures are a compilation of the calculations carried out by the Ministry of Planning and the respective ministries and agencies of Iraq in December 2002.

Table 4.2-2: Estimated Amount of Investment Needed by Sector (calculated as of 2002)

(billion U.S. dollars)

Sector	2007	2008	2009	2010	Four-year total
Oil and gas	8.4	8.7	9.3	9.6	36.0
Electricity	6.0	4.4	3.5	2.6	16.5
Water resources	1.0	1.5	1.5	1.2	5.2
Agriculture	1.1	1.0	1.0	1.0	4.1
Industry (and mining & manufacturing)	0.3	0.2	0.2	0.1	0.8
Transport	7.5	7.5	7.5	7.5	30.0
Construction	1.5	1.5	1.5	1.5	6.0
Housing	10.0	12.0	15.0	15.0	52.0
Insurance	2.5	3.3	4.4	4.5	14.7
Education	0.6	0.6	0.6	0.6	2.4
Communications	0.3	0.3	0.2	0.2	1.0
Public sanitation	1.4	1.9	2.0	2.7	8.0
Regional development	2.5	2.5	3.0	3.0	11.0
All sectors	43.1	45.4	49.7	49.5	187.7

(Source: *The National Development Strategy* (2007-2010) published by the Iraqi Government)

As shown in Table 4.2-2 above, when calculated based on the viewpoint of "fulfilling the basic needs of the Iraqi people", the necessary investment amounts for the mining and manufacturing sector were estimated rather low in 2002. This was unavoidable because, as previously mentioned, the government had a policy to give paramount priority to the reconstruction and development of the oil and gas sector, which underpins the nation's economy, and the improvement of the quality of life of the people, in order to accomplish its reconstruction vision. The lower priority given to the Industry and Minerals sector, however, does not mean that the sector was considered as insignificant. On the contrary, the importance of the sector is expected to heighten as the country's economy gets on a reconstruction track. The following provides the rationales for this interpretation as seen in the National Development Strategy.

(1) Moving away from the excessive dependence on the oil and gas sector

The National Development Plan refers to the strengthening of the oil and gas sector as the most effective way to reinforce the foundations for the Iraqi economy. At the same time, it highlights the risks of the excessive dependence on this sector and the necessity for diversifying domestic industries, from the standpoint of sustainable economic growth, building on the following three reasons.

- Avoiding monoculture economy excessively replyin on the natural resources.
- Economic growth relying exclusively on oil is unstable due to the volatility of crude oil prices.
- Addressing the unemployment issue.

Iraq has undergone drastic declines in the government's revenue due to crude oil price doldrums and export moratoriums for various reasons. Therefore, the country recognizes the necessity for reforming its industrial structure and diversifying sources of economic growth.

The Industry and Mineral sector may well play an essential role in diversifying Iraq's industries. As explained earlier, this sector covers a wide spectrum of sub-sectors and thus the growth of the sector will directly lead to industrial diversity. Moreover, since many of the industries in the sector are labour-intensive, it is highly potential for creating jobs. This also endorses the importance of the sector.

(2) Decentralization

The National Development Strategy points out the importance of decentralization and the reconstruction and development of regional economies. To move away from the centralized

economic system, the plan notes as necessary actions the utilization of local governments, equitable distribution of budgets, and allocation of funds provided by foreign aid organizations and private enterprises to regions.

From the standpoint of revitalizing regional economies as well, the Industry and Minerals sector is expected to assume a significant role. In this sector, the location of natural resources is not the only factor for the industries to determine the place to construct plants, as in the oil and gas sector; economic activities associated with this sector can take place in many parts of the country.

(3) Revitalizing the private sector

Revitalizing the private sector is also an integral part of Iraq's reconstruction and development. In the light of this importance, the government of Iraq is working toward creating a setting and framework which allow the private sector to make easy entry; more specifically, the government is tackling to improve security, establish legal systems, and improve the remittance scheme and other aspects of the financial sector.

As previously described, the Industry and Minerals sector has a lot of SOEs. Because they are in moderate sizes and many of them are in relatively downstream industries, they can be operated independently with ease. Thus, the barrier for private capital to enter is fairly low. In fact, the Ministry of Industry and Minerals has launched a policy to maximally tap private capital in reconstructing and developing the Industry and Minerals sector. Again, the sector will play a vital role in this aspect as well.

With all the above considered, the Industry and Minerals sector should be sufficiently recognized as indispensable for sustainable development of the Iraqi economy from the mid- and long-term standpoint, though it is not regarded as one of the top priority sectors in the National Development Strategy.

4.2.4 Positioning of the Chemical Fertilizer Industry

Table 4.2-3 shows an industry-by-industry breakdown of the estimated amounts of investment needed in the mining and manufacturing sector (2007-2010) calculated as of 2002, provided in Table 4.2-2.

Table 4.2-3: Estimated Amounts of Investment Needed in the Industry and Minerals Sector by Industry (calculated as of 2002)

(million U.S. dollars)

Industry	2007	2008	2009	2010
Mineral resources mining	1.8	1.2	1.2	0.6
Food, beverages, and tobacco	12.3	8.2	8.2	4.1
Spinning, clothing, and leather products	14.4	9.6	9.6	4.8
Papermaking and timber	0.9	0.6	0.6	0.3
Chemical industry	84.3	56.2	56.2	28.1
Pharmaceutical industry	11.4	7.6	7.6	3.8
Construction	67.5	45.0	45.0	22.5
Steel and non-ferrous industry	50.4	33.6	33.6	16.8
Machinery and electric engineering	55.2	36.8	36.8	18.4
Others	1.8	1.2	1.2	0.6
All industries	300.0	200.0	200.0	100.0

(Source: *The National Development Strategy* (2007-2010) published by the Iraqi Government)

As shown above, a greater amount of investment was estimated for the chemical industry, to which the chemical fertilizer industry is included in this study belongs, than the other industries. This is probably because the chemical industry is positioned relatively upstream and closely related to the oil and gas sector and it is a process industry that requires substantial costs for reconstruction. Another reason can be the levels of its economic impact and contribution to job creation that the industry's reconstruction can bring.

The chemical fertilizer industry, in particular, has considerable link with the country's agricultural policies. The agriculture of Iraq today occupies a limited fraction of the national economy. Nevertheless, the recent rapid increase in the population, limited arable lands, and worsened productivity due to absence of irrigation installations have caused the nation to procure its staple foods mainly through import.

That being the case, the National Development Strategy states that the reconstruction of agriculture and fisheries is also a key to the reconstruction and development of the Iraqi economy and needs focused efforts. The reconstruction of agriculture and fisheries will expectedly lead to a higher self-sufficiency and a better climate for employment, just like the Industry and Minerals sector. Fertilizers are indispensable for enhancing crop yields. Thus, reconstructing and developing the chemical fertilizer industry should be given a relatively-high priority among the industries in the mining and manufacturing sector.

4.3 Reconstruction Policies for the Industry and Minerals Sector

4.3.1 Recent Reconstruction Policies and their Outcomes

In view of the current stagnation in the Industry and Minerals sector, the Ministry of Industry and Minerals has hammered out various measures in recent years. In the "Guide Book for State-owned Enterprises (in the Industry and Minerals Sector)" issued in 2006, the Ministry affirms the necessity for serving as the driving force in revitalizing non-oil-and-gas sectors and diversifying domestic industries by fostering advanced and value-added industries. To do so, bringing down the capital participation in SOEs and reforming the intra-ministry structure are fundamental, as noted in the publication.

At that time, the Ministry drew up short-, mid- and long-term plans, as explained below, and aimed to realize them.

Short-term plan: Reconstruct and reform state-owned manufacturers with high growth potential (slated for two years from 2004)

Mid-term plan: Prepare for devolving state-owned manufacturers to the private sector (slated for five years from 2005)

Long-term plan: Develop an overarching policy framework for growth of the domestic industry led by the private sector (slated for 2004 and succeeding years)

The Ministry quoted the following three pillars as the priorities in reconstructing the sector.

① Create an environment for the private sector to lead the regeneration of domestic industries, by developing adequate legal and financial systems.

② Prepare for a market-oriented economic environment with a view to privatization of SOEs.

③ Revitalize the cement, glass and other industries that new comers can enter with a small amount of investment yet can expect domestic demand.

In addition to these pillars, the Ministry has been planning and implementing more concrete measures through trial and error. For example, it once intended to develop large-scale industrial zones on the then Ministry of Armaments and Industry's proprietary land in Basrah Province, Babil Province, and Nenavah Province.

As described above, the Government of Iraq and the Ministry of Industry and Minerals have long been striving to cultivate the Industry and Minerals sector with explicit policies. Certain

outcomes are visible in that some plans to rehabilitate SOEs have already reached the implementation stage and that private capital participation in some SOEs has been determined. Yet, it is fair to say that the reconstruction of the Industry and Minerals sector is at the very beginning stage, based on the statistics shown in Section 4.1.1 and the issues discussed in Section 4.1.2 above.

4.3.2 Directionality of Reconstruction Policies beyond 2010

The above-mentioned the *Industrial Sector Paper* published by the Iraqi Ministry of Planning and Development Cooperation in August 2009 raises the following directions for its reconstruction policies beyond 2010.

- Reconstruct SOEs by laying new production lines and thereby improving productivity.
- Reconstuct companies and plants in accordance with the market principles.
- Expand the scope of roles to be assumed by the private sector in developing the national economy and allow the private sector to lead the Industry and Minerals sector to a high-value added industry.
- Encourage the provision of soft loans for fostering medium- and small-scale industries, developing industrial zones and cities, and projects under planning.
- Introduce modern technologies into the Industry and Minerals sector through partnering with global corporations that have cutting-edge technologies.
- Improve and expand research facilities and institutes in collaboration with the Ministry of Science and Technology.
- Intensify geographical and mineral resources surveys to identify available natural resources.
- Identify high-value added and competitive industries and attract investment from in and out of the country.
- Create “investment maps” based on available natural resources and competitive advantages, in collaboration with local governments, thereby promoting the establishment of new industries with the use of domestic and foreign investors’ funds.
- Develop laws to materialize an investment climate appropriate for domestic and foreign investors as well as laws on consumer protection and antimonopoly.

These reveal that there is no change in the Iraqi government’s basic policies of leveraging private capital in developing domestic industries; the only exception is that private investment is called for in high-value added industries that need more advanced technologies rather than

existing industries in the country. In the meantime, the above policies suggest that they will tap soft loans from international aid providers in those areas where it is difficult for private investors to partake.

4.4 Background and Results of Privatization Policies for the Mining and Manufacturing Sector

4.4.1 Privatization Policies of the Coalition Provisional Authority (CPA)

Iraq's policies of privatizing SOEs started with policy measures pushed forward by the Coalition Provisional Authority (CPA), which was formed following the declaration on the extensive ending of the Iraqi war. In September 2003, the CPA announced a new Foreign Investment Law as a stepping stone to promote the liberalization of the Iraqi economy. The bill was to assure that any foreign private company investing in Iraq would receive the same treatment as Iraqi private companies and to stimulate foreign investment to contribute to the reconstruction of the economy.

The new Foreign Investment Law acknowledges a 100% ownership of an Iraqi SOE by foreign capital in any field other than oil and mineral resources-related fields. It stipulates reforms of tax and financial systems in order to promote investment by such foreign firms. There has been, however, constant criticism against the policy to privatize SOEs by virtue of this law, because some view that the law gives priority to interests of multi-national companies over those of Iraqi players and thus does not necessarily contribute to a sound growth of the Iraqi economy. It has also been said that an employment issue emerged as a result of the large-scale payroll cutting in SOEs in the course of privatization.

4.4.2 Privatization Policies of the Ministry of Industry and Minerals and their Results

Although the CPA's initiative with the new Foreign Investment Law was not well accepted by the Iraq population, the concept of leveraging private investment in reconstructing the Iraqi economy was inherited by the following Interim Government, Transitional Government, and democratic government. There are growing expectations for private companies today, particularly in the Industry and Minerals sector, whose reconstruction has been slow though it plays a vital role in diversifying the economy and creating jobs and is highly anticipated to support the national economy into the future.

In the "Guide Book for State-Owned Enterprises", mentioned earlier, the Ministry of Industry and Minerals categorized the 56 SOEs that were under its jurisdiction at the time of issuance into four, from the standpoints of current profitability and future prospect, as part of the SOE reform.

SOEs affiliated with the Ministry of Industry and Minerals: 56 with 200 plants (as of 2006)

(A) Enterprises with high levels of domestic demand and promising markets (14)

(B) Enterprises with high growth potential and vast amounts of investment needed (8)
(State Company for Iron & Steel, Mishraq Sulphur State Company)

(C) Enterprises that will supposedly be able to cover the minimum labor cost with appropriate amounts of investment (28)

(D) Enterprises to be liquidated (6)

The Iraqi counterpart did not provide explicit explanation on whether this categorization is still valid or which SOEs fall under which category, during the field survey. The above information at least proves that the Ministry had an intention to set priorities to SOEs as part of their effort to reconstruct the sector at that time.

Also, the Investment Department of the Ministry compiled a document called "Industrial Investment Opportunities in Iraq," dated August 2007, which lists up 21 factories and plants that have investment opportunity for private companies in and outside Iraq (Table 4.4-1).

Table 4.4-1: Factories and Plants Subject to Investment by Private Companies

1	Iron & Steel Company Plant	12	Pharmacitical Bottles Plant in Famadi
2	Petrochemical Complex	13	Medicine Drugs Plant in Nineveh
3	Automotive Complex	14	Fertilizer Plant in Khor Al-Zubair
4	Glass & Ceramic Industry (New Ceramic Floor Tile Factory)	15	Electric Transformer Plant in Diala
5	Glass & Ceramic Industry (Old Ceramic Floor Tile Factory)	16	Aluminium Plant Nasiriya
6	Glass & Ceramnic Industry (Sanitary Ware Factory)	17	Cable Plant in Nasiriya
7	Missan Paper Plant	18	Irrigation system manufacturing Plant
8	Kubaisa Cement Plant	19	Mecanical Plant in Iskandiriya
9	White Cement Plant in Falluja	20	Phosphate Plant in Al-Qaim
10	Najaf Cement Plant	21	Urea Fertilizer Plant in Abu Al-Khasib
11	Sheet Glass Plant in Ramadi		

(Source: MIM data)

The applicable law in "Industrial Investment Opportunities in Iraq" is the Investment law enacted in 2006. The law defines benefits that domestic and foreign private companies can enjoy by investing in Iraq; more details of the law will be discussed later in Section 4.5.1.

"Industrial Investment Opportunities in Iraq" presents an investment concept to "rehabilitate a factory in Iraq in accordance with the latest technology and modern management and operation methods, all at the investor's account against their share of accomplished production, for a certain period." The rehabilitation plan of a factory will be released to the investor in form of an "Investment File", which contains a plan formulated by the Ministry of Industry and Minerals or the pertaining SOE. The investor in Iraq or abroad will carry out the plan proposed in the File within the prescribed period of time, during which they concurrently recover the investment cost and returns from the outputs from the factory.

It is noteworthy that the term "privatization" is not used so much as it used to be, in recent movements concerning the utilization of private investment in the mining and manufacturing sector. The Iraqi counterpart also made a memorable statement, during the field survey, "The term 'privatization' is no longer relevant to the Ministry of Industry and Minerals' policies today." As already mentioned, the government's policy to privatize SOEs caught much criticism from inside the country. The reconstruction of the Industry and Minerals sector today does not mean simply bringing in private capital into a SOE itself. It is more like a scheme in which a private firm (or a joint venture between Iraq and a private firm) wins an order for a rehabilitation project at a plant and recovers the fund invested and due profits from the products generated at the plant, and they call it "investment." This investment scheme seems to have been elaborated in order to renovate the decrepit plants while keeping the status of SOEs as it is.

As described above, Iraq's privatization policies on SOEs in the simple sense have changed the direction due to the criticism from the nationals and delays in developing necessary laws. In the meantime, expectations for the private sector at domestic and abroad are still evidently high, and private capital will continue to be aggressively introduced in the framework of the new "investment scheme". On the other hand, the hurdle for the private sector to aggressively participate in these rehabilitation projects is high because the projects are extremely risky and, among other things, security in the country is yet to be improved. This is why the rehabilitation projects are not in progress in line with the timelines initially plotted by the Ministry.

4.5 Investment Law of Iraq and Examples of Introducing Private Capital

4.5.1 Investment Law of Iraq (Original copy translated from Arabic to English is Attached to the Appendix)

In 2006, the Government of Iraq established and enacted the Investment Law (Law No. 13 of 2006) for the purposes of accelerating investment by foreign private companies and protecting interests of domestic investors. The following outlines the purposes of the law.

(Purposes of the Investment Law of Iraq)

- Promote investment in and transfer up-to-date technology to Iraq aiming at contribution to the country's reconstruction.
- Encourage investment from inside and outside the country by offering incentives and protection to private investors.
- Foster human resources and improve the employment climate in Iraq.
- Expand exports by Iraq so as to improve the nation's international balance of payments and foreign trade position.

Investors need to be licensed by the National Investment Commission (NIC), which was founded based on the Investment Law, in order to enjoy the investor's rights authorized by the law. The investment licensing is given to any project funded with an investment of 250,000 U.S. dollars or more in the areas other than the oil and gas, banking and insurance sectors. The law stipulates the rights of licensed investors, whether Iraqi or non-Iraqi, as follows:

(Rights of investors)

- Remit investment capital and profits after taxes and duties levied in Iraq in hard currency to the investor's home country.
- Acquire or dispose of stocks and bonds listed on the Bagdad Stock Exchange.
- Lease necessary land for the project for up to 50 years.
- Purchase insurance for the project from any insurance company in and out of Iraq.
- Open a bank account for local or foreign currency at a bank in or out of Iraq.
- Secure a certain level of protection with respect to expropriation or nationalization of the project in whole or in part.
- Employ non-Iraqi personnel in case where there is no Iraqi skilled or qualified adequately.
- Provide residential and immigration visas to the non-Iraqi personnel.
- Remit compensations for the non-Iraqi personnel after taxes and duties to an overseas bank account.
- Have immunity from corporate and other relevant taxes for ten years from the start of commercial operation.
- Have immunity from duties imposed on exported assets for three years from the start of the project.

In the meantime, investors will be legally bound to perform the following obligations.

(Obligations of investors)

- Notify the NIC or the local investment commission immediately after the installation of a fixed asset for the project or the start of business operation.
- Maintain the appropriate accounting documents audited by a certified accountant in Iraq.
- Submit to the NIC a report on the feasibility study concerning the economic and technical aspects of the project and information regarding budgeting and progress of the project.
- Record all imported products exempted from taxes based on the Investment Law and their term of depreciation.
- Abide by Iraqi legislations and international standard laws and regulations concerning environmental protection, safety, sanitation, and other systems in association with security and customs.
- Abide by the Iraqi Labor Law and assure the minimum working conditions, such as wages, leaves, and working hours.
- Comply with the project implementation schedule submitted to the NIC (A delay of more than six months may result in punitive measures, including forfeit of the investment license.)
- Provide adequate training to Iraqi workers as well as hiring Iraqis with priority.

4.5.2 Example of Introducing Private Capital in the Industry and Minerals Sector

As stated above, the Ministry of Industry and Minerals has been striving to execute rehabilitation projects based on private capital by giving priority to highly-potential SOEs or their factories and plants. Accordingly, the rehabilitation projects of some cement plants and chemical fertilizer plants have been awarded to private companies (or joint ventures between SOEs and private companies.)

On its Websites, the Ministry of Industry and Minerals presents its investment plan for year 2009 containing rehabilitation projects for 15 SOEs. It is unknown whether private companies in or out of Iraq have shown interests in some of these projects. However, many of these rehabilitation projects may fail to raise interests of domestic and foreign private companies in participation, in consideration of the delay in improving security in the country, the technical difficulties in implementing the rehabilitation projects at some factories and plants, and the long term for recovering investment cost and profit.

4.6 Assistance by International Aid Agencies (Donors)

The preceding sections have explained that, although the utilization of private capital inside and outside Iraq has been seriously examined for rehabilitating factories and plants of SOEs in the mining and manufacturing sector, these projects are not progressing at the pace initially expected due to various factors. Under such circumstances, there is a growing expectation for international aid agencies also in this sector, which was given lower priority in the past.

U.N. Security Council Resolution No. 1511 adopted in October 2003 articulates transfer of sovereignty to Iraq and roles to be played by the United Nations. It also calls for assistance of U.N. member states in reconstructing and developing the Iraqi economy. Following the resolution, the international community expressed an intention to provide the country with an assistance of at least 32 billion U.S. dollars in total, at the International Conference on the Reconstruction of Iraq, held in Madrid, Spain, in the same year. At the conference, the Government of Japan pledged an assistance of up to five billion U.S. dollars, comprising 1.5 billion dollars in grant aid and a maximum 3.5 billion dollars in soft loan, the second largest amount after the United States, which pledged to donate approximately 20 billion dollars.

In the wake of these movements, governments and international institutions have been providing assistance in the said international framework. Many of their efforts, however, have focused on humanitarian assistance in form of food assistance, refugees relief, and medical, educational, and other assistance; development of highly-urgent infrastructure, such as electricity, transport, communications and irrigation; and reconstruction of the oil and gas industry, which forms the backbone of the nation's economy. Very little has been provided to the mining and manufacturing sector, subject to this study.

According to what was told by the Iraqi counterpart during the field survey, the United States (or the government agency) has provided the following assistance to the mining and manufacturing sector in Iraq in recent years.

(2007)

- A total of approximately 50 million U.S. dollars was provided to the sector in grant aid.
- Of the above, about 5 million U.S. dollars was provided to Northern Fertilizer Company (State Company for Fertilizer Industry in Beiji).

(2008)

- A total of approximately 25-30 million U.S. dollars was provided to the sector in grant aid.

- Of the above, about 2 million U.S. dollars was provided to Southern Fertilizer Company (State Company for Southern Fertilizer Industry).

Moreover, again according to the information obtained from the Iraqi counterpart during the field survey, the United Nations Industrial Development (UNIDO) has provided the following grant-aid assistance.

- Rehabilitation of a dairy product factory (of State Company for Dairy Products) in Diwaniyah, Qadisiyah Province <4.1 million U.S. dollars>
- Provision of experiment apparatuses to food production companies <1.6 million U.S. dollars>
- Human resources development <3.6 million U.S. dollars>
- Rehabilitation of a dairy product factory in Mosul, Ninawa Province <to be determined>

According to the above information obtained during the survey, the actual assistance implemented in the sector, though there exists some, is by far less than that provided to the oil and gas sector. It is limited to funds for procuring bare minimum spare parts and maintaining facilities at factories and plants and those projects that are directly related to the livelihood of citizens, such as food factories.

In light of this situation, the Government of Japan and JICA have decided to provide approximately 18 billion yen in soft loan for the rehabilitation project at an existing fertilizer factory in Khor Al-Zubair, Basrah Province. If this project is completed, it is one of the largest assistance projects by an overseas donor in the Iraqi Industry and Minerals sector.

As described above, assistance by overseas donors in the Industry and Minerals sector has been limited today. While the developments of basic social infrastructure and the oil and gas sector have just been embarked at last, the reconstruction of the sector is an indispensable part of the nation's efforts to improve the employment environment, diversify its domestic industries, and revitalize regional economies. Thus, while paying close attention to coherence to the Government of Iraq's private capital utilization policies, demand for assistance by overseas donors in the sector seems to increase more than ever.

4.7 Mining and Manufacturing Sector in Mid-Western Iraq

4.7.1 Mining and Manufacturing Sector in Mid-Western Iraq

Mid-Western Iraq where Al-Anbar, Najaf, and Karbala Governorates are situated occupies an area of about one-third of the whole land. This area and its surrounding area are mostly

composed of steppe and desert soils. The Governorate has a desert climate with little precipitation and a huge gap between day and night temperatures. The mercury rises to 42 degrees centigrade in summer and drops to as low as 9 degrees centigrade in winter. The area is situated in a very harsh natural environment—strong northwest winds and occasional southwest winds blow with the wind velocity sometimes reaching 21 meters per second.

As for the mining resources, Al-Anbar Governorate has very little production of such resources as crude oil and natural gas that are abundantly yielded in the country. Recently, however, natural gas reserves are confirmed in the Akaz region located near Al-Qaim in the province. There is an idea of utilizing the gas for large-scale test production of ammonia and urea in Al-Qaim.

At present, major minerals yielded in the Mid-Western Iraq, mainly in Al-Anbar Governorate, are abundant phosphate rocks that mostly concentrate in Akashat and silica sand, limestone, argil and clay that are produced in the desert area. In Al-Anbar Governorate, these resources are utilized as raw materials as follows: the former for phosphate fertilizers and the latter for cement, glass and ceramic industries.

The phosphate fertilizer and glass production in the Governorate are highly valuable because they are the only production site in the country. However, the mining and manufacturing sector in the Mid-western region accounts for a very small portion of all industries in Iraq.

It is not an overstatement to say that the Iraqi economy depends almost exclusively on exportation of crude oil. It exports crude oil and oil refinery products and imports industrial products. This is demonstrated by the following figures: oil-related exports accounted for 91.9% of all exports in value and industrial products accounted for 93.1% of all imports in value in 2003.

The National Development Strategy (2007-2010) issued by the Government of Iraq in March 2007 describes that the mining and manufacturing sector in Iraq accounts for less than 10 percent of the nation's GDP. Nearly 100 percent of the business activities of the sector are conducted by SOEs. The sector contributes greatly to employment in the country; of approximately 200 SOEs with a total of approximately 500,000 employees across the country, 42 companies with approximately 130,000 employees are under the umbrella of the Ministry of Industry and Minerals, according to a ministerial announcement in April 2008.

Nevertheless, in the Mid-western part of the country, there is no noticeable industry (As mentioned earlier, phosphate fertilizer, cement, glass and ceramic are major industries there and

there are only a few SOEs operating in the sector.). There is no question as to the importance of future expansion and development of the mining and manufacturing sector in the region.

4.7.2 Glass Industry

The state-owned glass and ceramic company in An-Anbar Governorate totally dominates the glass industry in Iraq. An overview of the company and its equipment and products are described below.

Company name: State Company For Glass & Ceramic Industry (hereinafter referred to as SCGC.)

Location: Al-Anbar, Ramadi Beside Warar Bridge

No. of employees: 2,387 as of 2006 (including 2,162 in the production segment and 225 in the administration segment.)

History: Since founded as a sheet glass producer in 1970, SCGC has been expanding its business to include floor tiles, sanitary ware and other ceramics, glass bottles and tableware glass.

(1) Current operational status

1) Facility currently under operation: Equipment for floor tiles, sanitary ware

2) Facility slated to begin operation soon: Equipment for wall tiles, glass panes for windows, and glass bottles for medicine

3) Facility whose operation is discontinued due to ageing: Equipment for glass bottles, glass jars, tableware glass, and sodium silicate

(2) Plant overview

1) Floor tile plant :

① New plant that began operation in 2002. The floor area is 35,000 m^2.

② Built by an Italian construction company.

③ The current production capacity is 1,000,000 m^2 per year, which can be increased with a small modification.

④ Produces 30-centimer-square floor tiles in various shapes and colors.

⑤ 100 percent of argil used as raw materials is domestically procured.

2) Sanitary ware plant:

① New plant that began operation in 2002. The floor area is 35,000 m^2.

② Built by an Italian construction company.

③ The current production capacity is 5,000 tons per year, which can be increased with a small modification.

④ Produces toilet bowls and cesspits in various shapes and colors

⑤ 40 percent of argil used as raw materials is domestically procured.

3) Wall tile plant:

① Currently being reconstructed under the leadership of a Lebanese company. The start of operation is slated for 2007. The floor area is 35,000 m^2.

② The planned production capacity is 1,250,000 m^2.

③ 100 percent of argil used as raw materials is domestically procured.

4) Sheet glass plant:

① Currently being reconstructed under the leadership of three Iraqi companies. Machines and materials for the works are from Europe.
The floor area is 25,000 m^2.

② The planned daily production of transparent and figured sheet glass is 120 tons.

③ Approximately 22 billion Iraqi Dinar (approximately 15 million dollars) is needed for the construction.

5) Medical glass bottle plant:

① Currently under restoration work. Major equipment necessary for the works, including heat-resistant fusing furnace and other equipment, are from Italy or India.

② Because profitability is expected high, the resumption of operation is hoped for.

③ The production capacity is 40,000 m^2. Medical bottles are produced by modifying regular glass bottles (and special equipment for the modification is needed.)

④ Major customers are pharmaceutical companies.

6) Tableware glass plant:

① The production has been suspended since 2003 due to ageing of the equipment. The facility needs to be replaced and repaired to restart operation. The company hopes to restore the plant.

② There are four fusing furnaces, each of which has a daily production capacity of 35 to 45 tons. The floor area is 25,000 m^2.

③ Products produced here include flat-bottom water cups, tea cups, plates, saucers, big salad bowls and ash trays.

7) Glass bottle and jar plant:

① The production has been suspended since 2003 due to ageing of the equipment. The fusing furnaces of all lines need to be replaced and repaired to restart operation. The company hopes to restore the plant.

② There are four fusing furnaces, each of which has a daily production capacity of 55 to 85 tons. The floor area is 70,000 m^2.

③ The products produced here include various wide- and small-mouth glass bottles.

8) Sodium silicate plant:

① The production has been suspended since 2003 due to ageing of the equipment. The fusing furnaces of lines need to be replaced and repaired to restart operation. The company hopes to restore the plant.

② There is one fusing furnace, which has a daily production capacity of 30 tons. The floor area is 10,000 m^2.

③ Products produced here include solid and liquid sodium silicate.

(3) Advantages of SCCG

① Demand can be expected at home and overseas.

② Production cost is not high because approximately 80 percent of raw materials can be obtained from Anbar Desert.

③ There is good water transportation as it is located near the Euphrates.

④ Located near Jordan, Saudi Arabia and Syria, it is close to markets.

(4) SCGC's project plans

SCGC intends to implement the following major facility investment projects:

Table 4.7-1: Glass Sector Project

Project name	Estimated investment	Installation capacity	Ratio of domestically-procured raw materials	Estimated no. of employees
	million dollars	tons/day	%	
Sheet glass	150	450	80	600
Lead crystal glass	15	6	65	100

(Source: SCGC document)

Table 4.7-2: Ceramic Sector Project

Project name	Estimated investment	Installation capacity	Ratio of domestically-procured raw materials	Estimated no. of employees
	million dollars	tons/day	%	
Ceramic tableware	7	15	60	150
Red bricks	10	30	100	100
Ceramic insulator	10	2	60	80
Glaze for ceramics	7	18	60	100
Kaoline	7	40	100	100

(Source: SCGC document)

4.7.3 Cement Industry

There are three cement companies in Iraq. There are also two other companies that deal with such construction materials as refractory bricks and gravels that have similar properties to cement. An overview of the three cement companies are introduced hereunder, especially that of Iraqi State Company for Cement in An-Anbar Province in detail.

4.7.3.1 Overview of Three Cement Companies in Iraq

(1) Iraqi State Company for Cement

1) History, etc.:

① It was established in 1936 in Baghdad and production began with one kiln in 1949. As of 1995, there were four plants.

② Employment: 2,867 (2,300 in the production segment and 567 in the administration segment)

③ Products: regular cement, acid-proof cement, white cement

2) Plant overview

Table 4.7-3: Facility of Iraqi State Company for Cement

Plant name	Product	Design capacity (ton/year)	Actual capacity (ton/year)	Others
Kubaisa	Regular cement	2,000,000	1,500,000	Located in eastern end of Al-Anbar
Kirkuk	Regular cement	2,000,000	1,500,000	
Al-Qaim	Acid-proof cement	500,000	500,000	Located in western end of Al-Anbar
Falluja	White cement	290,000	218,000	
Kubaisa paer sacks		30 million sacks	not available	
Kirkuk paer sacks		30 million sacks	not available	
Bagdad paer sacks		15 million sacks	not available	

(Source: 2006 document of Iraqi Ministry of Industry and Minerals)

The Kubaisa plant (west of provincial capital of Ramadi and Heet) was built in 1981 by Kawasaki Heavy Industries. It has the annual production capacity of two million tons, maintaining the biggest production in Iraq. Although it is still in operation, there are management, technical and maintenance problems. Currently, about 0.3 million tons are produced annually.

The Al-Qaim plant was built in 1981 with Rumanian know-how and machinery. The plant has various technical problems and the Ministry of Industry and Minerals is leasing the facility to a private investor. Currently, 2.200 tons are produced daily.

3) Current problems

The operation rate in 2002 was low at 48%, because of management, technical and maintenance problems, aging of facility and a lack of major parts. There is awareness of the need for overall rehabilitation. An estimated total amount of over one million dollars is needed to recover to the original design capacity.

(2) Iraqi State Company for Northern Cement

1) History, etc.:

① It was established as Al Rafideen Cement Company in 1953 in Badoosh in northern Iraq. It merged with Hammam Alalil Cement Company in 1964 to form Mosul Cement Company, of which the current SOE become. Although it expanded to operate 10 plants by 1984, only seven are under operation today.

② Products: regular cement, acid-proof cement, etc.

2) Plant overview

Table 4.7-4: Facility of State Company for Northern Cement

Plant name	Product	Design capacity (ton/year)	Actual capacity (ton/year)	Others
Badoosh (phase 1)	Regular cement	192,000	not available	
Badoosh (phase 2)	Regular cement	690,000	not available	
Badoosh (phase 3)	Regular cement	960,000	not available	
Sinjar	Regular cement	1,152,000	not available	
Hammam Al-Alil (phase 1)	Regular cement	218,000	not available	
Hammam Al-Alil (phase 2)	Regular cement	367,000	not available	
total		3,579,000		

(Source: 2006 document of Iraqi Ministry of Industry and Minerals)

(3) Iraq State Company for Southern Cement

1) History, etc.:

① It was established in 1995 in Al-Ashraaf in Najaf Province in southern Iraq. It has eight plants. The major market is southern Iraq.

② Employment: 5,793 (4,528 in the production segment and 1,265 in the administration segment)

③ Products: regular cement, acid-proof cement, etc.

2) Plant overview

Table 4.7-5: Facility of State Company for Southern Cement

Plant name	Product	Design capacity (ton/year)	Actual capacity (ton/year)	Others
Kufa (New)	Regular cement	1,800,000	not available	
Karbala	Regular cement	2,000,000	not available	
Muthana	Regular cement	2,000,000	not available	
South Cement	Regular cement	450,000	not available	
Om Qaser	Regular cement	400,000	not available	
Najaf	Regular cement	208,000	not available	
Al Sada	Regular cement	200,000	not available	
Al Semawa	Regular cement	450,000	not available	
Al Noora	Regular cement	200,000	not available	
Total		7,708,000		

(Source: 2006 document of Iraqi Ministry of Industry and Minerals)

Details of current operation of the company are not known. According to the corporation's information, overall rehabilitation and staff training are needed to recover to the original design capacity of the plants. This implies that the plants are not performing

as well as would be expected.

In the meantime, the need for new capital investment is also mentioned. This indicates active demand in southern Iraq.

4.7.3.2 Overview of Refractory Bricks in Iraq

(1) Iraq State Company for Refractoriness Industry

1) History, etc.:

① It was established in 1994 in Falluja near Baghdad to produce refractory bricks and other refractory products.

② Employment: 696 (596 in the production segment and 100 in the administration segment)

③ Products: refractory bricks and other refractory products

2) Plant overview

Table 4.7-6: Facility of State Company for Refractoriness Industry

Plant name	Product	Design capacity (ton/year)	Actual capacity (ton/year)	Others
Falluja	Refractory brick	1,500	not available	
Karbala	Other refractory products	6,000	not available	

(Source: 2006 document of Iraqi Ministry of Industry and Minerals)

3) Current problems

There is a plan to enhance and restore some fusing furnaces, boilers and heat exchangers. There is also a plan of producing quality refractory bricks in different shapes with excellent heat resistance, insulation and acid resistance capacities. The possibility of producing red refractory roof tiles and exporting some types of refractory materials are also examined.

4.7.4 Chemical Fertilizer Industry

As described in Section 4.7.1 above, the only phosphate fertilizer production base in Iraq is located the Mid-Western Iraq including three Governorates : namely State Company for Phosphate (SCP) located in Al-Qaim, Al-Anbar Governorate. Phosphate rocks are excavated in Akashat, approximately 170 km west-southwest of Al-Qaim, and transported to Al-Qaim where they are processed into phosphate fertilizers.

SCP contributes greatly to the economy and society of the region as the only fertilizer

production site in the three provinces, and at the same time, it is extremely valuable since it is the only phosphate fertilizer supplier in the country. Nevertheless, the company is currently in great trouble due to the calamity of war inflicted over the years. One of the purposes of the field survey is to investigate the possibility of restoring SCP.

Traditionally, the region has not produced crude oil or natural gas; therefore, production bases of nitrogen chemical fertilizers, such as urea and ammonium sulfate, are concentrated in the Southern and Northern regions where the resources are produced in large quantities. Recently, however, natural gas reserves have been found in Akaz, near the city of Al-Qaim, and there are some propositions about large-scale production of ammonia and urea in Al-Qaim based on the newly-found natural gas. Please refer to the location of Akaz in the MAP of the Iraq.

For reference, the trend in the chemical fertilizer industry in Iraq and an overview of SCP and its operational status are provided later in Chapters 5 and 6, respectively.

4.7.5 Projects concerning the Industry and Minerals Sector in Anbar Province

During the period of the meeting in Amman, the Iraqi counterpart brought up the following three as projects concerning the Industry and Minerals sector in Anbar Province.

(1) Rehabilitation of the phosphate fertilizer factory in Al-Qaim
(2) Rehabilitation of the glass factory in Ramadi
(3) Construction of a new ammonia and urea plant

The Government of Iraq has already submitted official requests for yen loan to the Government of Japan (JICA) with regard to Projects (1) and (2). Project (3) for constructing a new ammonia and urea plant is pursued concurrently with Project (1).

Among the above three projects, the reason why the rehabilitation of the phosphate fertilizer factory in Al-Qaim is prioritized was confirmed by the Iraqi counterpart as follows;

- The improvement of food situation is politically urgent issue from viewpoints of both central government and provincial governments of Iraq.
- State Company for Phosphate has good market for additional production level after rehabilitations.
- Provided the rehabilitation project of Al-Qaim is materialized, it could potentially solve the problem of unemployment.

In addition to the above, the reason why the Iraqi government is looking for Japanese ODA Loan to be provided especially for the rehabilitation of the phosphate fertilizer factory in Al-Qaim was clarified as follows;

- Expected rehabilitation cost of Al-Qaim complex is relatively higher than other two industries (cement industry and glass & ceramic industry).
- To execute the rehabilitation of Al-Qaim complex is difficult in the manner of investment by domestic and foreign private enterprises.
- The Iraqi government expect the Japanese companies to take up the modernization of the existing facilities.

During the workshop meeting between the Iraqi counterpart and the Study Team, the methodologies of modernization of Al-Qaim complex were discussed. As for the location for the modernization project, the Iraqi counterpart affirmed that there is no possibility to newly construct phosphate fertilizers complex outside the existing Al-Qaim complex area, taking into consideration of the availability of basic infrastructure and residential environment for workers of the complex. The Study Team indicated that in such case, Al-Qaim complex may be forced to completely stop its production during the rehabilitation, while idea of the Iraqi counterpart for this concern is that demand peak of P-Fertilizer might be limited to be in winter season and they can build inventories or alternatively import as an emergency solution.

When Study Team compare the rehabilitation of Al-Qaim complex and new construction of the similar complex at other location, the following factors have to be considered as the prevailing conditions of rehabilitation.

1. Economical condition:
   Judging that restoring is more economical than new building.

2. Existing utility supply facility availability (water / electricity etc.):
   So far meets the demand of plants and new power generation units are under placing order.

3. Existing wastes handling facility availability (gypsum / waster water etc.):
   From Anti-pollution point of view, the currently applicable countermeasures are still effective.

4. Existing infrastructure (road / railway etc.):
   Not serious and those are still workable.

5. Work force availability (for operation and maintenance):
   Al-Qaim complex keeps enough manpower to execute the rehabilitation project. If the other location is selected, it would be more difficult to obtain work force and it will cost more.

6. Feedstock delivery conditions (other than phosphate rock):
   So far there is no significant difference due to the availability of rail and road.

7. Other conditions and restriction, if any:
   Difficulties of relocation of housing complex and not better life conditions.

Chapter 5

Market Trend of Chemical Fertilizer Industry

Chapter 5 Market Trend of Chemical Fertilizer Industry

5.1 Global Market Trend of Chemical Fertilizer Industry

Fertilizers can be divided broadly into chemical and organic fertilizers. A chemical fertilizer is chemically produced and its production history dates back to the mid-19th to early 20th centuries. It is to supplement nitrogen, phosphoric acid and potassium that are most essential nutrients for plants. The establishment of synthetic/production techniques increased the agricultural production drastically and greatly contributed to world's stable food supply policies in the times when food supply was unstable due to the population increase after Industrial Revolution to lay the foundation of economic development in various countries. Food security to maintain lives of humans is essential as a basis of growth and further development of a variety of industries for the restoration of a country and continuing stability and prosperity. It is not hard to imagine how chemical fertilizer industry that assists the food security is needed for the restoration of Iraq.

In discussing the development scenarios of the mining and manufacturing sector (chemical fertilizer sector, in particular) in Mid-Western Iraq that is the target site of the survey, global trend of chemical fertilizer industry is observed first. Understanding of product features, supply-demand balance and distribution mechanisms of the products and awareness of recent industry trend will help study the future course of chemical fertilizer industry in Iraq.

5.1.1 Nitrogen Fertilizer

(1) Supply-Demand Balance

Because the major raw material of typical nitrogen fertilizers is ammonia in urea, ammonium sulphate and ammonium nitrate, focus is placed on the supply-demand balance of ammonia.

Ammonia is a gas chemical produced by the reaction between nitrogen and hydrogen with high pressure. About 80 percent is used as raw materials for agricultural use (nitrogen fertilizer) and the rest for industrial use.

Because a gas transportation method with low temperatures and high atmospheric pressure is required, transportation of ammonia itself for a long distance is not common. It is usually produced and consumed in the same area (inductive product mainly composed of urea is produced and consumed at the same place) and distribution of inductive products mainly composed of ammonia is most common. Distribution of ammonia itself at the global level accounts for only around 10 percent of production.

World demand of ammonia reached 150 million tons in 2008. It is expected to grow at the rate of 2 to 4 percent per annum for the next 10 years to reach 180 million tons in 2017 due to a world population increase. When the production capacity, real production and demand by region is looked at, China produces about 40 percent of global production, being the biggest consumer of ammonia, followed by Europe and former Soviet Union. As for the distribution of ammonia alone that accounts for approximately 10 percent of all production, former Soviet Union, Republic of Trinidad and Tobago and the Middle East are major exporters (they have developed and grown for their supply capacity and price competitiveness of natural gas that is used as the main raw material of ammonia), while major importers are the United States and India where the demand for fertilizers have grown due to a population increase and the Far East where there is demand of ammonia for industrial use.

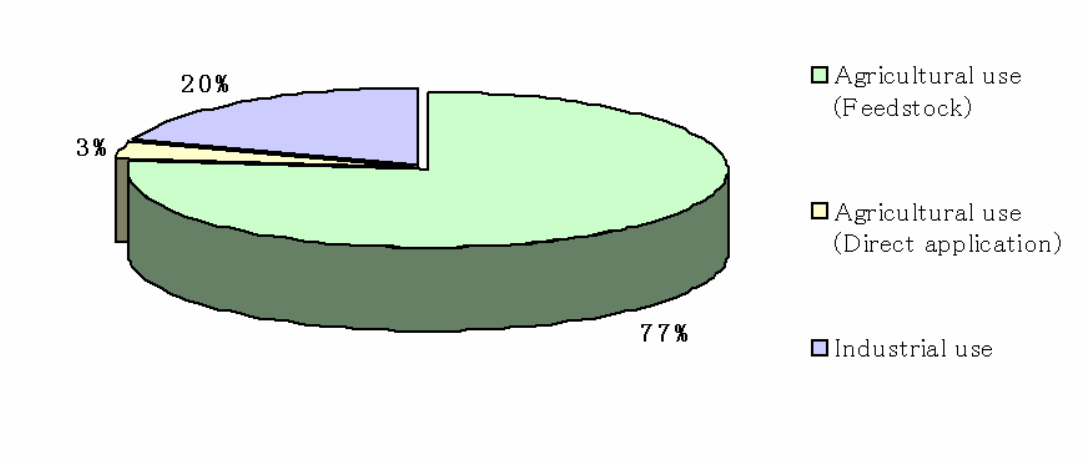


Figure 5.1-1: Ammonia Demand by Use

(Source: Compiled by Study Team based on International Fertilizer Industry Association)

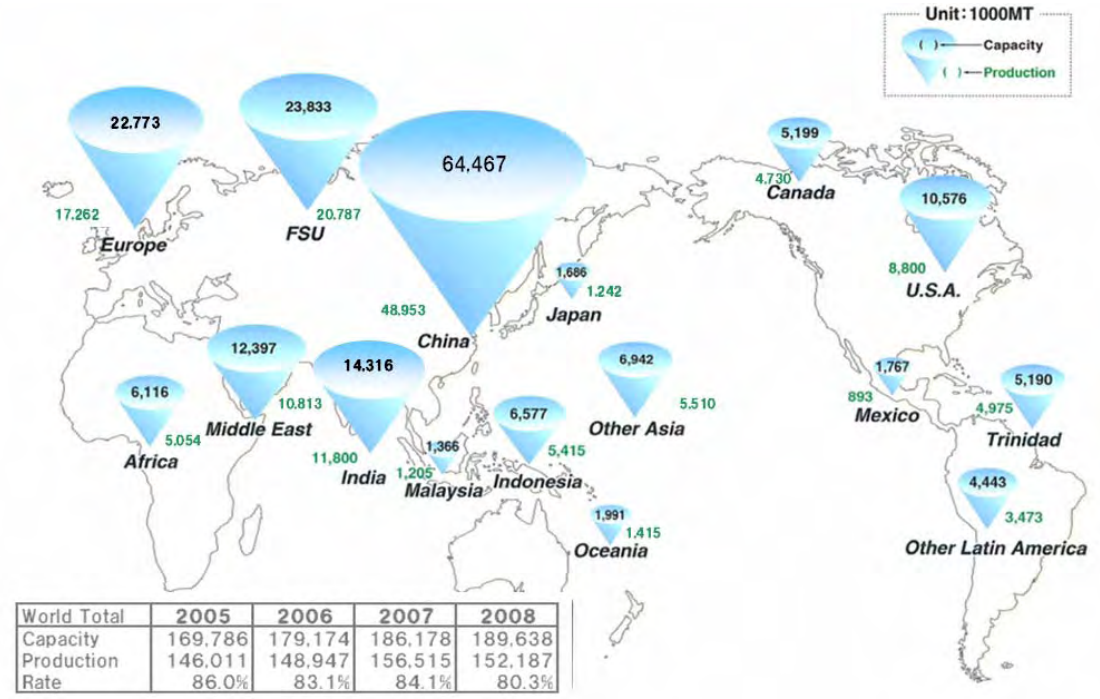


Figure 5.1-2: Distribution Map of Ammonia Production Capacity and Volume (2008)

(Source: Compiled by Study Team based on FERTECON Ammonia OUTLOOK)

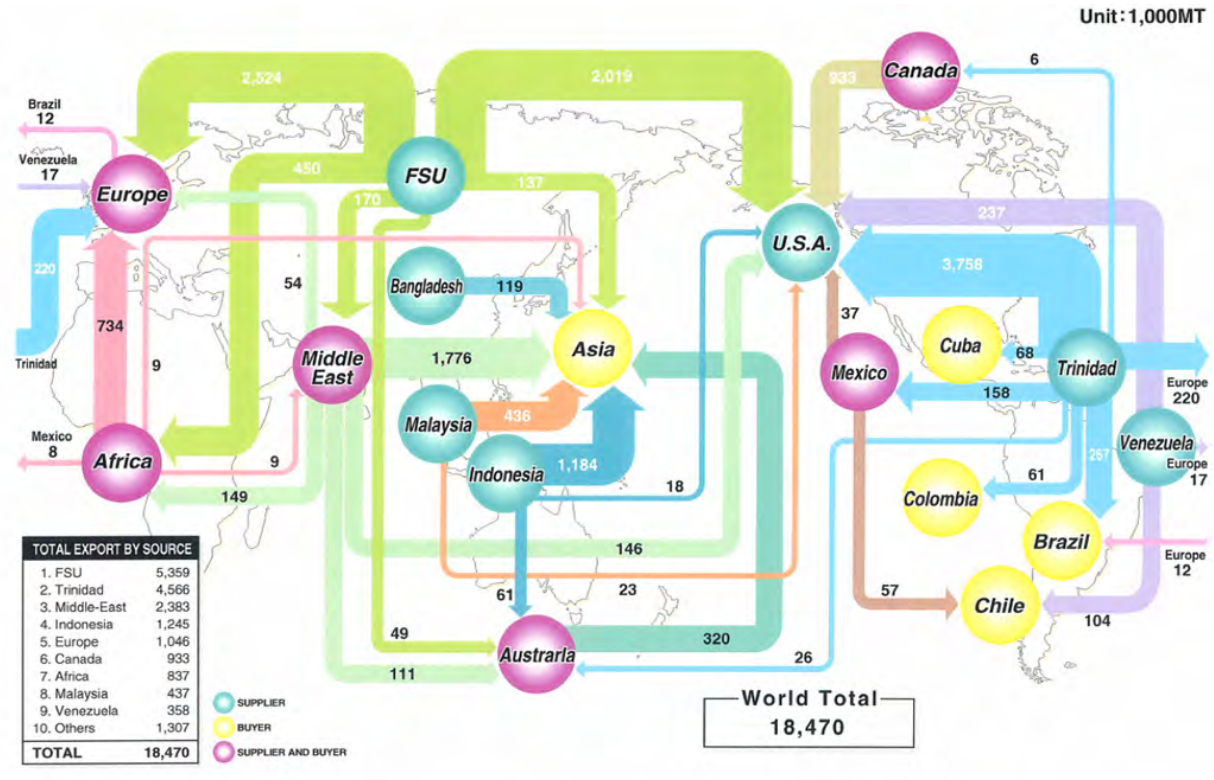


Figure 5.1-3: Overview of Major Importers and Exporters of Ammonia (2008)

(Source: Compiled by Study Team based on FERTECON Ammonia OUTLOOK)

As for urea, approximately 140 million tons is consumed annually for agricultural fertilizers. China, India and North America account for about 60 percent of the consumption. Approximately 25 percent of the production is distributed via the market and this is also expected to increase at the rate of 1.6 percent per annum to reach 45 million tons in 2020 because of the demand in India and North America and other countries where agriculture is one of their key industries for their food security policy as well as in European countries that are requested to take a drastic measure to reduce Nox emissions from gas power plants and diesel engine automobiles.

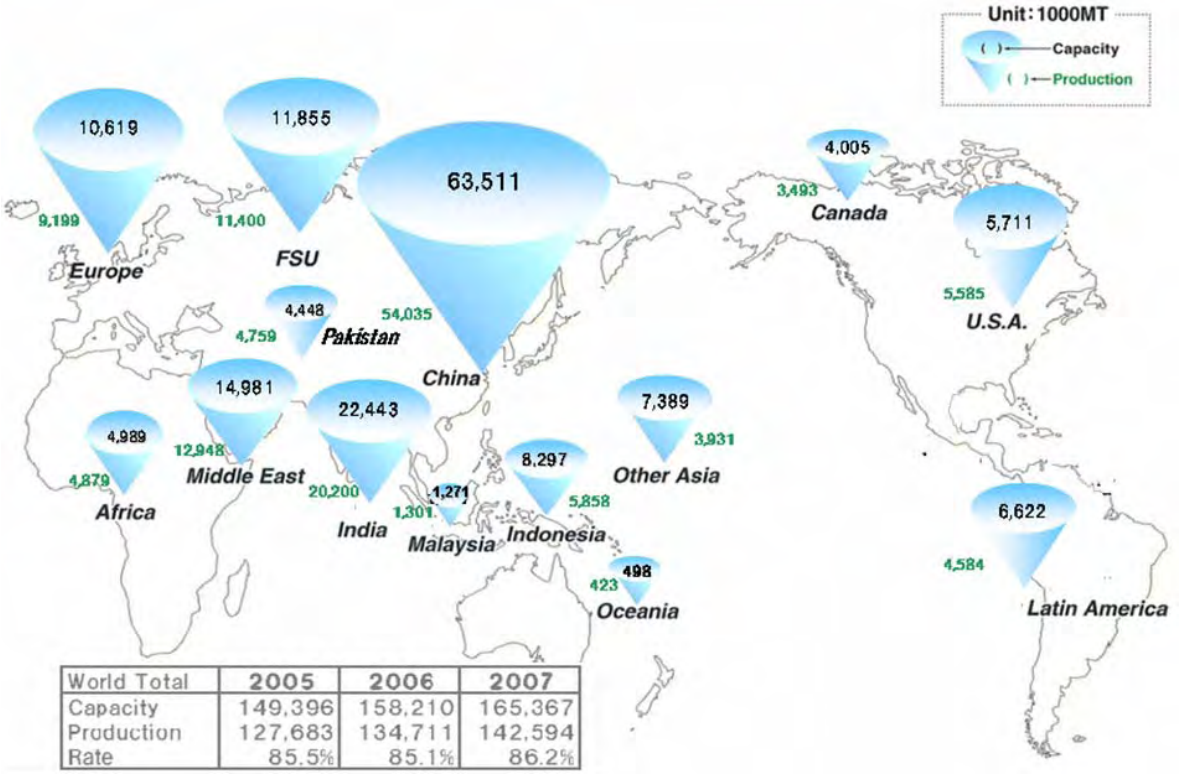


Figure 5.1-4: Map of Urea Production and Consumption Volumes (2007)

(Source: Compiled by Study Team based on FERTECON Urea OUTLOOK)

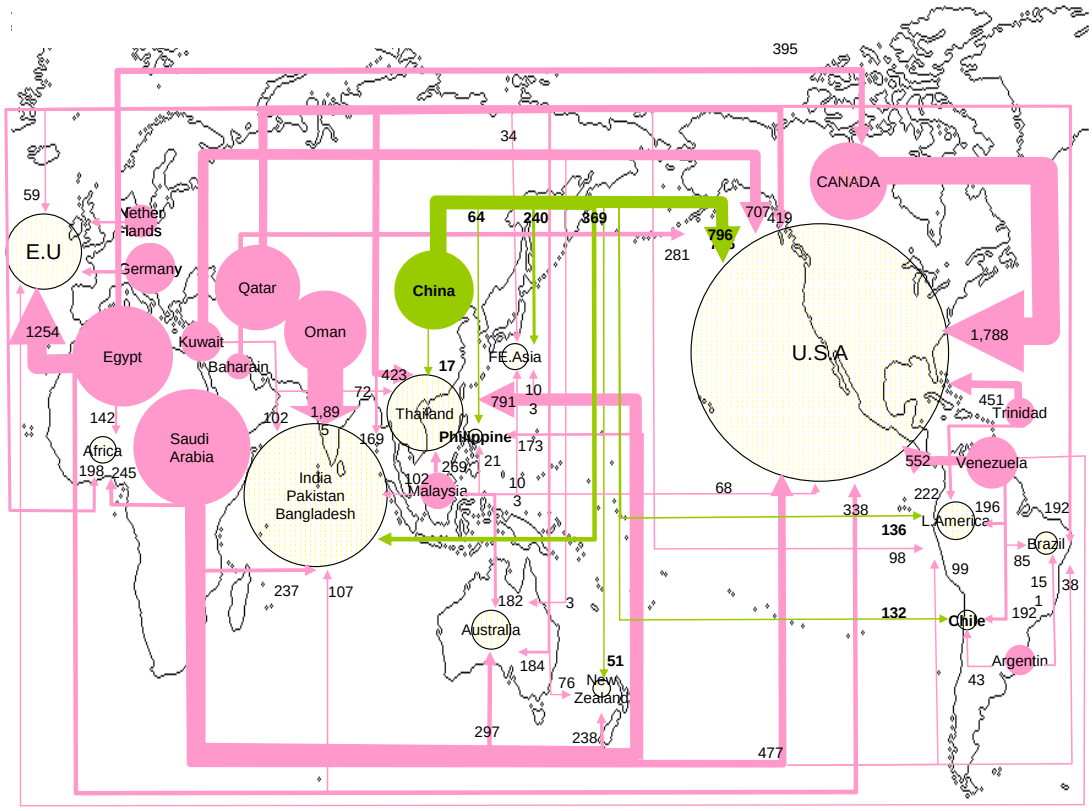


Figure 5.1-5: Overview of Major Urea Importers and Exporters (2007)

(Source: Compiled by Study Team based on FERTECON Urea OUTLOOK)

(2) Price Trend

As described above, the major ingredient of ammonia is nitrogen in natural gas. Because the cost of the raw material accounts for a large portion of total production cost, the ammonia price is heavily influenced by Henry Hub (US) and other global natural gas market trend in the long run. In addition, supply-demand balance of ammonia, market trend of such inductive products as urea, and seasonal factors affect the price in the short run.

The ammonia price used to be around 200 U.S. dollars, before it rose from 2002 to the first half of 2008 to hit the record high reaching 900 U.S. dollars. However, the price fell sharply after the global financial crisis in October 2008 to below 200 U.S. dollars equivalent to the 1974 oil shock level temporarily. It seems to have hit the bottom and the price is assumed to be on a recovery trend as the industrial demand is recovering and there is an indication of stability of natural gas prices. In a cycle of price drop in spring and summer when demand declines and price rise in autumn and winter when demand increases, the average price is estimated to fluctuate between 300 to 400 U.S. dollars per ton.

Meanwhile, urea that is a final product and relatively easy to handle is treated for which subsidies can be provided as part of their agricultural policy by the government of many countries that consume the chemical. The price fluctuates in accordance with the fluctuation of ammonia price as well as its supply-demand balance. It is estimated to be around 300 to 400 U.S. dollars on average.

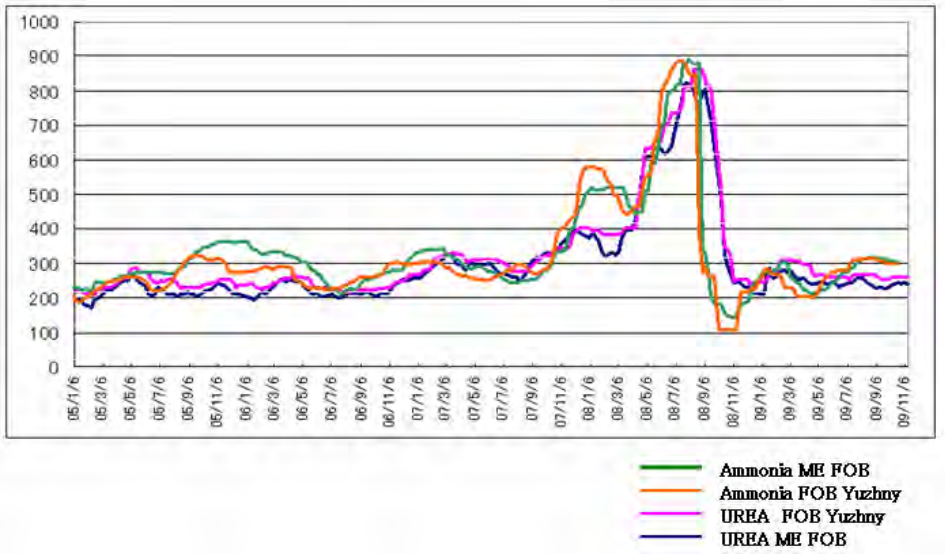


Figure 5.1-6: Trend of Natural Gas, Ammonia and Urea Prices (USD/ton)

(Source: Compiled by Study Team based on FERTECON Ammonia/Urea)

(3) Future Market Forecast

Due to the global financial crisis in October 2008, import demand for industrial use in the United States and Far East dropped sharply and the global import demand for ammonia declined by 4 to 6 percent in 2009 from the year earlier. The price drop of grains influenced urea and other fertilizer prices. Demand for ammonia decreased in areas that judged that the cost of ammonia that is a raw material of fertilizers cannot be covered by the fallen sales prices of fertilizers. This affected not only Europe with less production cost competitiveness but the production system of other major importers including Republic of Trinidad and Tobago.

However, in the future, demand for agricultural fertilizers is forecast to increase due to a global population increase especially in India and demand for industrial use is also expected to recover in the Far East — 160 million tons of demand in 2010 is expected to exceed 190 million tons in 2020. Import is believed to be recovering gradually in line with the demand increase. New plants under construction (or under planning) mainly in the Middle East and North Africa where raw materials can be obtained inexpensively are estimated to become major exporters. Ammonia demand is estimated to increase steadily due to a global population increase,

improvement of quality of life as a result of economic growth and food security policy related to the economic growth in the long run, although the import demand growth may slow down temporarily for reasons described below. The production capacity is expected to increase by approximately 40 million tons by 2020.

Potential factors that hinder demand growth are, as stated below, self consumption of ammonia and decline of demand of downstream products. Export-oriented plants will need to enhance its price competitiveness by leveraging raw material cost and access to consumption sites.

① Construction of ammonia-urea integrated plants and MAP and DAP in ammonia producing countries become the mainstream and self consumption of ammonia further increases.

② Production of ammonium nitrate that is the major product of importation of ammonia for industrial use tends to decrease due to its safeness. However, use of ammonium nitrate accounts for a very small portion of the total and the impact is estimated to minor.

5.1.2 Phosphate Fertilizer

(1) Supply-Demand Balance

Phosphate fertilizers refer to fertilizers mainly consisting of phosphate rocks. In this report, however, focus is placed on phosphate rocks, DAP, MAP and TSP.

A total of 90 percent of phosphate rocks are in the form of sedimentary rocks formed in the process of phosphorus in seawater settled and deposited biochemically on seabed by the act of microorganisms. The rest is largely divided into igneous phosphate rocks formed by refined phosphorus-containing magmas that erupted and guano phosphate rocks. The quality significantly differs by production site and generating process. The phosphate rocks that can be used by consumers are not like other such commodities as fertilizers partly because of the differences in the production method at the plant.

The proven reserve of phosphate rocks is estimated to be 50 billion tons and more than 30 countries extract the resources. The top 15 nations account for nearly 95 percent of the output. The top three nations, the United States, China and Morocco, account for about two-thirds of the total output. This shows that the ores are very unevenly located limited mineral resources. Of major producers of North America, China, Africa, the Middle East and Russia, such countries as Morocco (45 percent of all exports) and Jordan in North Africa and the Middle East have the capacity to export. The top five exporters (Morocco, Jordan, Syria, Russia and

Algeria) account for about 80 percent of all export. As of 2008, economic reserve in the world was 18 billion tons and the annual production volume was approximately 175 million tons.

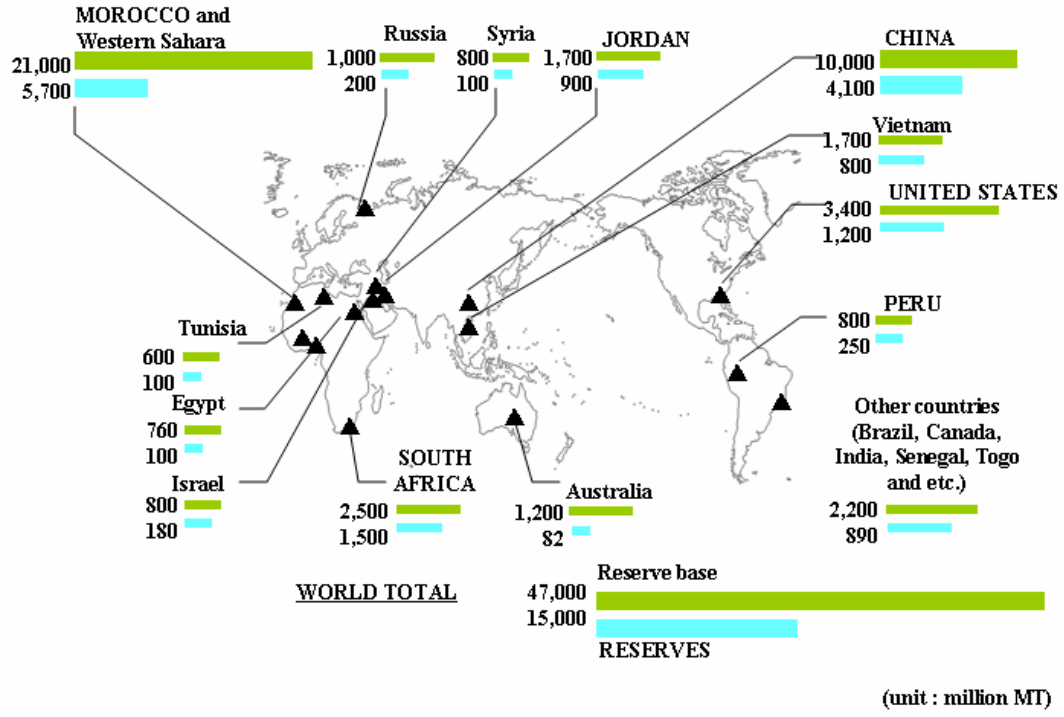


Figure 5.1-7: Map of Phosphorus Ore Reserve (2008)

(Source: Compiled by Study Team based on U.S geological Survey)

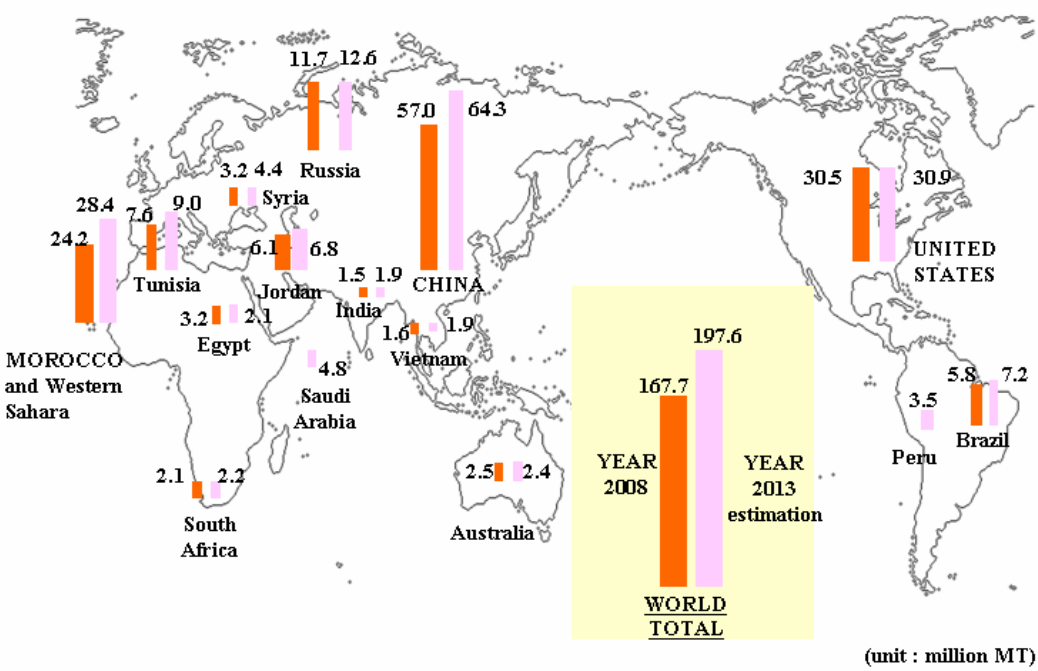


Figure 5.1-8: Map of Phosphorus Ore Annual Extraction (2008 actual /2013 forecast)

(Source: Compiled by Study Team based on FERTECON Phosphate Rock OUTLOOK)

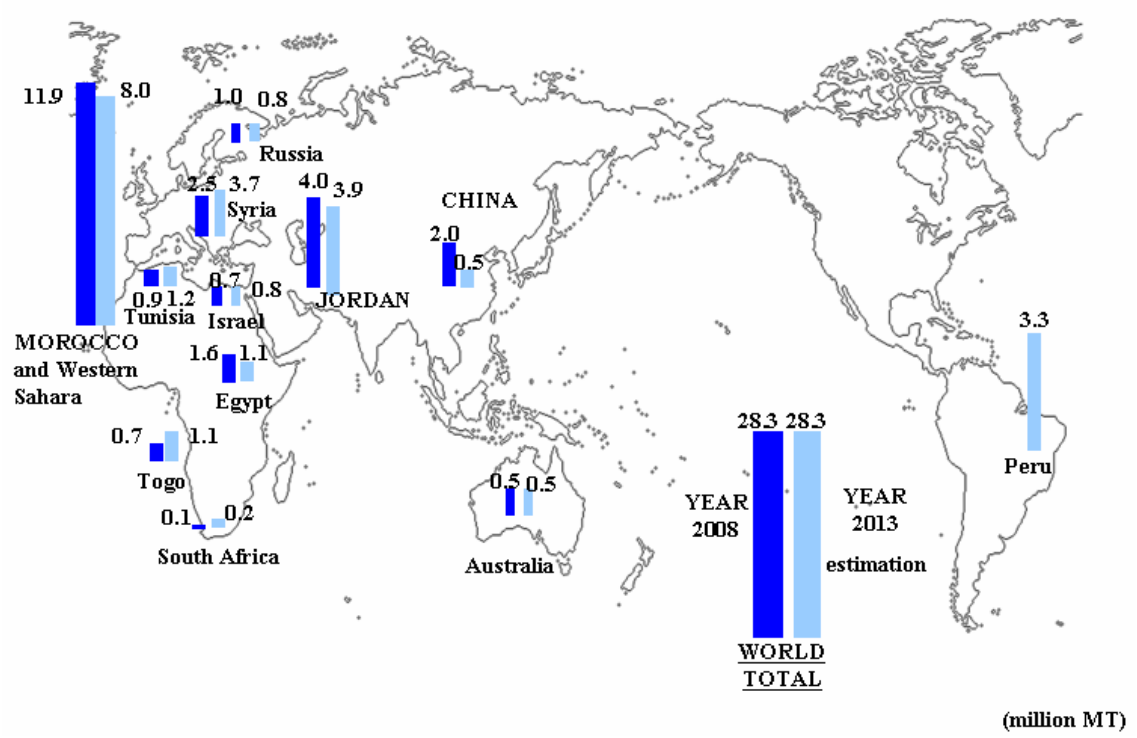


Figure 5.1-9: Overview of Phosphorus Ore Exporters (2008 actual /2013 forecast)

(Source: Compiled by Study Team based on FERTECON Phosphate Rock OUTLOOK)

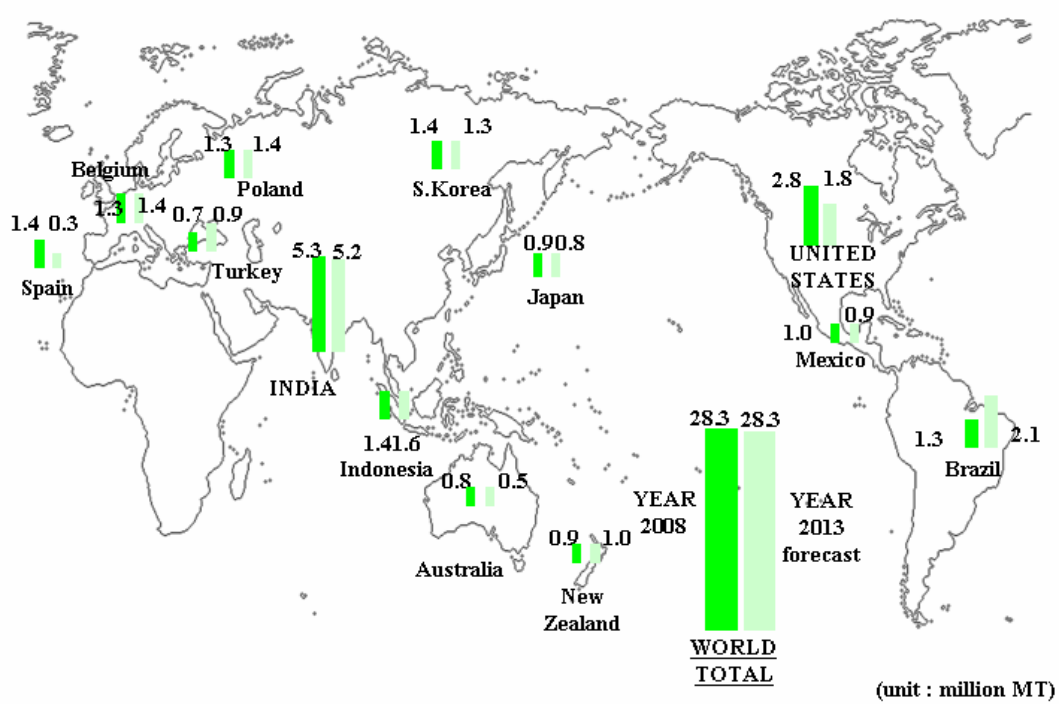


Figure 5.1-10: Overview of Phosphorus Ore Importers (2008 actual /2013 forecast)

(Source: Compiled by Study Team based on FERTECON Phosphate Rock OUTLOOK)

Of major phosphate fertilizers (DAP/MAP/TSP), DAP is the biggest in production and trade volumes. DAP production in 2008 was 26.2 million tons and their main producers were the United States, China, India, Russia and North Africa. About 40 percent of the production is traded. Of DAP producers, the United States, Morocco and Jordan that are producers of phosphate rocks have the capacity to export. The United States is very strong, accounting for about 50 percent of both the production and export volumes. China, which is the world's second biggest consumer of phosphate fertilizers, has enhanced its production recently to export 1 million to 2 million tons per annum.

Trade of MAP and TSP is limited. MAP production in 2008 was approximately 16.75 million tons, of which about 4 million tons were exported from such producers as the United States, Russia and China to such consumers as Brazil and Canada. About 5.85 million tons of TSP was produced in 2008 and 3.5 million tons were exported from such countries as China, Tunisia and Israel to such consumers as Brazil and Bangladesh.

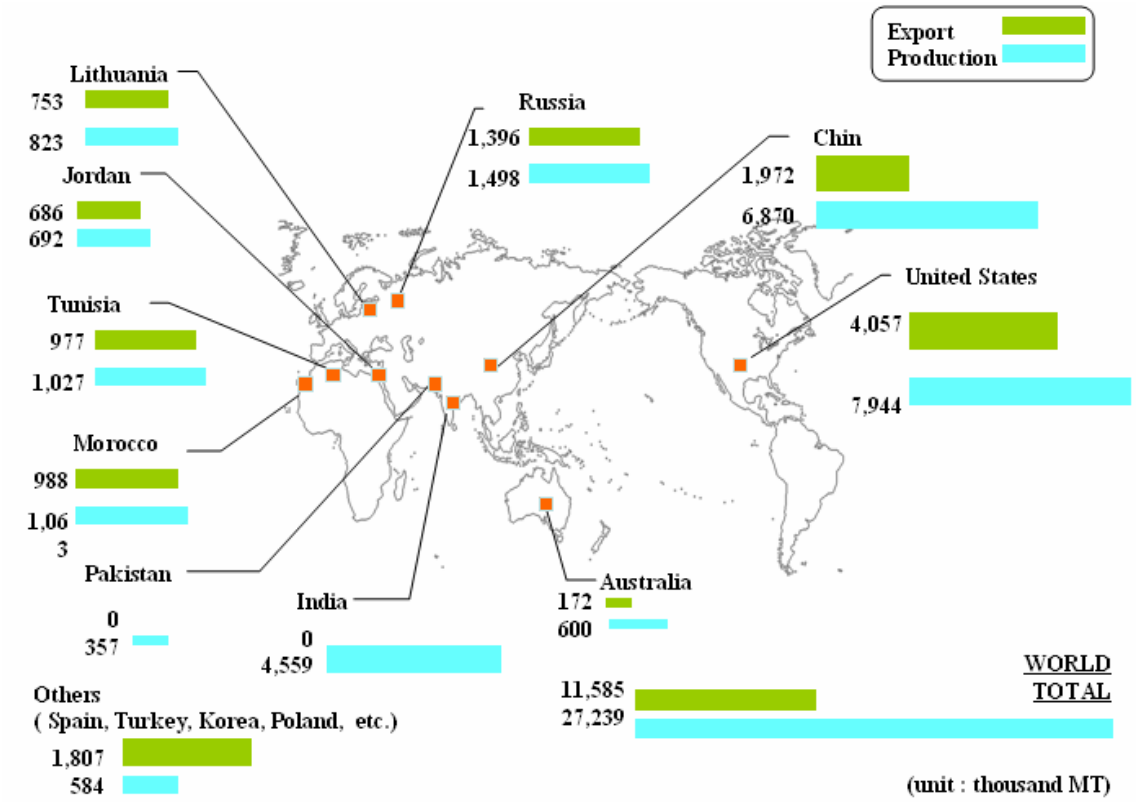


Figure 5.1-11: Map of DAP Production and Export Volumes (2007)

(Source: Compiled by Study Team based on Processed Phosphates Statistics)

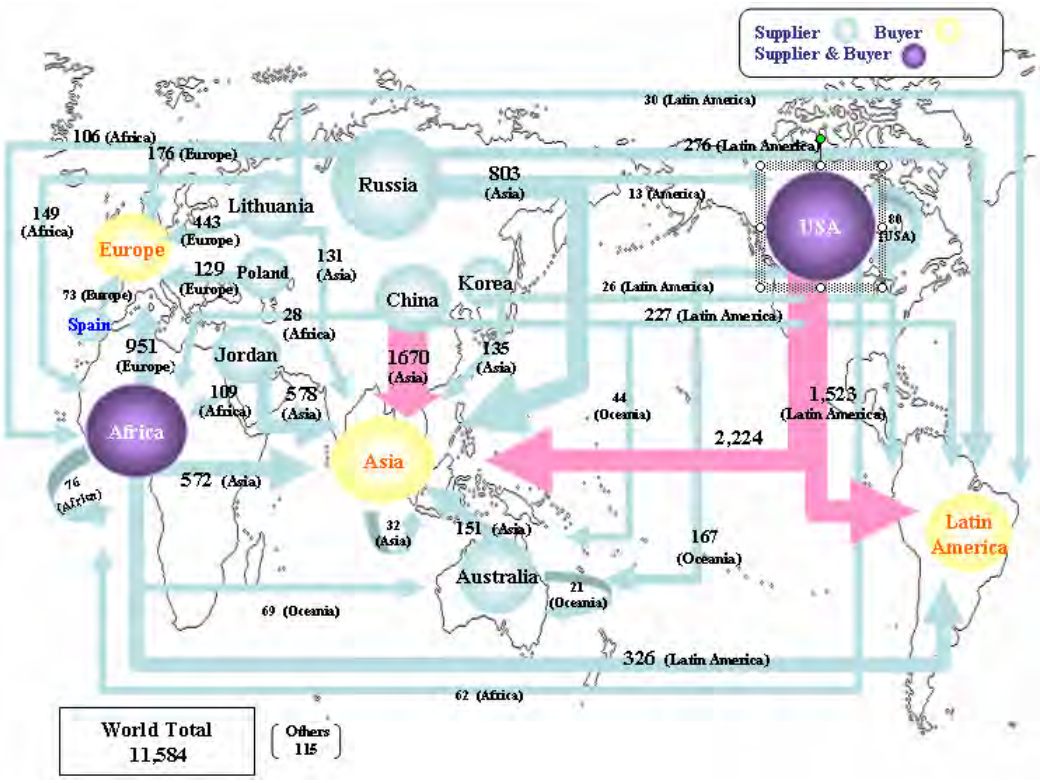


Figure 5.1-12: Map of DAP Distribution (2007)

(Source: Compiled by Study Team based on Processed Phosphates Statistics)

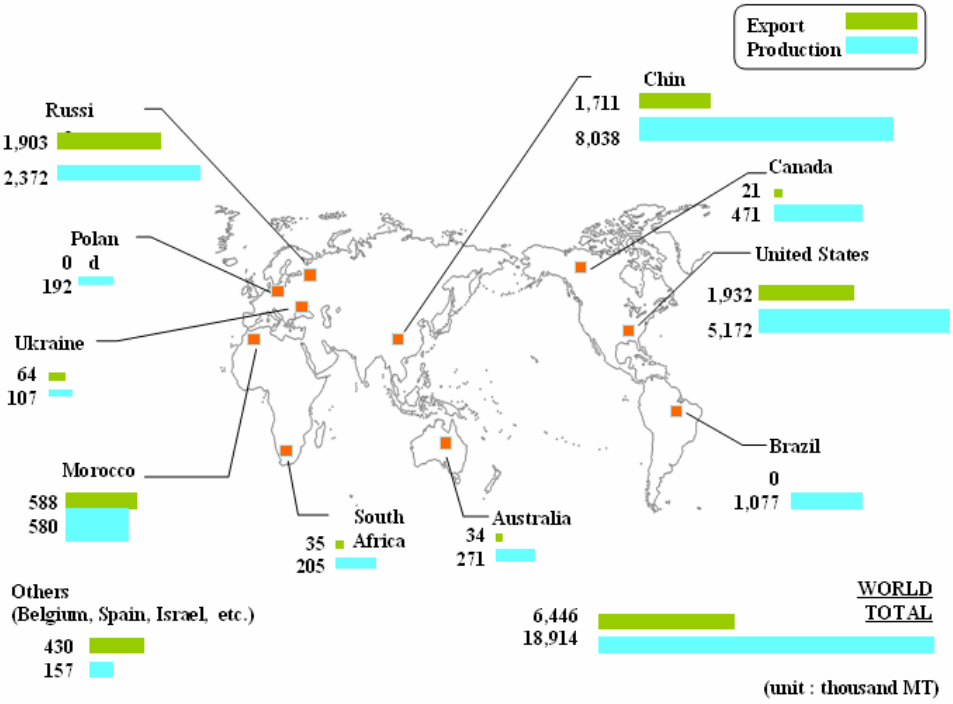


Figure 5.1-13: Map of MAP Production and Export Volumes (2007)

(Source: Compiled by Study Team based on Processed Phosphates Statistics)

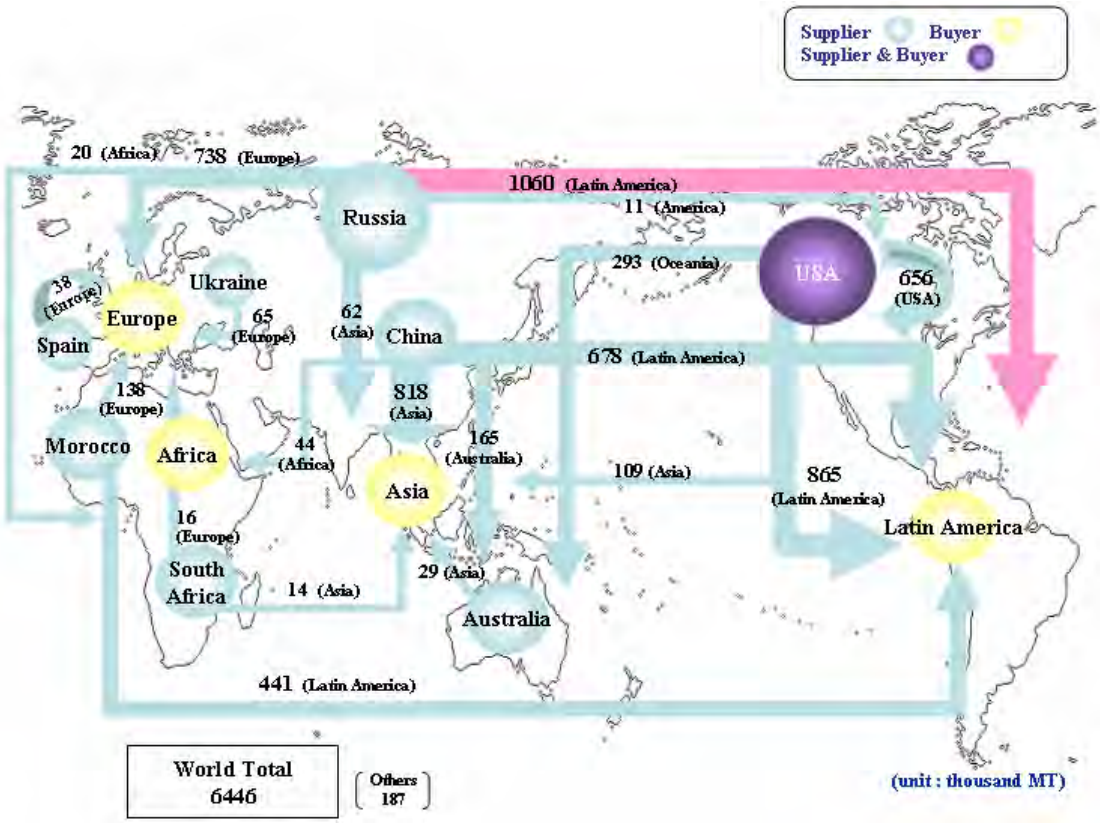


Figure 5.1-14: MAP of MAP Distribution (2007)

(Source: Compiled by Study Team based on Processed Phosphates Statistics)

(2) Price Trend

Prices of phosphate rocks had been stable for a long period of time since the late 1970s to 2005 between 30 to 60 U.S. dollars per ton according to the FOB Casablanca price index. However, the prices have risen sharply in line with other resource prices since 2005 due to the pressed food supply-demand balance, an increase in demand for grains for bio ethanol, a global population increase, and a speculation of fertilizer demand increase. The price index of FOB Casablanca hit the peak of over 400 U.S. dollars per ton in summer 2008.

Later due to a sharp price fall after the global financial crisis, the price index of FOB Casablanca is around 100 U.S. dollars per ton in March 2010.

The phosphate fertilizer categorized as commodities does not have a potassium-like oligopoly market structure formed by producers. The prices fluctuate sharply because they are more heavily influenced by short-term supply-demand, global economy, trend of major energy prices and trend of prices of its major ingredients of phosphate rocks, sulfur and ammonia. In 2008, phosphate fertilizer prices rose fivefold as in the case of energy and other fertilizer prices.

The international DAP price nearly exceeded FOB 1,000 U.S. dollars. Later the FOB price dropped to below 300 U.S. dollars per ton due to the global economic crisis and has recovered to around 500 U.S. dollars per ton.

(3) Future Market Forecast

The demand for phosphate fertilizers is expected to grow mainly in India and China. The demand of phosphate rocks, which are raw materials of the fertilizers, is also expected to increase at the rate of approximately 1.7% per annum to reach 280 million tons in 2017. As described above, phosphate rocks are natural mineral resources that distribute highly unevenly, it is hard to imagine the entry of new producers. In recent years, in major producing countries, there is a significant trend in the phosphorus exporting countries to restrict the export of the mineral with low added values, prioritize consumption in their own countries due to the rising resource nationalism and shift to production of value-added products by themselves. Major exporting nations are likely to have a stronger impact on the phosphate fertilizer market.

Morocco : It maintains a stable position as phosphate supplier.
Jordan : Volume is gradually decreasing. There are many projects to develop phosphate-derived products in the country.
US : The industry has restricted itself to suspend export of phosphate rocks since 1997.
China : It exported 5 million tons in 2001. It began to impose export tariffs in November 2006 and introduced an export quota system (1.5 million tons per annum) in 2009 to prioritize supply for fertilizers in their own country.

In relation to phosphate fertilizers, there is a plan to begin, around 2012, the operation of a new DAP plant with annual production of 3 million tons in Saudi Arabia's Ma'aden project. This will increase the trade volume by nearly 30 percent of the current volume. Although this is expected to soften the phosphate fertilizer market in a short run (excessive supply), the global demand is estimated to continue to grow and the prices will grow steadily.

5.1.3 Potassium Fertilizer

(1) Supply-Demand Balance

Potassium is an essential mineral for organisms including the human body and plants. It is one of the three fertilizer elements together with nitrogen and phosphate. The focus in the report is placed on potash ores and potassium chloride and potassium sulphate.

Potash mines are unevenly located geographically across the world and the development of new mines requires investment of several billion US dollar and sophisticated special techniques. As a result, it is the oligopoly market formed by existing suppliers mainly consisting of Canada and Russia. There are only 10 to 20 producing companies with capacity to export in the world. Although there was overproduction for the last 30 to 40 years, recent consolidations of producers have established a system to enable production adjustment to avoid excessive supply. The plant operation rate has been around 90 percent.

Global demand for potassium chloride has grown at the rate of approximately 2 to 3 percent per annum, and the demand in 2007 was 58 million tons. The demand is expected to continue to increase pushed by the increase in food demand and grain demand for bio ethanol. Since the demand is expected to increase in the future, expansion of production capacity is essential in the long run.

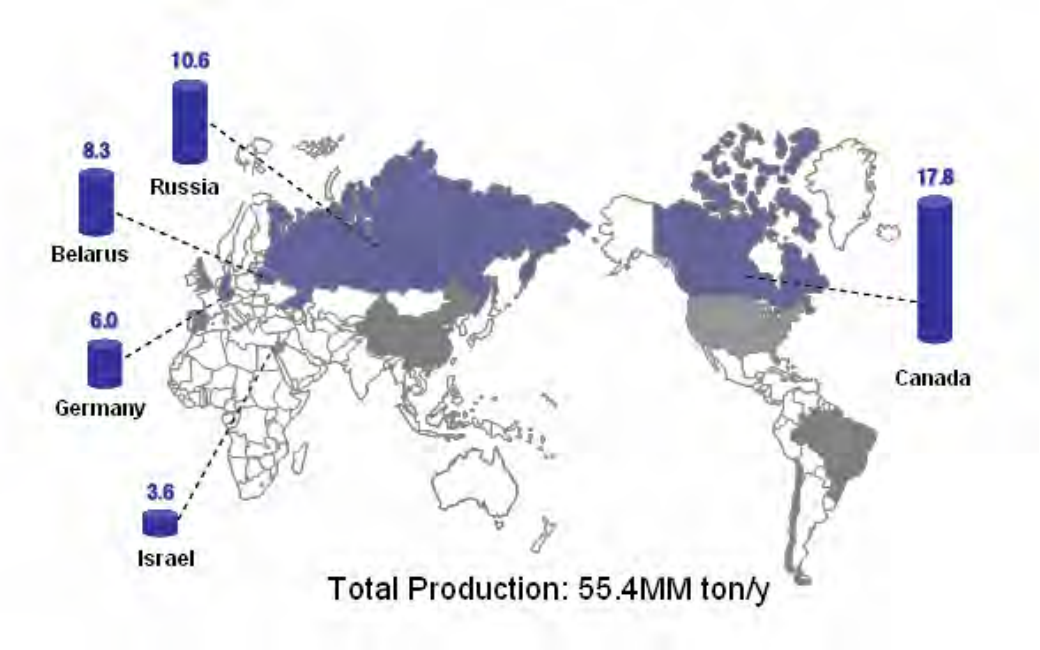


Figure 5.1-15: Potassium Chloride Production Volume by Country (2007)

(Source: Compiled by Study Team based on International Fertilizer Industry Association)

The annual global production capacity of potassium chloride was approximately 60 million tons and actual production volume was 54 million tons as of 2008. About 75 percent is traded in the market for exportation. The biggest importer is China that imports 10 million tons, followed by Brazil (7 million tons) and India (5.5 million tons). Demand is expected to grow at a higher rate particularly in Brazil and Asian countries.

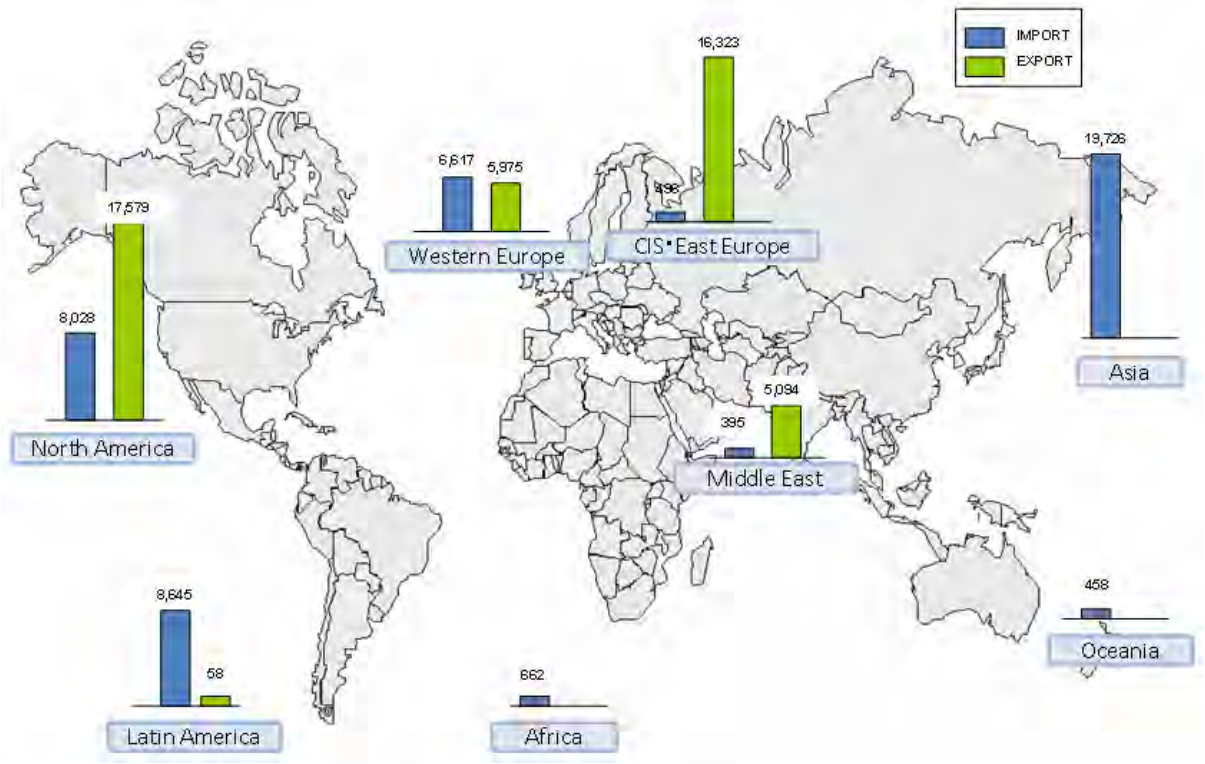


Figure 5.1-16: Potassium Chloride Export and Import Volume (2007)

(Source: Compiled by Study Team based on International Fertilizer Industry Association)

Potassium sulphate (K_2SO_4) mostly used for tobacco and vegetables is mainly produced by adding sulphate to potassium chloride. Compared with potassium chloride, it is less oligopoly market. Because its use is limited, it is a very unique product. Production volume is mere 5 million tons in the world. In addition to Germany (1 million tons) and Belgium (0.8 million tons) that have long controlled the supply balance, such Asian countries as China, South Korea, Taiwan, and the Philippines have increased production, enhancing their presence.

(2) Price Trend

Potassium fertilizer prices are decided mainly by such producing countries as Canada and former Soviet Union because of the following two reasons:

1) Direct sales to customer (no traders between producers and consumers)

2) Easy adjustment of production volume because of oligopoly market

More specifically, the price decided by Japan and Canadian CANPOTEX every six months is used as the standard for the Far East. Thus, Japan has reasonable presence although its

demand is only 650,000 tons, which accounts for 1.3 percent in the global market.

Since the global financial crisis in 2008, the prices have been on the decline trend. However, because producers control plant operation, prices are expected to stabilize at around 300 to 400 U.S. dollars per ton.

(3) Future Market Forecast

As described above, new participation in the market is extremely hard because the development of new potassium mines require enormous investment and special techniques, although demand is expected to grow steadily. Thus, there is little possibility of significant expansion of production capacity or an increase in supply volume. The oligopoly market structure will be maintained and the supply and demand will be well balanced.

5.2 Trend of Chemical Fertilizer Industry in Iraq

5.2.1 Production Trend

Table 5.2-1: Production Trend of Chemical Fertilizer Industry in Iraq
(Ammonia, Urea)

Location, Time of Establishment	Design Production Capacity	Major Raw Materials	Operation Trend
(Ammonia, urea)			
Plant No. 1 Basra (Abu-Al-Khaseeb) 1969	Ammonia: 200 t/d (66,000 t/y) Urea: 160 t/d (52,800 t/y) Ammonium sulfate: 420 t/d (138,599 t/y)	Natural gas is supplied from North Rumaila Oil Field via a pipeline.	In 1980, the Iran-Iraq War broke out and it caused serious damage to production facilities. The opeation has been competely suspended since 1980. Parts that can be used elsewhere were supplied for Machine No. 3.
Plant No. 2 Basra (Abu-Al-Khaseeb) 1978	Ammonia: 800 t/d (264,000 t/y) Urea: 1,300t/d (429,000t/y)	Same as above	Same as above
Plant No. 3 Basra (Khur Al-Zubair) 1978	Ammonia: 1,000 t/d 2 lines (660,0000 t/y) Urea: 1,600 t/d 2lines (1,056,000 t/y)	Natural gas is supplied from South and North Rumaila Oil Fields via a pipeline.	In 1980, the Iran-Iraq War broke out and it caused serious damage to production facilities. The opeation was suspended after the outbreak. Production resumed in March 1988 immediately after the end of the war. Although Gulf War II and later wars did not cause serious damage, operation rate is low due to shortages of parts and catalysts, at around 28 percent in the case of urea, for example.
Plant No. 4 Baiji 1987	Ammonia: 1,000 t/d (330,000 t/y) Urea: 1,750 t/d (577,500 t/y)	Natural gas is supplied from Kirkuk Oil Field via a pipeline.	It is hard to conduct stable operation due to shortages of natural gas and electricity. This has resulted in suspension of operation since April 2003.
Note Urea: Total of design production capacity 2,115,300 t/y Production volume in 2009 307,400 t/y (14.5 %)			

(Source: Compiled by the Study Team based on various materials)

Table 5.2-2: Production Trend of Chemical Fertilizer Industry in Iraq
(Phosphate fertilizer)

Location, Time of Establishment	Design Production Capacity	Major Raw Materials	Operation Trend
(Phosphate fertilizer)			
Plant No. 1 Al-Qaim Akashat 1976	Phosphate rocks: 3.4 Million t/y (22% P_2O_5) TSP: 600,000 t/y (45% P_2O_5) MAP: 280,000 t/y Chemical fertilizer: NP 655,000 t/y Ammonia: 50,000 t/y	Phosphate rocks are transported by rail from Akashat Mines 170 kilometers to the west. Sulfur is transported from Mishaqyori Sulfur Mine and oil refineries in the country. Natural gas to produce ammonia is supplied from Kirkuk Oil Field via a pipeline. However, the ammonia plant has completed closed since 1990 and liquefied ammonia is transported from a fertilizer plant in Baiji by tank truck.	Although the Iran-Iraq War did not cause much damage, furious airstrikes by allied forces in Gulf War II caused tremendous damage to the production facility. After that, it reduced the operation rate drastically. Furthermore, Gulf War III in 2003 also caused more damage and currently it hardly functions as a production plant. It is inevitably in a situation where it needs to plan and examine the rehabilitation.

(Source: Compiled by the Study Team based on various materials)

Points:

1) Chemical fertilizer plants constructed in Iraq are shown in the table above. All the production facilities are owned by state-owned companies.

2) Use of ammonia:

World supply-demand balance: Approx. 80% for fertilizers and 20 % for other industrial use

Iraq: Mostly for fertilizers. Both Basra and Baiji plants consume most of ammonia they produce for the production of urea. Although ammonium sulfate was produced with Plant No. 1 at Basra, the operation has been completely suspended. Although the Al-Qaim plant used to produce ammonia for MAP production, ammonia production is currently suspended. To compensate it, ammonia is obtained from the Baiji plant by tank truck.

3) Operation of Iraqi fertilizer plants:

As noted in the table above, the Iran-Iraq War that broke out in 1980 and ended in 1988 (also called Gulf War I), Gulf War II that broke out because Iraq invaded Kuwait from August 1990 to February 1991, and Iraq War from March to May 2003 (also called Gulf War III) caused serious damage to production plants and their operation has declined to an extremely low level.

Out of fertilizers in Iraq in the table below, production and sales of urea fertilizers are summarized, as they are major fertilizers in the country. As for production, the Khur Al Zubair plant in Basra manages to maintain 30% level of operation rate. However, the rate of the Baiji plant in the northern part dropped sharply in 2003 (67.7% in 2002 to 16.2% in 2003) and has been zero since 2007. This is mainly because the gas pipeline was frequently damaged and caused shortages of supply of natural gas that is a raw material of the fertilizers. In 2005, it had no supply of natural gas for eight and nine months. Furthermore, there is a power supply problem, which has led to zero production since 2007.

Table 5.2-3: Production and Demand Balance of Urea in Iraq

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
(Production)												
Baiji Factory	209,299	252,256	235,214	203,594	392,200	93,881	76,121	58,149	10,795	0	0	0
(Capa;579,000 tons) Ope Rate%	36.1	43.6	40.6	35.2	67.7	16.2	13.1	10.0	1.9	0.0	0.0	0.0
Basra Factory(Khur Al Zubair)	388,503	454,308	454,701	554,811	597,661	99,167	262,713	226,744	300,907	232,253	300,235	307,409
(Capa;1,056,000 tons) Ope Rate%	37	43	43	53	57	9	25	21	28	22	28	29
Total	597,838	706,608	689,956	758,440	989,929	193,064	338,847	284,903	311,704	232,253	300,235	307,409
(Total Capacity 1,635,000 tons)												
Total Operation Rate%	36.6	43.2	42.2	46.4	60.5	11.8	20.7	17.4	19.1	14.2	18.4	18.8
(Sales)												
Baiji Factory	190,427	223,635	268,373	183,992	369,900	161,895	53,551	70,468	18,299	4,171	0	0
Basra Factory (Khur Al Zubair)	414,025	449,015	384,601	658,610	572,307	134,208	225,130	258,196	302,602	220,554	311,662	293,040
Total	604,452	672,650	652,974	842,602	942,207	296,104	278,680	328,664	320,902	224,725	311,662	293,040
(Breakdown of the Sales)												
1) Sales to MOA												
From Baiji Factory	159,428	144,360	64,506	109,855	185,855	40,876	38,984	58,468	7,777	3,200	0	0
From Basra (Khur Al Zubair)	335,061	298,549	73,881	216,888	353,533	82,496	190,192	246,677	299,698	220,001	302,900	267,091
Total	494,489	442,908	138,387	326,743	539,388	123,371	229,176	305,145	307,474	223,201	302,900	267,091
2) Sales to PS												
From Baiji Factory	7,231	16,837	46,908	3,670	13,438	108,055	5,933	0	0	0	0	0
From Basra (Khur Al Zubair)	3,240	33,638	116,773	100,491	18,207	30,115	32,665	710	0	400	0	0
Total	10,471	50,474	163,680	104,161	31,645	138,170	38,597	710	0	400	0	0
3) Sales for Export												
From Baiji Factory	6,942	7,359	51,796	20,351	86,386	10,614	0	0	0	0	0	0
From Basra (Khur Al Zubair)	13,782	68,221	135,039	253,140	116,759	6,491	453	0	0	0	3,328	0
Total	20,724	75,580	186,835	273,491	203,145	17,104	453	0	0	0	3,328	0
4) Sales to SCP												
From Baiji Factory	12,411	20,378	16,049	9,981	34,464	884	321	10,312	10,523	971	0	0
From Basra (Khur Al Zubair)	58,749	46,192	55,622	84,612	81,109	15,107	0	0	2,855	89	5,000	25,904
Total	71,160	66,569	71,671	94,593	115,573	15,992	321	10,312	13,378	1,060	5,000	25,904
5) Sales to Others												
From Baiji Factory	4,415	34,702	89,114	40,136	49,757	1,466	8,313	1,687	0	0	0	0
From Basra (Khur Al Zubair)	3,193	2,417	3,286	3,479	2,700	0	1,820	10,810	50	64	434	45
Total	7,608	37,119	92,400	43,615	52,457	1,466	10,133	12,497	50	64	434	45

(Source: Compiled by Study Team based on document of Ministry of Industry and Minerals)

The table above is shown in the figures below to have it more easily understood.

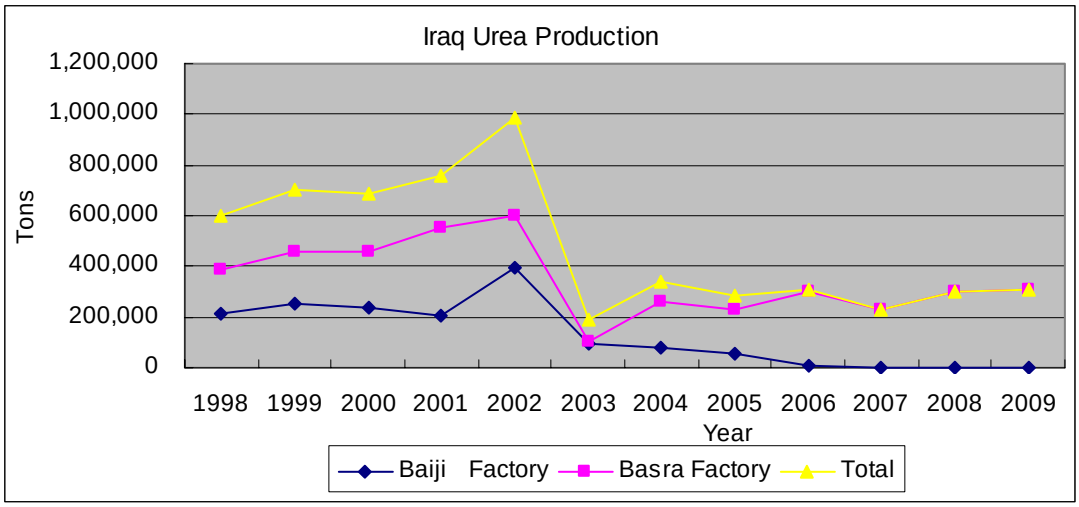


Figure 5.2-1: Trend of Urea Production by Plant in Iraq

(Source: Compiled by Study Team based on document of Ministry of Industry and Minerals)

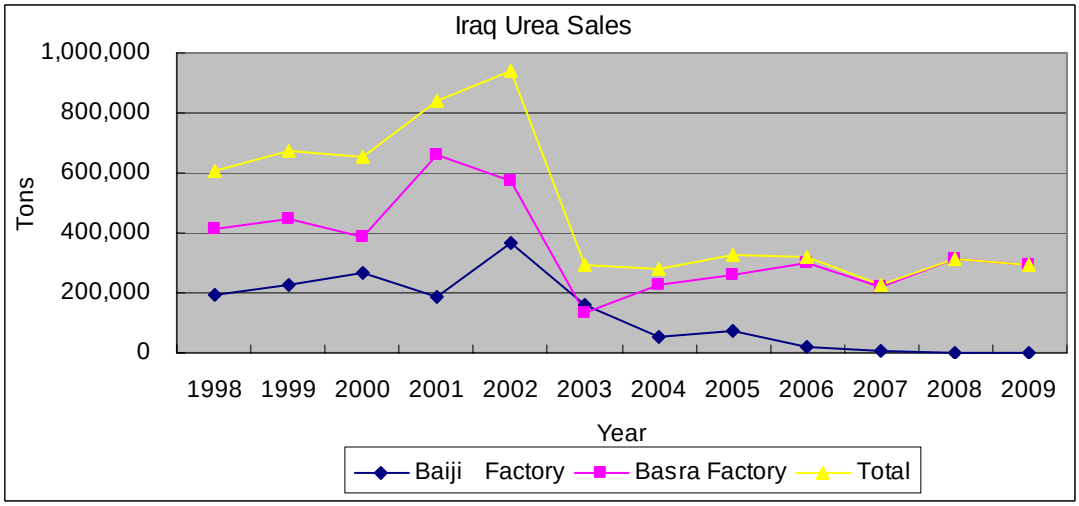


Figure 5.2-2: Trend of Urea Sales by Plant in Iraq

(Source: Compiled by Study Team based on document of Ministry of Industry and Minerals)

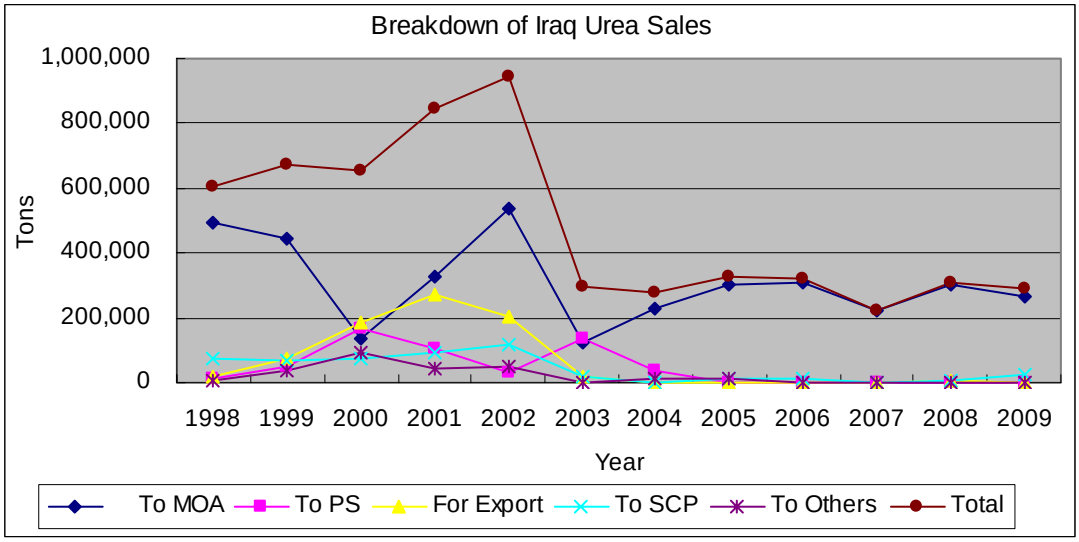


Figure 5.2-3: Trend of Urea Sales by Purchaser in Iraq

(Source: Compiled by Study Team based on document of Ministry of Industry and Minerals)

5.2.2 Demand Trend

1) Ammonia:

As described earlier, most of ammonia produced in Iraq is consumed for urea production at their plants (Khur Al-Zubair plant in Basra and Baiji plant in northern Iraq).

MAP is required for the production of compound chemical fertilizers, NP (N:P 27:27), at the phosphate fertilizer plant at the Al-Qaim plant. MAP production also needs ammonia. However, the plant cannot produce ammonia and thus it is transported from Basra and Baiji.

The required amount is estimated as follows based on the production volume of NP at the Al-Qaim plant: (Production of 1 ton of NP requires 0.51 ton of MAP and production of 1 ton of MAP requires 0.144 ton of ammonia.)

Yr 2000 ; 16,760 tons

Yr 2001 ; 18,164 tons

Yr 2002 ; 25,214 tons

2) Use of urea in general

Urea is most used for fertilizers (approximately 90 percent for fertilizers and approximately 10 percent for other purposes, according to world average) and it is the most common nitrogen fertilizers. (Approximately 65 percent of nitrogen fertilizers is urea.)

Because most fertilizers are water soluble, its toxicity to fish and other living matters needs to be taken into consideration. Because urea has low toxicity, it is used for a wide variety of crops. However, attention needs to be paid to groundwater contamination. Use efficiency has been improved recently and usage per unit tends to be lowered.

3) Urea demand in Iraq

All urea is consumed for fertilizers in Iraq.

Annual demand of urea in Iraq has increased as follows:

Just before Iran-Iraq War in 1980:	Approx. 50,000 tons
In the first half of 1990s:	Approx 70,000 tons
1998 to 2000:	Approx 650,000 tons
2002:	Approx 942,200 tons

However, urea production has decreased sharply because of Gulf War III in March to May 2003 (collapse of the Saddam Hussein's regime after airstrikes by allied forces led by the US and the UK) that caused much damage to a wide range of production facilities and infrastructure as well as long-lasting instability of public safety in the country. Annual urea production for the last six years has been low at about 300,000 tons.

The Government of Iraq has a policy to manage urea domestic consumption without depending on importation. In Iraq, oil exportation was restricted because of the economic sanctions imposed by the international community (1990-2003), which resulted in a shortage of foreign currencies to put the country in the situation where it cannot import goods during the period. As a result, it had to depend on the limited domestic production and it had no other choice but to apply an absolutely small amount of fertilizers.

There is an urgent need to recover the domestic fertilizer production at the earliest possible date. However, in reality, there is a shortage of domestically produced farm products. According to SCF data in 2002, the Iraqi grain self-sufficiency rate dropped to 33%, with 67% percent managed by grain import and food aid.

4) Phosphate fertilizer demand in Iraq

-1: General remarks;

For the cultivation of the crops, nitrogen, phosphate and potassium are considered as the most important nutrients. Each nutrient has its own characteristics and uses.

Quantitatively, phosphate fertilizer is the second largest fertilizer next to nitrogen.

As for the uses and the effectiveness of phosphate fertilizers manufactured by SCP, including Triple Super Phosphate (TSP), Mono-ammonium Phosphate (MAP) and NP (Compound fertilizer), are as follows;

TSP; It is hard to dissolve in water and suitable for acid soil, volcanic ash soil and soil improvement of poor soil. It dissolves and is absorbed in the organic acid in root crop. It has a slow-acting effect.

MAP; Mix ratio of nitrogen and phosphorus in MAP is excellent and it is an essential fertilizer for the growth in the early stage of various crops. It is also frequently used as the intermediate as raw materials of compound fertilizers.

NP; Fertilizers whose total contents of nitrogen, phosphate and potassium exceed 30 percent are called compound fertilizers. In the case of SCP, the nutrient content ratio of NP is N:P = 27:27. The N:P:K ratio of NPK is 18:18:18.
What is important in selecting a compound fertilizer is the balance of the three nutrients. Horizon-type fertilizers with well-balanced contents of the three nutrients are suitable as base fertilizers and the mountain type with high contents of phosphate is suitable as base fertilizers for long-term crops (fruit vegetables, root vegetables and flowers) that require a large amount of phosphate. Valley-type fertilizers with low contents of phosphate are suitable as base fertilizers for leafy vegetables with a short growing period as well as for top-dressing.

-2 Iraqi phosphate fertilizer plants

It is obvious that effective use of phosphate fertilizers is the essential matters for the food production increase. The Government of Iraq began the production of phosphate fertilizers at the Al-Qaim plant in 1976 assumably because it recognized its importance for the food production. It is undoubtable that the government made the decision because a large volume of phosphate rocks used as raw materials for the fertilizers can be produced in Akashat approximately 170 kilometers southwest of Al-Qaim.

-3. Demand forecast of phosphate fertilizers in Iraq by accumulation method

It is not so easy to identify the demand of phosphate fertilizers in Iraq, because there are many uncertainties and thus it requires the examination of various issues—correct

understanding of soil quality of cultivated land in Iraq, understanding of a careful plan of what type of crop is produced where, consideration of alternatives to other types of fertilizers, and demand for export in some cases. In this survey, as for these important factors we could not find effective data. Accordingly, it is very hard to obtain a feasible demand forecast of Iraqi phosphate fertilizer based on such an accumulation method.

-4. Demand forecast of phosphate fertilizers in Iraq by inductive method

Table 5.2-4: Fertilizer Consumption by Nutrient and Regions

Area and Country	N-Fertilizers	P-Fertilizers	K-Fertilizers	Grand Total
World Total	85,500 **(1.00)**	33,800 **(0.39)**	23,600 **(0.28)**	142,900
America Total (N.C.S. America)	15,900.5 **(1.00)**	7,898.8 **(0.49)**	8,270.7 **(0.52)**	32,070
Europe	10,876.5 **(1.00)**	3,321.1 **(0.31)**	3,888.9 **(0.36)**	18,077.5
Middle East	2,893 **(1.00)**	1,059.3 **(0.37)**	248 **(0.08)**	4,200.3
Iran	884.2 **(1.00)**	305.5 **(0.42)**	101.7 **(0.11)**	1,291.4
Iraq	510.7 **(1.00)**	127.4 **(0.25)**	0.7 **(0.0014)**	638.8

(Source: Compiled by Study Team based on FAO data in 2003)

The unit used for each fertilizer in the table is 1,000 tons of nutrient. Namely, consumption volume of nitrogen fertilizers is shown by the nitrogen content in the fertilizers and phosphate & potassium fertilizers are shown by the content of P_2O_5 and K_2O respectively.

Figures in the parentheses means the consumption ratio of fertilizers when the consumption volume of nitrogen fertilizer is assumed as 1.

Generally speaking, as shown in the table 5.2-3, it is experientially recognized that the consumption ratio of three basic fertilizers has some specific relation. It is roughly estimated that consumption ratio of phosphate fertilizer against nitrogen fertilizer ranges from 30 to 40 %.

However, in the case of Iraq, phosphate fertilizer consumption ratio, actually 25% against nitrogen fertilizer consumption, is lower than most other regions and countries. Considering the similar weather and soil situations, Iraq's figure should be closer to the figures of total Middle East of 37% and Iran of 42%. Based on such inductive method, it will be expressed

that Iraq will have to raise the consumption ratio of phosphate fertilizers in future.

-5. SCP operation results

Phosphate fertilizer production at the Al-Qaim plant was close to zero from around 2004 to 2006. Specifically, production of TSP and MAP was zero and NP was about 80,000 tons (around 12% of design capacity) during the period. The shortage cannot be offset by the importation mainly because of the shortage of foreign currency and the governmental policy not to rely on the foreign products.

The reality in recent years is that there was absolute produceable volume first and then demand could not exceed it. This idea is clearly stated about urea fertilizers and it is fair to say that the government took the same approach for phosphate fertilizers because there was no importation of phosphate fertilizers recently.

.

-6. SCP design capacity

The following shows the figures of SCP phosphate fertilizer design capacity and it has probably been considered that these design capacity are roughly equal to the Iraqi domestic demand because the Iraqi Government might have considered that the local demand should be fulfilled by the local products. Actually, however, because of many troubles, real production volumes were far below than these design capacity:

	(Design Capacity)	(Converted volume into P_2O_5)
TSP	600,000 tons (45% P_2O_5),	270,000 tons
MAP	280,000 tons (52% P_2O_5)	145,600
NP	655,000 tons (27% P_2O_5)	176,850
	Total	592,450

It will be helpful to compare above figures with the estimated domestic urea consumption.

In chapter 5.3.3, annual urea domestic consumption is estimated as 2,000,000 tons, converted amount into nitrogen nutrient is 900,000 tons.

In this case, consumption ratio of phosphate fertilizer against nitrogen fertilizer is about 66%, which is larger weight compared with the global results. However, it will not be easy to keep such complete consistency because both figures were arranged based on the different conditions.

-7. SCP forecast of Iraqi domestic demand of phosphate fertilizers

SCP forecast of domestic demand for phosphate fertilizers, compiled by SCP for the Al-Qaim plant rehabilitation plan in April 2009, can be used as a reference material for the domestic demand of phosphate fertilizer. According to the estimation based on studies adapted by Ministry of Agriculture, annual domestic demand for TSP and NP are 600,000 tons and 1,250,000 tons, respectively. As for the demand for TSP, it is identical with the design capacity of the Al-Qaim plant. As for NP demand, SCP forecast is about two times higher than the SCP plant design capacity, which means that the local coverage ratio is only 47%. Again, in the last few years, actual NP production was about 2.5 % to 22.5 % of design capacity. Its record high figure was 62 % in the year of 1993. In this estimation, at first, realization of full design capacity volume is necessitated and, secondly, similar amount will have to be procured from outside. With regard to the basis of this estimation, no specific explanation has been expressed, so it might be only the expected amount. On the contrary, it might be necessitated to forecast based on more realistic situation.

5.2.3 Fertilizer Production, Consumption and Trade in Iraq's Neighboring Countries and Other Major Countries

Just for reference, global production and consumption of major fertilizers in other countries are introduced here. Although the data is somewhat old, FAO (UN Food and Agriculture Organization) data in 2003 is summarized as follows: This shows a global trend of fertilizer production and consumption. (As for Iraqi fertilizer supply/demand balance, year of 2002 was the latest normal year. Accordingly, it is probably said that this data of 2003 would be the most feasible ones for this report purpose.)

The unit used for each fertilizer in the tables is 1,000 tons in ingredients, which means nitrogen for nitrogen fertilizers, P_2O_5 for phosphate fertilizers and K_2O for potassium fertilizers. Thus, it should be noted that the indications are different from the regular production volume of fertilizers.

For example, nitrogen content in urea is 46% and thus 100 tons of urea contains 46 tons of nitrogen. In other words, 100 tons of urea in the tables is equivalent to 217 tons of urea in the indication of urea production volume. Similarly, 100 tons of TSP contains 46 tons of P_2O_5 and thus 100 tons of TSP production volume in the tables is equivalent to 217 tons of TSP production volume in regular indications.

Table 5.2-5: Breakdown of Production Volume of Major Fertilizers by Country

	Nitrogen						Phosphate					Potash				
	Urea	AS	AN	CAN	Others	N. Total	MAP,DAP	SSP	TSP	Others	P. Total	KCL	PS	PN	Po. Total	Grand T
(Middle East)																
Saudi Arabia	1,260.4	61.0	0.0	0.0	7.1	1,328.5	155.9	0.0	0.0	12.2	168.1	0.0	0.0	0.0	0.0	1,496.6
(Al Jubayl)																
Bahrain	290.3	0.0	0.0	0.0	0.0	290.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	290.3
Iran	623.2	2.2	60.7	0.0	81.8	767.9	116.9	5.9	0.0	23.9	146.7	0.0	0.0	0.0	0.0	914.6
Iraq	460.0	0.0	0.0	0.0	64.0	524.0	0.0	0.0	62.5	70.0	132.5	0.0	0.0	0.0	0.0	656.5
Israel	0.0	0.0	0.0	0.0	75.0	75.0	13.0	72.1	94.0	70.0	249.1	1,918.0	0.0	0.0	1,918.0	2,242.1
Jordan	0.0	0.0	0.0	0.0	133.0	133.0	255.6	0.6	0.0	21.0	277.2	1,173.6	0.0	0.0	1,173.6	1,583.8
Kuwait	255.3	0.0	0.0	0.0	0.0	255.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	255.3
Qatar	798.6	0.0	0.0	0.0	0.0	798.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	798.6
Turky	247.0	40.8	32.4	249.7	64.5	634.4	75.2	0.0	26.0	200.0	301.2	0.0	0.0	0.0	0.0	935.6
UAE	277.0	0.0	0.0	0.0	0.0	277.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	277.0
M.E. total	4,211.8	104.0	93.1	249.7	425.4	5,084.0	616.6	78.6	182.5	397.1	1,274.8	3,091.6	0.0	0.0	3,091.6	9,450.4
(Africa)																
Algeria	0.0	0.0	98.2	0.0	20.0	118.2	0.0	5.0	21.8	9.0	35.8	0.0	0.0	0.0	0.0	154.0
Egypt	1,078.2	22.1	448.1	0.0	0.0	1,548.4	0.0	167.4	19.6	0.0	187.0	0.0	0.0	0.0	0.0	1,735.4
Morocco	0.0	0.0	0.0	0.0	349.5	349.5	911.1	8.0	249.5	62.0	1,230.6	0.0	0.0	0.0	0.0	1,580.1
South Africa	0.0	35.9	0.0	114.5	148.0	298.4	142.6	0.0	0.0	137.4	280.0	0.0	0.0	0.0	0.0	578.4
Tunisia	0.0	0.0	57.1	0.0	224.9	282.0	528.5	10.0	351.9	2.0	892.4	0.0	0.0	0.0	0.0	1,174.4
Africa total	1,078.2	58.0	603.4	114.5	742.4	2,596.5	1,582.2	190.4	642.8	210.4	2,625.8	0.0	0.0	0.0	0.0	5,222.3
(Asia)																
China	14,048.0	230.5	235.0	3.7	9,127.1	23,644.3	2,039.0	3,773.4	177.0	1,922.9	7,912.3	430.0	0.0	0.0	430.0	31,986.6
India	8,614.4	112.7	0.0	43.5	1,786.9	10,557.5	2,408.6	379.7	0.0	1,113.9	3,902.2	0.0	0.0	0.0	0.0	14,459.7
Indonesia	2,762.8	88.2	0.0	0.0	16.8	2,867.8	0.0	0.0	199.0	16.8	215.8	0.0	0.0	0.0	0.0	3,083.6
Japan	233.0	315.0	18.8	0.0	103.2	670.0	0.0	10.0	5.2	363.0	378.2	0.0	0.0	0.0	0.0	1,048.2
Korea	99.2	112.7	0.0	0.0	147.8	359.7	130.0	0.4	0.0	222.5	352.9	0.0	0.0	0.0	0.0	712.6
Pakistan	2,025.8	0.0	0.0	87.1	70.4	2,183.3	30.8	26.4	0.0	72.9	130.1	0.0	0.0	0.0	0.0	2,313.4
Viet Nam	49.2	0.0	0.0	0.0	0.0	49.2	0.0	145.0	0.0	70.0	215.0	0.0	0.0	0.0	0.0	264.2
Uzbekistan	98.0	30.9	422.8	0.0	71.3	623.0	100.6	24.0	0.0	0.0	124.6	0.0	0.0	0.0	0.0	747.6
Asia total	27,930.4	890.0	676.6	134.3	11,323.5	40,954.8	4,709.0	4,358.9	381.2	3,782.0	13,231.1	430.0	0.0	0.0	430.0	54,615.9
(Europe)																
Austria	4.0	0.0	0.0	170.0	69.0	243.0	0.0	7.6	8.0	67.0	82.6	0.0	0.0	0.0	0.0	325.6
Bel-lux	0.0	299.0	48.0	415.0	68.0	830.0	0.0	26.0	26.0	193.0	245.0	0.0	0.0	0.0	0.0	1,075.0
Belarus	432.8	59.9	88.5	0.0	44.8	626.0	25.2	0.0	25.0	34.0	84.2	3,791.0	0.0	0.0	3,791.0	4,501.2
Bulgaria	76.3	0.0	236.7	0.0	13.7	326.7	0.0	0.0	108.0	12.2	120.2	0.0	0.0	0.0	0.0	446.9
France	178.0	1.0	322.0	105.0	500.0	1,106.0	0.0	40.0	25.0	212.0	277.0	130.0	0.0	0.0	130.0	1,513.0
Lithuania	168.4	0.0	178.8	0.0	243.8	591.0	302.0	0.0	0.0	57.7	359.7	64.2	0.0	0.0	64.2	1,014.9
Netherlands	55.0	98.0	54.0	614.0	192.0	1,013.0	0.0	14.0	30.0	130.0	174.0	0.0	0.0	0.0	0.0	1,187.0
Poland	264.3	131.3	374.5	258.6	148.0	1,176.7	208.0	17.4	30.0	212.5	467.9	0.0	0.0	0.0	0.0	1,644.6
Romania	406.2	6.1	245.3	10.8	137.7	806.1	9.5	0.0	0.0	72.7	82.2	0.0	0.0	0.0	0.0	888.3
Russia	1,872.7	297.4	2,366.7	0.0	1,474.6	6,011.4	1,581.9	3.6	0.0	816.7	2,402.2	4,380.0	0.0	0.0	4,380.0	12,793.6
Spain	159.4	104.7	141.0	172.2	225.2	802.5	158.2	6.2	0.0	230.5	394.9	407.0	0.0	0.0	407.0	1,604.4
UK	0.0	0.0	278.0	0.0	262.0	540.0	0.0	0.0	0.0	50.0	50.0	540.0	0.0	0.0	540.0	1,130.0
Ukraine	1,427.0	59.1	525.1	0.0	302.3	2,313.5	22.0	13.0	0.0	7.3	42.3	9.0	0.0	0.0	9.0	2,364.8
Germany	350.0	160.0	0.0	310.0	193.3	1,013.3	0.0	13.0	0.0	24.0	37.0	3,451.0	0.0	0.0	3,451.0	4,501.3
Italy	158.0	80.0	14.0	81.0	90.0	423.0	0.0	24.0	0.0	25.0	49.0	0.0	0.0	0.0	0.0	472.0
Europe total	5,552.1	1,296.5	4,872.6	2,136.6	3,964.4	17,822.2	2,306.8	164.8	252.0	2,144.6	4,868.2	12,772.2	0.0	0.0	12,772.2	35,462.6
(Oceania)																
Australia	51.5	88.0	11.0	0.0	180.5	331.0	346.0	332.8	0.0	44.0	722.8	0.0	0.0	0.0	0.0	1,053.8
(America)																
Canada	1,940.0	0.0	413.1	0.0	1,483.2	3,836.3	296.4	0.0	0.0	0.0	296.4	8,027.4	0.0	0.0	8,027.4	12,160.1
Mexico	0.0	207.0	71.9	0.0	100.3	379.2	183.0	22.3	96.9	25.0	327.2	0.0	0.0	0.0	0.0	706.4
USA	2,044.3	619.3	1,055.6	0.0	5,723.1	9,442.3	7,058.6	4.8	456.1	447.5	7,967.0	696.4	0.0	0.0	696.4	18,105.7
Brazil	421.7	44.6	133.7	0.0	152.4	752.4	479.0	769.8	157.6	73.6	1,480.0	376.3	0.0	0.0	376.3	2,608.7
Venezuela	418.4	17.7	0.0	0.0	103.4	539.5	38.0	0.0	0.0	22.0	60.0	0.0	0.0	0.0	0.0	599.5
Chile	0.0	0.0	0.0	0.0	115.0	115.0	0.0	0.0	0.0	0.0	0.0	409.0	0.0	0.0	409.0	524.0
America total	4,824.4	888.6	1,674.3	0.0	7,677.4	15,064.7	8,055.0	796.9	710.6	568.1	10,130.6	9,509.1	0.0	0.0	9,509.1	34,704.4
Total	43,648.4	3,325.1	7,931.0	2,635.1	24,313.6	81,853.2	17,615.6	5,922.4	2,169.1	7,146.2	32,853.3	25,802.9	0.0	0.0	25,802.9	140,509.4
Share(%)	53.4	4.1	9.7	3.2	29.6	100.0	53.6	18.0	6.6	21.8	100.0	100.0	0.0	0.0	100.0	
World Total						87,206.0					33,909.0				25,853.0	146,968.0

(Source: Compiled by Study Team based on FAO data)

Similarly, the following table shows a summary of consumption volume of major fertilizers by country.

Table 5.2-6: Breakdown of Consumption Volume of Major Fertilizers by Country

	Nitrogen						Phosphate					Potash				
	Urea	AS	AN	CAN	Others	N. Total	MAP,DAP	SSP	TSP	Others	P. Total	KCL	PS	Others	Po. Total	Grand T
(Middle East)																
Saudi Arabia	163.0	0.0	0.0	0.0	61.0	224.0	125.0	0.0	0.0	7.3	132.3	0.0	0.0	25.0	25.0	381.3
(Al Jubayl)																
Bahrain	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iran	708.0	8.7	60.7	0.0	106.8	884.2	160.8	5.9	109.8	29.0	305.5	9.1	47.0	45.6	101.7	1,291.4
Iraq	439.2	0.0	0.0	0.0	71.5	510.7	7.1	0.0	51.6	68.7	127.4	0.7	0.0	0.0	0.7	638.8
Israel	17.3	4.9	0.0	0.0	18.3	40.5	0.0	0.0	0.0	9.2	9.2	9.0	0.0	22.6	31.6	81.3
Jordan	5.0	1.6	1.4	0.0	6.0	14.0	2.5	0.6	0.0	7.4	10.5	1.0	0.0	8.0	9.0	33.5
Kuwait	1.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
Qatar	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Turky	330.5	62.1	221.1	248.8	332.5	1,195.0	176.5	0.0	10.5	287.4	474.4	0.0	5.0	68.5	73.5	1,742.9
UAE	20.0	0.5	0.0	0.0	3.0	23.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	6.5	30.0
M.E. total	1,684.1	77.8	283.2	248.8	599.1	2,893.0	471.9	6.5	171.9	409.0	1,059.3	19.8	52.0	176.2	248.0	4,200.3
(Africa)																
Algeria	2.0	1.0	22.0	0.0	23.0	48.0	0.0	0.0	5.0	23.0	28.0	2.0	0.0	20.0	22.0	98.0
Egypt	588.0	53.9	425.6	0.9	0.0	1,068.4	0.0	142.1	0.0	0.0	142.1	0.0	57.0	0.0	57.0	1,267.5
Morocco	55.0	20.0	69.0	0.0	54.0	198.0	25.0	8.0	5.0	62.0	100.0	0.7	15.5	33.8	50.0	348.0
South Africa	337.3	37.5	0.0	109.8	86.2	570.8	160.0	0.0	1.0	70.2	231.2	26.0	2.0	135.1	163.1	965.1
Tunisia	0.0	0.0	47.6	0.0	8.4	56.0	18.7	0.0	21.2	1.1	41.0	0.0	5.0	0.0	5.0	102.0
Africa total	982.3	112.4	564.2	110.7	171.6	1,941.2	203.7	150.1	32.2	156.3	542.3	28.7	79.5	188.9	297.1	2,780.6
(Asia)																
China	14,761.4	193.5	745.0	1.6	9,728.5	25,430.0	4,040.0	3,747.7	151.3	1,985.0	9,924.0	2,525.7	405.2	1,319.5	4,250.4	39,604.4
India	8,506.8	97.4	0.0	41.7	1,824.1	10,470.0	2,517.6	399.8	0.0	1,087.3	4,004.7	1,147.2	9.6	490.1	1,646.9	16,121.6
Indonesia	1,965.6	161.4	41.4	0.0	44.6	2,213.0	10.0	0.0	254.0	65.0	329.0	405.0	0.0	45.0	450.0	2,992.0
Japan	109.0	142.0	2.0	0.0	210.0	463.0	0.0	9.0	2.0	471.0	482.0	7.0	3.0	329.0	339.0	1,284.0
Korea	141.4	3.9	0.0	0.0	218.1	363.4	0.0	0.4	0.0	145.9	146.3	11.0	4.2	164.9	180.1	689.8
Pakistan	1,960.9	3.3	0.0	93.3	278.4	2,335.9	490.8	38.1	2.7	86.4	618.0	4.8	4.0	0.0	8.8	2,962.7
Viet Nam	836.0	97.0	0.0	0.0	130.2	1,063.2	259.0	145.0	0.0	102.0	506.0	380.0	9.0	17.0	406.0	1,975.2
Uzbekistan	559.0	0.0	0.0	0.0	0.0	559.0	126.3	0.0	0.0	0.0	126.3	33.0	0.0	0.0	33.0	718.3
Asia total	28,840.1	698.5	788.4	136.6	12,433.9	42,897.5	7,443.7	4,340.0	410.0	3,942.6	16,136.3	4,513.7	435.0	2,365.5	7,314.2	66,348.0
(Europe)																
Austria	8.0	3.0	0.0	65.0	42.0	118.0	6.0	1.0	4.0	36.0	47.0	2.0	0.0	41.3	43.3	208.3
Bel-lux	1.0	8.0	0.0	111.0	44.0	164.0	5.0	4.0	5.0	31.0	45.0	28.0	1.0	51.0	80.0	289.0
Belarus	250.0	0.0	0.0	0.0	0.0	250.0	48.0	0.0	0.0	0.0	48.0	450.0	0.0	0.0	450.0	748.0
Bulgaria	4.4	0.0	146.5	0.6	0.5	152.0	0.0	0.0	11.9	0.5	12.4	1.0	0.0	0.4	1.4	165.8
France	237.0	26.0	736.0	238.0	1,042.0	2,279.0	197.0	11.0	108.0	413.0	729.0	396.0	15.0	549.0	960.0	3,968.0
Lithuania	115.0	0.0	0.0	0.0	0.0	115.0	35.0	0.0	0.0	0.0	35.0	44.0	0.0	0.0	44.0	194.0
Netherlands	1.0	3.0	1.0	201.0	78.0	284.0	8.0	0.0	0.0	44.0	52.0	36.0	6.0	24.0	66.0	402.0
Poland	200.6	14.8	399.7	161.1	85.5	861.7	38.3	16.4	23.0	224.8	302.5	165.0	0.0	227.0	392.0	1,556.2
Romania	70.0	0.0	120.0	78.4	0.0	268.4	0.0	0.0	0.0	72.9	72.9	9.0	0.0	5.0	14.0	355.3
Russia	74.9	2.5	675.7	0.0	337.4	1,090.5	112.8	0.0	0.0	221.2	334.0	38.5	1.5	150.0	190.0	1,614.5
Spain	270.3	86.6	98.2	193.0	421.9	1,070.0	216.1	18.0	17.4	349.8	601.3	130.5	23.3	334.5	488.3	2,159.6
UK	114.0	10.0	454.0	26.0	538.0	1,142.0	27.0	0.0	18.0	238.0	283.0	12.0	10.0	354.0	376.0	1,801.0
Ukraine	200.0	100.0	200.0	0.0	0.0	500.0	60.0	0.0	0.0	0.0	60.0	29.0	0.0	0.0	29.0	589.0
Germany	284.6	47.0	0.0	823.0	633.0	1,787.6	107.0	2.0	23.0	195.0	327.0	233.8	0.0	245.8	479.6	2,594.2
Italy	351.2	33.5	157.0	0.0	243.6	785.3	0.0	32.1	29.4	310.5	372.0	63.8	15.4	196.1	275.3	1,432.6
Europe total	2,182.0	334.4	2,988.1	1,897.1	3,465.9	10,867.5	860.2	84.5	239.7	2,136.7	3,321.1	1,638.6	72.2	2,178.1	3,888.9	18,077.5
(Oceania)																
Australia	551.0	24.0	12.0	7.0	456.0	1,050.0	529.0	237.0	27.0	284.0	1,077.0	43.0	5.0	182.0	230.0	2,357.0
(America)																
Canada	720.8	83.0	66.1	21.0	738.8	1,629.7	605.8	0.0	3.2	28.9	637.9	331.5	4.7	9.8	346.0	2,613.6
Mexico	560.0	265.0	20.5	0.0	331.0	1,176.5	222.0	18.5	2.7	106.8	350.0	120.0	33.0	32.6	185.6	1,712.1
USA	2,211.9	201.0	476.2	0.0	7,989.2	10,878.3	2,116.7	3.0	126.6	1,628.6	3,874.9	2,932.1	76.3	1,536.7	4,545.1	19,298.3
Brazil	990.0	280.4	119.9	21.2	404.5	1,816.0	878.4	659.8	339.7	929.1	2,807.0	2,022.0	21.3	1,015.7	3,059.0	7,682.0
Venezuela	130.0	11.0	1.7	0.0	47.3	190.0	26.0	0.0	0.0	24.0	50.0	25.0	4.0	31.0	60.0	300.0
Chile	171.0	0.0	1.0	14.0	24.0	210.0	72.0	0.0	106.9	0.1	179.0	63.0	3.0	9.0	75.0	464.0
America total	4,783.7	840.4	685.4	56.2	9,534.8	15,900.5	3,920.9	681.3	579.1	2,717.5	7,898.8	5,493.6	142.3	2,634.8	8,270.7	32,070.0
Total	39,023.2	2,087.5	5,321.3	2,456.4	26,661.3	75,549.7	13,429.4	5,499.4	1,459.9	9,646.1	30,034.8	11,737.4	786.0	7,725.5	20,248.9	125,833.4
Share(%)	51.7	2.8	7.0	3.3	35.2	100.0	44.7	18.3	4.9	32.1	100.0	58.0	3.9	38.1	100.0	
World Total						85,500.0					33,800.0				23,600.0	142,900.0

(Source: Compiled by Study Team based on FAO data)

Of two tables above, production and consumption of phosphate fertilizers, especially MAP, TSP and NP with which SCP is associated, in Iraq's neighbouring countries is shown below.

Trade data is effective to examine competitiveness of each country. Thus, trade of DAP and MAP in 2005 is also introduced below.

Because this is also true in the case of nitrogen fertilizers (including urea and ammonium sulphate), the global production and consumption of fertilizers above is also used in its

discussion later. Trade of urea and ammonia is also introduced as reference.

Table 5.2-7: DAP Import and Export by Country

Di-ammonium phosphate (DAP) Trade : FY 2005

Unit: 1,000 tons

Importers / Exporters	West & East Europe					America				Asia						Others	Grand Total	
	Germany	Spain	France	Turkey	Total	Brazil	Mexico	Canada	Total	Japan	Viet Nam	China	Pakistan	India	Total		Volume	Ratio %
W. & E. Europe																		
Netherlands	25				25				0						0		25	0.3
Belgium	14	12	21		47				0								47	0.5
Lithuania	70	23	80	158	331				0				78	33	111		441	4.6
Russia	4		64	152	220			9	9				35	273	308		536	5.6
Poland	68				68				0								68	0.7
Ukraine					0				0					33	33		33	0.3
Total	181	35	165	310	691	0	0	9	9	0		0	112	339	451	0	1,151	12.0
Africa & Mid East																		
Tunisia		97	120	253	470				0		17	96	46		159		629	6.6
Senegal		7			7				0						0		7	0.1
Jordan					0				0	75			25	99	199		199	2.1
Saudi Arabia					0			13	13						0		13	0.1
Morocco		35	124		159	78			78			101			101		338	3.5
Total	0	139	244	253	636	78	0	13	91	75	17	197	71	99	459	0	1,187	12.4
America																		
U S A				52	52	166	406	104	677	289	24	1,549	174	819	2,855		3,584	37.5
Total	0	0	0	52	52	166	406	104	677	289	24	1,549	174	819	2,855	0	3,584	37.5
Asia																		
China					0				0	6	478				484		484	5.1
Korea					0				0	3	33				36		36	0.4
Philippines					0				0		71				71		71	0.7
Total	0	0	0	0	0	0	0	0	0	9	582	0	0	0	591	0	591	6.2
Oceania																		
New Zealand					0				0						0		0	0.0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Others	2	8	37		47	1		36	37		26		52	30	108	2,861	3,053	31.9
Grand Total	183	182	446	615	1,426	245	406	162	813	373	649	1,746	409	1,287	4,464	2,861	9,565	100.0
Ratio %	1.9	1.9	4.7	6.4	14.9	2.6	4.2	1.7	8.5	3.9	6.8	18.3	4.3	13.5	46.7	29.9	100.0	

(Source: Compiled by Study Team based on FAO data)

Table 5.2-8: MAP Import and Export by Country

Mono-ammonium phosphate (MAP) Trade : 2005

Unit: 1,000 tons

Importers / Exporters	West & East Europe				America						Asia				Australia	Others	Grand Total	
	Germany	Spain	France	Total	Brazil	Argentina	Mexico	USA	Canada	Total	China	Pakistan	India	Total			Volume	Ratio %
W. & E. Europe																		
Netherlands	9			9						0				0			9	0.1
Belgium	9	6	11	26					5	5				0			31	0.4
Russia	35	17	9	61	397	65		28		489		373	66	440			990	14.3
Kazakhstan				0						0	20			20			20	0.3
Total	53	23	20	95	397	65	0	28	5	495	20	373	66	460	0	0	1,050	15.2
Africa & Mid East																		
Tunisia		5		5						0		42		42			47	0.7
South Africa				0		16				16				0	57		73	1.1
Jordan				0						0			12	12			12	0.2
Saudi Arabia				0						0				0			0	0.0
Israel	1	5	6	12			8	13		22			16	16			50	0.7
Morocco		30	40	69	300	12	30			342				0	17		428	6.2
Total	1	40	46	86	300	28	38	13	0	379	0	42	28	70	74	0	610	8.8
America																		
Mexico				0				8		8				0			8	0.1
Canada				0				46		46				0			46	0.7
U S A				0	590	268	204		609	1,670		405		405	717		2,792	40.4
Total	0	0	0	0	590	268	204	54	609	1,725	0	405	0	405	717	0	2,846	41.1
Asia																		
China				0			6	12		19		40	41	81	46		145	2.1
Philippines				0						0				0	11		11	0.2
Total	0	0	0	0	0	0	6	12	0	19	0	40	41	81	57	0	156	2.3
Oceania																		
New Zealand				0						0				0			0	0.0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Others	1	9	5	15			6	14		20		6	1	7	11	2,203	2,255	32.6
Grand Total	54	72	71	197	1,287	361	254	122	614	2,637	20	866	136	1,023	858	2,203	6,918	100.0
Ratio %	0.8	1.0	1.0	2.8	18.6	5.2	3.7	1.8	8.9	38.1	0.3	12.5	2.0	14.8	12.4	31.8	100.0	

(Source: Compiled by Study Team based on FAO data)

From the data about phosphate fertilizers and trend of the fertilizers in and around Iraq (especially production, consumption and trade volumes in neighbouring nations), the following issues can be pointed out:

Points:

1) Production and export volumes of phosphate fertilizers (MAP, DAP, SSP, TSP, NP, etc.)

Iraq's neighboring countries (in the Middle East and Africa, etc.) are relatively rich in phosphate rocks and many of them produce phosphate fertilizers actively (including Saudi Arabia, Iran, Israel, Jordan, Turkey, Morocco, Egypt and Tunisia).

As clearly shown in DAP and MAP trade data above, they have export competitiveness of phosphate fertilizers. There is no doubt that they can be very tough competitors if Iraq wants to export phosphate fertilizers in future. (Morocco, Tunisia, Jordan, Saudi Arabia, Russia, Lithuania and Israel are strong exporters.) Iraq needs to make careful preparation in order to compete with them as a supplier in the global market. Experiences and business strategies of such major Japanese trading houses as Mitsui & Co., Ltd. are expected to be very useful in making the preparation.

2) Consumption and import volumes of phosphate fertilizers (including MAP, DAP, SSP, TSP, NP, etc.)

Many of Iraq's neighboring countries (in the Middle East and Africa, etc.) actively produce phosphate fertilizers as mentioned above. However, most of their products are exported and they are not major agricultural nations.

Biggest consumers of phosphate fertilizers are China, India, the United States, Brazil and Australia and they are also major importers. Iraq should consider these countries if they want to export their fertilizers.

As for Iraq, it first needs to satisfy its consumption. As described earlier, only the Al-Qaim plant is equipped with phosphate fertilizer production facility in Iraq. The production volume is extremely low, far from satisfying the national demand. Due to the country's policy of non-import of fertilizers, it is an urgent need to increase the production for domestic consumption.

DAP can be more competitive export product than TSP, because, although TSP contains more phosphorus (P_2O_5 46%), it is not a compound and the demand for compound fertilizers that contain phosphorus and nitrogen, specially DAP (N 18%, P_2O_5 46%), has grown sharply in the global market. Thus, it is more wise to produce DAP rather than TSP also in considering the domestic demand.

3) Urea import-export balance

Table 5.2-9: Urea Import and Export Volume by Country

Importers / Exporters	West & East Europe							America				Asia					Egypt & S.Africa	Oceania	Others	Grand Total	
	France	Germany	Italy	Spain	UK	Turkey	Total	USA	Brazil	Mexico	Total	India	Thailand	Pakistan	Philippines	Total				Volume	Ratio %
W. & E. Europe																					
Netherlands	140	33	6	28	45		252	31			31					0	2		361	646	2.1
Germany	80		41	18	83		222				0					0	1	1	352	576	1.9
Russia	211	193	249	170	201	28	1,052	35	648	618	1,301	47		33		80	73		1,902	4,408	14.6
Ukraine			33			460	493		292	267	559	614		247	164	1,025	263		1,231	3,571	11.9
Romania	3		161	65	4	273	506	266			266					0	56		0	828	2.7
Total	434	226	490	281	333	761	2,525	332	940	885	2,157	661	0	280	164	1,105		1	3,846	9,634	32.0
Africa & Mid East																					
Libya				12			12	77			77					0	245		348	682	2.3
Egypt	154		44	35	57		290	201			201		15	38		53			210	754	2.5
Kuwait							0	453			453	17	194		20	231		56	0	740	2.5
Qatar	95			35			130	828			828	152	263	54	159	628		584	790	2,960	9.8
Saudi Arabia	8						8	635			635	290	507	40	127	964	209	270	489	2,575	8.6
Oman							0				0	992				992			0	992	3.3
UAE							0				0	136				136			410	546	1.8
Total	257	0	44	82	57	0	440	2,194	0	0	2,194	1,587	979	132	306	3,004	454	910	2,247	9,249	30.7
America																					
USA							0			374	374					0			286	660	2.2
Canada							0	1,787			1,787					0			3	1,790	5.9
Trinidad	12						12	462		10	472					0			219	703	2.3
Venezuela	22				52		74	352	167	68	587					0			351	1,012	3.4
Argentina							0		336		336					0			232	568	1.9
Total	34	0	0	0	52	0	86	2,601	503	452	3,556	0	0	0	0	0	0	0	1,091	4,733	15.7
Asia(Total)					25		25	494			494	13	426	119	223	781	0	443	1,734	3,477	11.5
Others(Total)	88	220	287	66	72	64	797	600	30	0	630	0	61	0	0	61	646		887	3,021	10.0
Grand Total	813	446	821	429	539	825	3,873	6,221	1,473	1,337	9,031	2,261	1,466	531	693	4,951	1,100	1,354	9,805	30,114	100.0
Ratio %	2.7	1.5	2.7	1.4	1.8	2.7	12.9	20.7	4.9	4.4	30.0	7.5	4.9	1.8	2.3	16.4	3.7	4.5	32.6	100.0	

(Source: Compiled by Study Team based on FAO data)

Table 5.2-10: Ammonia Import and Export Volume by Country

Unit: 1,000 tons NH_3

Importers / Exporters	West & East Europe								America			Asia				Others	Grand Total	
	France	Germany	Bergium	Spain	Norway	Sweden	Turkey	Total	USA	Brazil	Total	India	Korea	Taiwan	Total		Volume	Ratio %
W. & E. Europe																		
Netherlands		134	64		121	125		444			0				0	313	757	4.0
Germany				6	91	35		132			0				0	216	348	1.8
UK		89	29	51	23			192			0					17	209	1.1
Russia	348	51	351	79	113	2	135	1,079	1,189		1,189	52	100		152	988	3,408	17.9
Ukraine		95	18	21	20	38	348	540	825		825	77	72		149	314	1,828	9.6
Poland					7			7			0				0	303	310	1.6
Total	348	369	462	157	375	200	483	2,394	2,014	0	2,014	129	172	0	301	2,151	6,860	**36.0**
Africa & Mid East																		
Algeria		107	10	31		221		369	10		10				0	227	606	3.2
Iran								0			0	189			189	29	218	1.1
Qatar								0	30		30	301	23		324	108	462	2.4
Saudi Arabia								0	25		25	326	40		366	34	425	2.2
Total	0	107	10	31	0	221	0	369	65	0	65	816	63	0	879	398	1,711	**9.0**
America																		
USA								0			0		547		547	94	641	3.4
Canada								0	1,338		1,338				0	0	1,338	7.0
Trinidad			35		26			61	4,213	238	4,451				0	155	4,667	24.5
Venezuela								0	149	17	166				0	86	252	1.3
Total	0	0	35	0	26	0	0	61	5,700	255	5,955	0	547	0	547	335	6,898	**36.2**
Asia(Total)								0	44		44	390	285	548	1,223	860	2,127	**11.2**
Others(Total)	16	221	19	28	11	155	1	451	156	0	156	364	1	0	365	470	1,442	**7.6**
Grand Total	364	697	526	216	412	576	484	3,275	7,979	255	8,234	1,699	1,068	548	3,315	4,214	19,038	100.0
Ratio (%)	1.9	3.7	2.8	1.1	2.2	3.0	2.5	**17.2**	41.9	1.3	**43.2**	8.9	5.6	2.9	**17.4**	**22.1**	100.0	

(Source: Compiled by Study Team based on FAO data)

5.2.4 Fertilizer Prices and Related Government Subsidies in Iraq

Iraq used to have government subsidy programs for fertilizers and other agricultural products. In the case of fertilizers, the government (Ministry of Agriculture) used to purchase fertilizers from SCP and other producers at a relatively high price and sell them to farmers at a lower price.

Iraq Government was able to carry out such subsidy programs because it had an enormous amount of revenues from crude oil exportation and the former regime tried to gain popularity among farmers by having such programs.

However, it is also true that such subsidy programs had distorted sound product prices and supply-demand that are usually determined in free market economy. Gradual abolishment of such programs has been voiced recently in order to eliminate such negative impact.

It is not clear in which process the prices for domestic market and exportation are used in the commercial distribution. Although Stud Team have asked the Iraqi side about the subsidy program to solve the problem, Stud Team have yet to receive a response.

In such a condition, Stud Team have collected following information on subsidies for agricultural products based on various sources:

i) According to National Development Strategy issued in 2007 by Iraqi Ministry of Planning and Development Cooperation

The Government of Iraq has begun taking action to liberalize prices of fertilizers, pesticides, wheat, barley and rice. The Ministry of Economy and Trade intends to purchase wheat and rice from farmers at an international price. This is expected to promote agricultural production.

The Government of Iraq is trying to improve its agricultural policy and related programs in order to secure food for a mid-term. More specifically, it intends to expand private agricultural sector, gradually abolish government subsidies, improve water resources management and implement full-scale measures for agricultural recovery.

ii) According to TEC data in 2006

Urea supply-demand balance in 2005 was as follows:

Domestic urea fertilizer demand (for grains; vegetables excluded)	850,000 tons
Domestic urea production	284,893 tons
(Basra 226,744 tons, Baiji 58,149 tons)	
Urea exportation and importation	0

This shows that the domestic production satisfies only about 33% percent of demand. In a normal situation, the shortage is compensated by imports. However, international economic sanctions were imposed on Iraq (1990-2003), which restricted oil exportation and caused a shortage of foreign currencies. This put the country into a situation where it could not import goods during the period. As a result, it used only an absolutely small amount of domestically produced fertilizers.

Another reason why the Government of Iraq has taken the policy is to protect farmers. The Ministry of Agriculture provides subsidies for both domestically produced and imported urea to maintain a low domestic price. In such a condition, it is unrealistic for private companies to import urea.

The international price for urea fertilizers per ton is around 320 U.S. dollars including 250 U.S. dollars for the fertilizers themselves and 70 U.S. dollars for transportation. Iraqi Ministry of Agriculture purchases 1 ton at 215,000 Iraqi dinars (150 USD at the rate of 1 USD = approximately 1,430 Iraqi dinars) from SCF and sells it to farmers for 175,000 Iraqi dinars (or approximately 120 U.S. dollars).

As long as such a huge price gap (between international and domestic prices) exists, it is unrealistic for private companies to import urea as business. This has made importation of urea difficult even without any legal restrictions.

3) According to SCP data

Urea prices before 2003 were as follows:

Urea was sold to farmers at less than 37,000 Iraqi dinars (approx. 20 USD) per ton via the Ministry of Agriculture and to the public sector at less than 65,000 Iraqi dinars (approx. 35 USD) also via the ministry.

After the Iraqi War in 2003, urea prices fluctuated tied to the international prices. The price per ton was 165,000 Iraqi dinars (approx. 135 USD) in 2004 and 500,000 Iraqi dinars (approx. 400 USD) in 2008.

The data i), ii) and iii) introduced above does not give any consistent satisfying explanation about fertilizer prices in Iraq and thus Stud Team would like to summarize our idea based on data from the Iraqi side in future.

5.2.5 Iraqi Trade Balance

As described above, the Government of Iraq was able to provide subsidies because it had a large amount of trade surplus for crude oil exportation. However, as also described earlier, international economic sanctions imposed on Iraq mainly in the 1990s restricted oil exportation and caused discrepancy to trade balance. As a result, it was put into a situation where it is not capable of importing a variety of necessary goods for a long time.

For reference, Iraqi trade structure is introduced briefly.

* Iraq originally exported crude oil and refined petroleum products and imported industrial goods.
* In 1986 (during the Iran-Iraq War), infrastructure of oil mining to transportation was destroyed, which caused a sharp decline of crude oil exportation to post 1.2 billion dollars of trade deficit.
* After the war ended in 1988, crude oil exportation gradually recovered thanks to the construction of new pipelines and restoration of damaged facilities.
* However, Iraqi invasion of Kuwait in August 1990 led the international community to impose economic sanctions on Iraq during the 1990s. As part of the sanctions, the UN heavily restricted crude oil exportation. It was allowed to export crude oil only for the acquisition of such humanitarian goods as food and pharmaceuticals.

* The implementation of UN Oil for Food Program in December 1996 led to the beginning of the improvement of Iraqi economy. In December 1999, The UN Security Council permitted Iraq to export crude oil to satisfy the humanitarian demand under the exchange program. The crude oil exportation has increased to 75% of the level before the Iran-Iraq War.
* As of 2003, oil-related export values accounted for 91.9 percent of all exports and import values of industrial goods accounted for 93.1% of all imports. Both export and import values were 10.1 billion dollars each.

5.3 Chemical Fertilizer Demand Forecast in Iraq

5.3.1 Agriculture Sector and Agricultural Policy in Iraq

According to the National Development Strategy the Government of Iraq announced in March 2007, the agricultural sector and agricultural policy are as follows. Although it is a little long quotation, it is introduced here because it is an important issue. Some specific themes are quotes from document of Water Forum.

Although the agricultural sector does not account for a large portion of all industries in Iraq, it is still an important component. However, it has to depend on a large volume of food import to satisfy the domestic food demand, because of a rapid population increase for the last 30 years, limited arable land, and low productivity of the agricultural sector in general.

In the 1980s, for example, Iraq had to depend 50 percent of necessary food on imports. 69% and 48% of domestic consumption of grains and poultry were needed to be imported, respectively. In 2002, about 90% to 100% of many of important food items, including wheat, rice, sugar, vegetable oil and meats, were imported. After Gulf War III in 2003, the stagnation even accelerated and it will not be able to satisfy its food demand without importation for the foreseeable future. It is also true that for some time in the future it will have no other choice but to depend on food aid from other organizations.

1) Iraq's land area is 43.7 million hectares (hereinafter million hectare is used as the unit) and it can be categorized as in the following:

Non-arable land	34.2	(78%)
Arable land	9.5	(22%)

About 3.5 million hectares to 4.0 million hectares is estimated to be actually used for cultivation.

About 50% of the arable land has very low productivity, barely good enough as pastureland for such livestock animals as goats and sheep in summer.

According to FAO document, other countries (Iraq's neighboring countries and other major countries) have following sizes of arable land. (Figures are those obtained in 1994 and expressed in million hectares.)

(Iraq's neighboring countries)

Egypt:	3.5	Libya:	2.1
Iran:	18.1	Morocco:	9.3
Jordan:	0.4	Oman:	0.06
Syria:	5.5	Qatar:	0.008
Saudi Arabia:	3.8	Tunisia:	4.9
Kuwait:	0.005	Iraq:	5.7
Lebanon:	0.3		

(Other major countries)

Japan:	37.2	France:	19.5
India	169.7	Germany:	12.0
China:	95.8	Italy:	11.1
US:	187.8	Spain:	20.1
Brazil:	50.7	UK:	5.9

Major crops in Iraq are date, wheat, barley, corn, rice, cotton and various fruits. Date, grape and olive are cultivated on a total area of approximately 0.34 million hectares.

Although the size of cultivated land of grains, legumes, fruits and vegetables differ every year because of climate and market conditions, it is reasonable to say that 3.5 million to 4 million hectares of land is cultivated. Land for wheat and barley accounts for 75% to 85% of land for all grains.

2) Cultivated land in Iraq is largely divided into rainwater-dependent grain production area in the northern part and irrigated farmland where grains, fruits and vegetables are grown in the central to southern part. According to data of the UN Food and Agriculture Organization, there was 2.55 million hectares of irrigated farmland in 1989.

The following description is found in Water Forum document:

A total of 5.5 million hectares of land was irrigable in 1990 — 63% around the Tigris, 35%

around the Euphrates, and 2% around the Shatt al-Arab waterway.

Soil condition is generally good. When the water level rises, flood irrigation (planting takes place when flood covers irrigated area with water and overflow of surface water goes into the headrace and earth-fill dam) was once conducted. Development of reservoirs in irrigable areas also helped a gradual increase of irrigable land from 4.25 million hectares in 1976. However, irrigation development still depends on the river water volume that is eventually natural phenomena and thus it is unstable.

By 1990, area size where irrigation water is managed increased to about 3.2 million hectares. This comprises of 0.1 million hectare (3%) around the Shatt al-Arab waterway, 2.2 million hectares (67%) around the Tigris, and 1 million hectares around the Euphrates (30%). This means that a total of 3.305 million hectares is irrigated by surface water. However, in reality, most of irrigation facility cannot be used due to salt damage and flood damage. As of 1993, irrigation facility that was actually functioning covered only 1.93 million hectares of areas.

3) The former regime struggled to manage the private agricultural sector and agricultural investment from 1979 to 1990. Although revenues from oil grew rapidly, the government wasted them for purchasing techniques from Europe and the United States and as an enormous amount of subsidies for the private agricultural sector. After Gulf War III, Iraq was divided into two regions — three northern governorates centering around Erbil and the remaining 15 governorates. The former regime launched various programs for the 15 governorates for domestic food production increase and food management after international economic sanctions by the UN and other organizations. They include monopolistic management of major grain production by the government and rationing of major food items under the national government control.

4) Due to various governmental stimulus packages and rise of domestic food prices, Iraqi farmers tried to cultivate hillsides with very low productivity for planting. As a result, cultivated land increased in 1992 and 1993. However, productivity did not improve because of shortages of fertilizers, farming tools and pesticides. The irrigation infrastructure was not rehabilitated and most of irrigation facility in the central to Southern part of the country is becoming old.

5) Restoration of public safety is of urgent need in order to recover the domestic grain production. Political stability and restoration of public safety is the key to bringing investment into the agricultural sector for its growth.

6) Rehabilitation of irrigation facility (long-term desalination project plan) and establishment of grain distribution infrastructure, which includes shipping and storage facility and distribution system for agricultural products, are of great importance.

7) Iraq heavily depends on international food aid. According to an estimate, the country needs more than 2 million tons of food, or food that worth 1.7 billion dollars, for the next six months, which is the biggest in the 40-year history of aid programs. According to the estimate, 16 million Iraqis (more than two-thirds of the national population) have no other choice but to depend on the food aid.

8) What is of most urgent need for the recovery of Iraq's agricultural sector is supply of quality seeds. Farmers need several thousand tons of high quality seeds mainly of wheat, rice, barley and root and other vegetables as well as pasture grass seeds to improve degraded pastureland as early as next year.

9) Iraq was capable of supplying major grains by itself until the end of the 1970s. However, it now needs to import necessary food items. The required amount of food is increasing because of a population increase at the rate of 3% per annum, which is about twice as high as that of India and China.

10) Handling of salt damage is a serious issue. About 75% of irrigated cultivated land suffers the damage as a result of improper water management. There is an urgent need to review the irrigation facility management method and adopt crops resistant to salt damage from international hybrid management organizations and gene development organizations.

Water Forum provides the following explanation:

Salt damage to soil is a serious issue in the region and a decrease in crop yield was reported due to salt damage to soil 3,800 years ago. In 1970, half of irrigated area in the central and southern Iraq became infertile due to salt and flood damage. A lack of drainage and irrigation techniques is a major cause of the problem. In 1978, a land revival program that includes the development of irrigation canals and drainage and water collection facilities was carried out.

In recent years, 4% of irrigated area is rapidly contaminated by salt to the level of 20% to 50% salt concentration. (74% of irrigated area has some kind of contamination by salt) The Irrigation Agency of the former regime announced that salt that was carried to the

Persian Gulf via the Saddam River was 17 million tons in 1995. Water with high salt concentration (1,500ppm or over) has been used for irrigation to grow dates since 1997. The salt-containing groundwater is used to grow tomatoes in the southern area.

As for the crop yield per hectare of cultivated land, an average of 2.7 tons and 1.7 tons of wheat was produced in irrigated production and in rainwater production, respectively, in 1991. The yield of barley was an average of 1.8 tons per hectare in irrigation production and 1.3 tons in rainwater production.

11) The Government of Iraq began to take action to liberalize the prices of fertilizers, pesticides, wheat, barley and rice. The Ministry of Economy and Trade intends to purchase wheat and rice from Iraqi farmers at international prices. This is expected to promote agricultural production.

The government also intends to improve agricultural policy and related programs in order to secure food on a mid-term basis. More specifically, it intends to expand private agricultural sector, gradually abolish government subsidies, improve water resources management and implement full-scale measures for agricultural recovery.

5.3.2 Current Conditions and Challenges of Water Resources in Iraq

An overview of Iraqi water resources, essential for agriculture, is provided below. Descriptions in this chapter are based on Water Forum, the United Nations Environment Program, “International Water Conflicts—Data Analysis by River System and Resolutions” published by the UN Press, and various data compiled by the Government of Iraq.

Water Flow Control of the Tigris and the Euphrates

Source: Le Monde diplomatique, Paris, 1994, updated in 2001.

(1) Geography of Iraq

- Alluvial plains formed by the Tigris and the Euphrates that originate in eastern Turley accounts for approximately 30 percent of national land.
- The mountainous area consisting of the northern area of the Tigris, the upstream of the Lesser Zab that is a tributary of the Tigris, and areas around The Zagros Mountains (near the border of Iran) located northeast of the Lesser Zab upstream accounts for approximately 20 percent of national land and its peak is at 3,550 meters above sea level.

- The western desert between Syria and Saudi Arabia accounts for approximately 40 percent of national land.
- The Tigris and the Euphrates forms a very flat area in the south of Baghdad. (Baghdad is 34 meters above sea level.) The extensive area encircled by Nasiriyah, Amarah and Qurna forms a lake and wetland district. The Shatt al-Arab River is formed by the confluence of the two rivers in Qurna and discharges into the Persian Gulf.

(2) Rivers Basins

- The annual average flow of the Euphrates River is estimated to be 30km^3. However, it fluctuates significantly within the range of 10km^3 to 40km^3. Unlike the Tigris, the Euphrates has no tributary in Iraq. A total of 10km^3 flows into Lake Al-Hammar annually. The Tigris has the average annual flow of 21.2km^3 and its tributaries are all on the left-side bank.
- Greater Zab River: It originates in Turkey and the flow is controlled by Bakhma Dam. The flow at the confluence with the Tigris is about 13km^3. The flow in Iraq is 25,810km^3 that accounts for 62% of all flows.
- Lesser Zab River: It originates in Iran and the flow is controlled by Dokan Dam. The river basin has a total area of 21,475km^2. Although the flow used to be 7.17km^3, it decreased to 5.07km^3 after the construction of the dam.
- The Al-Adhaim Rivers basin has a total area of 13,000km^2 and the water flow is 0.79km^3. It merges with the Tigris. It is not permanent and appears during floods.
- The Diyala River basin has a total area of 31,896km^2, 75% of which is in Iraq. The flow is controlled by Darbandikhan Dam and the flow at the confluence with the Tigris is 5.74km^3.
- The Nahr atTib River, the Dowarege River and the Shehabi River originate in Iran with a total river basin of 8,000km^2. The water is reported to contain a high level of salt.
- The Al-Karkha River basin has a total area of 46,000km^2, mainly in Iran. A total of 6.3km^3 of water flows into Iraq from a water catchment area of 46,000km^2 annually. It flows into the Hawr Al Hawiza when the water level rises and into the Tigris in the dry season.
- The Karun River originates in Iran and approximately 24.7km^3 flows into the Shatt al-Arab River annually. The Karun River brings a large volume of freshwater into the flow of the Shatt al-Arab River before it discharges into the sea.

- The Euphrates and the Tigris often cause serious damage when they are flooded. The water level of the Tigris sometimes increases at the speed of 30 centimeters per hour. A flood affects an extensive area in the southern region, in particular, regularly and the river bank is destroyed every time when such a serious flood occurs. Thus, a tall embankment is needed along the surrounding villages and roads. The Tharthar reservoir was built to control the rise of water flow at the Samarra Dam in order to protect Baghdad from the flood of the Tigris that occurred frequently in the 1950s.

(3) International Freshwater Agreements and Water Conflicts

More than 90 percent of the water flow in the Euphrates River in Iraq comes from neighbouring countries including Turkey and Syria and thus Iraq needs to have negotiations with these countries to control the flow. The concerned three counties (Turkey, Syria and Iraq) have had such negotiations to coordinate their interests. However, it is very difficult to come up with coordination that satisfies all the concerned nations, and no international agreement on the water issue of the Euphrates River has been concluded among the three nations.

Just as reference, major water conflicts over the Euphrates River in the past are introduced below.

- A conflict gradually emerged over water distribution among Iraq, Syria and Turkey in the middle of the 1960s. Although bilateral and tripartite negotiations were conducted among the three countries several times to find solutions, they have yet to reach any specific agreement.
- Beginning of water intake from two dams (Keban Dam in Turkey and Tabqa Dam in Syria) in 1973 caused a decrease in flow into Iraq, which is believed to have triggered a conflict.
- In 1974, Iraq and Syria negotiated to agree on the water discharge from Tabqa Dam to be increased to 200 million cubic meters annually.
- However, in the following year in 1975, Iraq claimed in protest that Syria had not satisfied the amount agreed in the negotiations. They agreed that Saudi Arabia would serves as a mediator between the two parties. Although details of the agreement are not disclosed, Syria and Iraq take 40 percent and 60 percent of the water flow of the river, respectively, according to some sources.
- However, later, the Southeastern Anatolia Project (GAP) formulated in Turkey was launched, which made an early settlement of the water distribution issue a must.

- In 1980, a joint technical committee to discuss water resources between Turkey and Iraq was formed, which was joined by Syria in 1983. However, they have not yielded any specific result.
- In 1986, a ministerial meeting was held among the three countries, which did not yield any specific result, either.
- In 1990, Ataturk Dam that is the biggest in the GAP began water storage. Because it suspended the flow of the Euphrates River for 30 days, tripartite meetings resumed. However, the talks were discontinued due to the outbreak of the Gulf War.
- In September 1992, ministers of the three nations met in Damascus. Turkey did not agree on Iraqi request to increase water flow and the negotiations broke down. Since then, no significant progress has been made.

(4) Groundwater

Good quality groundwater has been found in areas on the right bank of the Euphrates River and in the hills in the northeast of the country.

In north-eastern Iraq, the water runs at the depth of 5 to 10 meters below ground with the flow of around 10 to 40 m^3/s. The water vein flows toward the south-eastern region and salt concentration increases gradually up to 1 mg/l.

The aquifer on the right bank of the Euphrates river is found at the depth of 300 meters below ground with the water flow of 13 m^3/s. Salt concentration is reported to be 0.3 to 0.5 mg/l.

(5) Dam

As of 1997, 32 dams were in operation, eight were under construction and 13 were under planning in the Tigris and Euphrates river system. Reservoir capacity of all dams in the Tigris river system totalled 13.7 km^3 in 1977. Several dams were built in Iraq in the 1980s. They include Saddam Dam (11.1 km^3) on the Tigris River, multipurpose Qadisiyah Dam (8.2 km^3) on the Euphrates River, Bekhme Dam on the upper stream of the Great Zab (tributary of the Tigris) (17.1 km^3), Badush Dam (0.5 km^3) on the Tigris and some other dams in the desert (total flow of 0.5 km^3).

The construction of the dams increased the reservoir capacity of the Tigris River and the Euphrates River to 42 km^3 and 8.2 km^3, respectively, totalling 50.2 km^3. However, Bekhme Dam has been completely destroyed. As of 1997, Al-Adom Dam on the Tigris, with a capacity of 3.8 km^3, was under construction.

The construction of Tharthar Dam (85 km^3) in the Tigris river basin created two reservoirs that have stored the Wadi Tharthar waters, and, since 1985, Euphrates waters. Habbaniya Dam (3.3 km^3) stores waters in the Euphrates upstream and drains into the Euphrates downstream.

(6) New Water Resources

A new waterway (Saddam River) was constructed in the southern part of the country in order to increase water transport efficiency, minimize water loss and improve water quality. The Saddam River (or Third River) collects drainage water from more than 1.5 million hectares of farmland spreading from north of Baghdad to the Persian Gulf. The waterway construction was completed in December 1992 with a total length of 565 km and with a total discharge of 210 m^3/s. Other waterways were also constructed for reclamation of farmland, etc.

It is reported that, in 1990, water consumption in Iraq totalled approximately 42.8 km^3, 92% for agriculture, 3% for domestic use and the remaining 5% for industrial use. According to a recent survey, 85% of river water is used for agriculture.

(7) Major Challenges

- Responsive measures to decreasing water intake due to the impact of dams on the upstream of the Tigris and the Euphrates
- Drainage management in wetlands
- Solution to contamination of surface water caused by sewerage and garbage
- Restoration and good management of water supply network destroyed by wars
- Effective management of irrigation system to stop rising salt concentration
- Prevention of groundwater contamination caused by oil leakages
- About 5 million Iraqis (19% of the population) have no access to safe water and sanitary facility. Solution to the problem.
- Recent frequent suspension of operation of water and sewerage facilities is said to be caused by insufficient power supply system. Solution to the problem.
- Although 100% of city dwellers had access to safe water, only 55% of Iraqis in other areas had the access in 1991. This is because Iraq was not able to import chlorine necessary for water treatment as a result of the international economic sanctions after the Gulf War. Solution to the problem.

5.3.3 Chemical Fertilizer Demand Forecast in Iraq

It is not easy to forecast future demand of fertilizers accurately because there are a number of factors, which include future population increase/decrease, improvement of living standard, increase/decrease of arable land area, increase/decrease of fertilizer application per unit of arable land, crops, and fertilizer trade policy.

The factors listed below are used to forecast future chemical fertilizer demand in Iraq.

(1) Conditions

1) Population (unit: thousand people)

2000: 24,080

2002: 27,960

2012: 33,700 (2.7% of estimated annual increase)

2020: 41,700 (2.7% of estimated annual increase, about 50% increase from 2005)

2) Arable land (unit: million hectare)

The figures are not official but the following estimates are available. According to data of the Government of Iraq in 2007:

① Currently cultivated land: approx. 3.5 to 4.0

② Estimated maximum arable land: approx. 9.5

However, about 50% of the estimated maximum arable land has very low productivity, barely good enough as pastureland for such livestock animals as goats and sheep in summer, according to the governmental document. Thus, an optimistic estimate of land areas that would be actually cultivated for crops and where fertilizers would be applied is around 70% of the estimated maximum (6.65 million hectares, which is about 50 percent more than 4.0 million hectares that are currently cultivated. This corresponds to the 50% population increase in 2020 from 2005 mentioned above).

3) Types of fertilizer used in Iraq

As described in Sections 6.2.1 “Production Trend” and 6.2.2 “Trend of Urea Demand in Iraq”, nitrogen fertilizers account for an extremely large portion. Most of ammonia is consumed for urea production and about 8% is estimated to be transported to Al-Qaim for phosphate fertilizers (FY 2009).

Thus, chemical fertilizer demand forecast in Iraq is discussed based on urea demand forecast. .

4) Urea demand in Iraq

As also mentioned repeatedly earlier, supply-demand balance has not been led by market mechanisms recently in Iraq. There is no structure in which producers manufacture the necessary amount to satisfy actual consumer demand.

In fact, the total design capacity of two urea production plants in Iraq (Khur Al-Zubair plant in Basra and Baiji plant) is 1,633,500 tons. In 2002, approximately 989,000 tons were produced and 739,000 tons were consumed domestically. However, since 2003, both the production and consumption volumes have been low at around 300,000 to 400,000 tons. Thus, the figures after 2003 are not used for reference as normal conditions.

Usually, importation covers the gap. However, the Government of Iraq has had a policy to hinder fertilizer imports by providing subsidies for fertilizers. The shortage of agricultural produce has been imported and provided by other countries' food aid.

The most recent year when the supply-demand was somewhat reasonable was 2002. Thus, approximately 989,000 tons of the domestic production and 739,000 tons of domestic demand after the exported volume is subtracted are used in the calculation below.

5) Grain self-sufficiency rate in Iraq

According to data of the Government of Iraq, grain self-sufficiency rate in 2002 was 33% and the remaining 67% was satisfied by importation and food aid from overseas. As described earlier, because fertilizer consumption has decreased since 2003, the rate is estimated to have also fallen. However, no specific figures are available.

6) Urea fertilizer application in volume per hectare of cultivated land in Iraq

As described in 2) and 4) above, about 4,000,000 hectares are cultivated in Iraq and 739,000 tons of urea was consumed in 2002.

Thus, urea fertilizers applied to per hectare of cultivated land in Iraq were 185 kg (739,000 tons/4,000,000 hectares) in 2002.

7) Urea fertilizer usually necessary per hectare of cultivated land

About 200 to 250 kg of urea is applied per hectare.

(2) Estimated Urea Fertilizer Demand in Iraq

Fertilizer demand in Iraq is estimated based on the conditions above.

1) When urea applied per hectare of cultivated land is increased from the current 185 kg to 250 kg to meet the demand increase caused by population increase, with no increase of arable land (4,000,000 hectares):

4,000,000 ha x 250 kg = 1,000,000 tons

2) When arable land is increased from the current 4,000,000 hectares to the maximum of 9,500,000 hectares or 6,650,000 hectares (about 50% increase from the current level) and urea applied per hectare of cultivated land remains at the current level of 185 kg or is increased to 250 kg to meet the demand increase caused by population increase (50% increase from 2005 to 2020):

① 9,500,000 ha x 185 kg = 1,757,500 tons
② 9,500,000 ha x 250 kg = 2,375,000 tons
③ 6,650,000 ha x 185 kg = 1,230,250 tons
④ 6,650,000 ha x 250 kg = 1,662,500 tons

3) When grain self-sufficiency rate is raised from the current 33% to 60% in 2020:

When the grain self-sufficiency rate is 33%, 9,226,000 people of the population of 27,960,000 in Iraq in 2002 were covered by domestically grown grains, which means that 0.43 hectare of cultivated land is necessary to produce grains per person (4,000,000 hectares/9,226,000 persons, 185 kg of urea application/ha).

When the cultivated land areas are increased to raise the self-sufficiency to 60% in 2020 under the same conditions, 10,758,000 hectares (41,700,000 persons x 60% x 0.43 ha/person) of cultivated land is needed.

In this case, necessary urea at the current application level is 1,990,200 tons (10,758,000 ha x 185 kg/ha).

However, it is difficult to increase cultivated land to 10,758,000 hectares (it is estimated to be 9,500,000 hectares at maximum) and thus the fertilizer application per hectare will be increased to achieve the 60% self-sufficiency rate.

When the urea fertilizer application is increased from the current 185 kg per hectare to 250 kg per hectare, 7,960,000 hectares (1,990,200 tons/0.250) will enable the 60% self-sufficiency rate. This size may be feasible.

In other words, when 250 kg of urea is applied per hectare to a total of 7,960,000

hectares to raise the grain self-sufficiency rate to 60% in 2020, a total of 1,990,200 tons of urea is needed. These figures seem achievable.

Urea fertilizer demand is estimated based on the six scenarios above. It is of course important to consider the population increase and development of arable land. However, what is of most importance is what policy the Government of Iraq has and what is done to achieve the policy.

Iraq has a big potential with crude oil reserves estimated to be the second biggest in the world. However, as described in Section 6.3.1. 8) in this report, it has gone through extreme confusion and its grain self-efficiency rate is low and it heavily depends on international food aid.

The government has the responsibility to bring the nation out of such conditions soon and raise the rate from the current 33% to 60% at least to minimize foreign food aid.

To achieve it, the government should aim to achieve the last scenario as its policy — increase of arable land from the current about 4,000,000 hectares to 7,960,000 hectares by 2020 and fertilizer application from the current 185 kg/ha to 250 kg/ha. This requires 1,990,200 tons of urea.

(If **SCP plans 1,500,000 tons of annual urea production**, the capacity of the three plants totals 3,133,500 tons, which exceeds the target demand volume of 1,990,200 tons by as much as 1,143,300 tons.)

If this happens, the competition between the other two urea plants (total capacity of 1,633,500 tons) will become a problem. The two plants are:

① Khur Al-Zubair plant in Basra: 1,056,00 tons of annual design capacity of urea production

② Baiji plant: 577,500 tons of annual design capacity of urea production

＊ However, actual production of the two plants has fallen drastically for various reasons. The production capacity of the Basra plant has been around 300,000 tons since 2003 and that of the Baiji plant was below 100,000 tons from 2003 to 2006 and has been zero since 2007. The two plants are making efforts to recover their capacity and their outcome may change the overall supply-demand balance. In any case, if SCP plans 1,500,000 tons of annual urea production, quite a large volume of excessive supply will be unavoidable.

If the supply exceeds the demand, the following measures can be taken:

① SCP should be given priority as a domestic supplier as a policy. Basra and Baiji plants began operation as ammonia and urea production plants earlier than their counterparts in Iraq, because they have good access to the raw materials of natural gas and they are conveniently located near ports and river ports for transportation.

② The Al-Qaim plant of SCP had no access to gas sources and is located in the westernmost area of the country with bad access to water and land transportation. Thus, it was not considered as a large plant to produce ammonia and urea. It was constructed as a plant to produce a reasonable amount of phosphate fertilizers because it was happened to be located near phosphate rocks in Akashat. However, as explained earlier, their operation has been stagnant due to facility damage caused by wars and problems of gas and ammonia supply.

However, very recently, a promising gas field was found in Al-Qaim, which is believed to enable a large-scale ammonia and urea production. More importantly, new construction of the ammonia and urea plant is expected to help correct the regional industrial gap in Iraq.

Although Al-Anbar is a large governorate in size, it is developed less than other areas in Iraq because the soil is not suitable for farming due to desert that covers the majority of the area, it is remote from the central area with inconvenient transportation systems, and there were no other major resources.

Thus, it is important to make a policy to construct a new large-scale ammonia and urea production plant in Al-Qaim and give priority to their products to supply the domestic market before the products produced at Basra and Baiji plants. In order to realize this, various means of transportation need to be developed to ensure shipment to major farming areas in Iraq and develop product storage and shipment facilities as a national policy.

Various considerations should be given to both Basra and Baiji plants to serve as plants for domestic market next to the Al-Qaim plant. More importantly, there should be a policy to support them establish their status as strong exporters taking advantage of their convenient water transportation. To achieve this, the government has an important role to play, which includes renovation of major ports and harbors, assurance of the function of gas supply pipelines and improvement of power infrastructure. It is important for the government to take a leadership role to enable the three companies in Iraq to exist and prosper together. This role can be fulfilled only by the government.

However, the most urgent challenge the government needs to tackle in order to implement them is the early recovery from public confusion caused by political, religious and social conflicts.

5.4 Supply Mechanism of Raw Materials of Chemical Fertilizer Industry in Iraq

As for main raw material supply mechanism, it is basically mentioned in chapter 5.2.1. Therefore, it will be helpful to add the following issues to make clear the total situation again.

Plant No. 4: Operation of the Baiji plant in northern Iraq dropped sharply in 2003 (67.7% in 2002 to 16.2% in 2003) and to zero in 2007. This is mainly caused by the shortage of raw materials of natural gas supply due to frequent damage to the gas pipeline. It was not able to obtain natural gas for 8 to 9 months in 2005. There is also a problem of power supply. The combination of these factors has led to the zero production since 2007.

The current railway system to transport raw materials of phosphate rocks from Akashat to Al-Qaim consists of one diesel locomotive and 10 freight cars. Although it is sufficient at the current operation level (a little over 20%), more freight cars will be needed when the operation rate improves.

Supply source of ammonia at Al-Qaim plant:

No ammonia is produced at the Al-Qaim plant because the facility is damaged and deteriorated and thus ammonia is supplied from the fertilizer plants in Baiji and Basra. However, it raises the cost and the supply system is unstable. Recently, an abundant volume of natural gas was found in the Akaz field in Al-Qaim. The Al-Qaim plant is expected to produce ammonia with the gas as raw materials. Ammonia necessary for the production of phosphate fertilizers is only 50,000 tons a year. There is an idea to build a large-scale ammonia production facility — with an annual capacity of 1 million, for example — to produce a large volume of urea with a huge surplus after the consumption for phosphate fertilizer production and sell it to domestic and overseas market.

Although it is a very attractive scenario for concerned parties of Al-Qaim, it is also a difficult issue because some of such problems need to be solved: competition with domestic urea producers of Basra and Baiji plants, and whether new construction of ammonia and urea production facility in Al-Qaim is a suitable project as Japan's ODA. Thus, more discussions are needed.

Although the Al-Qaim plant currently produces only NP that contains nitrogen and phosphate among compound fertilizers. It may need potassium in some cases. If this happens, potassium can be imported from neighbouring Jordan that produces the chemical abundantly.

Chapter 6

State Company for Phosphate and

Al-Qaim Chemical Complex

Chapter 6 State Company for Phosphate and Al-Qaim Chemical Complex

6.1 Overview of State Company for Phosphate

In the previous chapters the Study Team discussed the overview of the Ministry of Industry and Minerals of Iraq, and that of the mining and manufacturing sector in the Mid-Western Iraq including Al-Anbar, Najaf and Karbala Governorates. Especially focusing on the chemical fertilizer industry, which the most important industry to the Mid-Western Iraq, Study Team mentioned both domestic and international market trends. In this chapter Study Team will discuss the overview of the State Company for Phosphate (hereinafter referred to as SCP), which manages this industry that is extremely important to the region.

6.1.1 Current Status of SCP

SCP is a state-owned company that was established in 1976 with a capital of 350 million Iraqi dinars (approx. 28 million yen at the current exchange rate). It has been managing phosphate rock in Akashat and a phosphate fertilizer complex in Al-Qaim. The company's products (including intermediate products) are sulfuric acid, phosphoric acid, and phosphate fertilizers such as TSP (Tripe Super Phosphate) and MAP (Mono-Ammonium Phosphate), compound fertilizers (NP and NPK). Fluorine salt is also produced as a by-product. The basic information of SCP is as below.

Establishment: 1976

Commencement of commercial operation: 1983

Initial paid-in capital:	350 million Iraqi dinars (approx. 28 million yen at the current exchange rate)
Authorized capital:	7,358 million Iraqi dinars (approx. 600 million yen at the current exchange rate, as of 2006)
Number of employees:	2,916 as of 2006
Business contents:	Production of phosphate rock in Akashat
	Production of chemical fertilizers and intermediate products in Al-Qaim Complex
Turnover:	29,961 million Iraq dinars (approx. 2,400 million yen at the current exchange rate)

6.1.2 Plants and Other Facilities Owned by SCP

The construction of the Al-Qaim Phosphate Fertilizer Complex was started in 1978 by a consortium led by a Belgian company, SYBERTA, and completed in 1983. The total investment is said to be 1,000 million USD. The design capacity and the overview of major products are as follows.

1) Phosphate rock (Unit-900) : Annual production 3.4 million tons
(Concentration is 22% of P_2O_5. Phosphate rock is mined in Akashat, 170 km west-southwest of Al-Qaim. The proven reserves of phosphate rock are approx. 0.5-0.7 billion tons and the estimated reserves are approx. 3-4 billion tons. All phosphate rock are transported to the Al-Qaim plant by rail.)

2) Beneficiation unit (Unit-100) : Annual production 1.7 million tons, 2 lines
(The concentration of P_2O_5 delivered from Akashat is enriched from 22% to 30%. This process and all processes after this are carried out in Al-Qaim.)

3) Sulfuric acid production plant (Unit-200): 98.5% sulfuric acid, annual production 1.5 million tons
(Has a daily production capacity of 1,500 tons with 3 lines. Sulfur used for production is delivered from Mishraq Sulfur Mine in Mousel and oil refineries in the country.)

4) Phosphoric acid production plant (Unit-300): Liquid phosphate of 54% P_2O_5, annual production 0.83 million tons
(Has a daily production of 1,260 tons with 2 lines. Materials are phosphate rock and sulfuric acid.)

5) Ammonia production plant (Unit-451): Annual production 50,000 tons
(Natural gas used for this production is supplied via a pipeline from Kirkuk, in the north of Iraq. However, the plant has been shut down since 1990 and thus liquid ammonia is currently transported by tank truck from a fertilizer plant in Baiji.)

6) Fertilizer production plant (Unit-400)

6-1) TSP (Triple Super Phosphate)

Total annual production of 600,000 tons (45% P_2O_5 concentration) with 2 lines

Raw materials: Phosphate liquid (0.44), phosphate rock (0.385)

* Figures in the parenthesis indicate the amount of raw materials in ton required to produce 1 ton of TSP.

Use: It is hard to dissolve in water and suitable for acid soil, volcanic ash soil and soil improvement of poor soil. It dissolves and is absorbed in the organic acid in root crop. It has a slow-acting effect.

6-2) MAP (Mono-ammonium Phosphate)

Annual production of 280,000 tons with 1 line (52% P_2O_5 concentration, 11% nitrogen concentration)

Raw materials: Phosphoric acid (0.578), ammonia (0.144)

Use: The mix ratio of nitrogen and phosphorus is excellent and it is an essential fertilizer for the growth in the early stage of various crops. It is also frequently used as the intermediate as raw materials of compound fertilizers.

6-3) Compound fertilizer (NP and NPK)

NP and NPK: Annual production of 655,000 tons with 2 lines

Because potassium fertilizers are rarely needed due to the property of the soil in Iraq, the plant mainly produces NP.

Raw materials: For NP (N27:P27)

Urea (0.472), MAP (0.51), sulfuric acid (0.005)

For NPK (N18, P18:K18)

Urea (0.317), MAP (0.329), KCL (0.317), sulfate (0.028)

* Urea is transported from fertilizer plants in Baiji in northern Iraq and Basrah in southern Iraq by truck. Ammonia is transported in liquid form from a fertilizer plant in Baiji by tank truck.

Use: Fertilizers whose total contents of nitrogen, phosphate and potassium exceed 30 percent are called compound fertilizers. In the case of SCP, the ingredient content ratio of NP is N:P = 27:27. The N:P:K ratio of NPK is 18:18:18.

What is important in selecting a compound fertilizer is the balance of the three ingredients. Horizon-type fertilizers with well-balanced contents of the three ingredients are suitable as base fertilizers and the mountain type with high contents of phosphate is suitable as base fertilizers for long-term crops (fruit vegetables, root vegetables and flowers) that require a large amount of phosphate. Valley-type fertilizers with low contents of phosphate are suitable as base fertilizers for leafy vegetables with a short growing period as well as for top-dressing.

7) Sodium fluorine production plant: (Unit-500). By adding and reacting aluminum hydroxide with fluorosilicate that is a byproduct of phosphoric acid produces sodium fluorine. The product is used as an alternative to zeolite, mainly for detergent manufacturing. However, the plant is hardly operated due to manufacturing technical problems.

8) Utility infrastructure: (Unit-620) Power generator - design capacity 34.8MW (2 diesel power generators, 2 steam turbine generators; currently only 1 diesel generator is operating.)

Water intake facility - 180,000M^3/d. (from the Euphrates)
Compressed air - 144,000 M^3/d. Wastewater treatment installation

Roads and railroads are well developed to connect the plants with the outside. For example, they are connected to such major cities as Baghdad, Baiji, Mosul, Kirkuk and Basrah and used for transportation of raw materials and products shipment. There is a special cargo line to connect with the phosphate ore production site of Akashat. There is also a warehouse for product exportation in Umm Qasr south of Basrah from where products are exported.

Roads and railroads between plants and with the outside are well-developed. They connect major regions and major cities including Baghdada, Beiji, Mousel, Kirkuk and Basrah, used for transportation of raw materials and shipment of products. Especially, there is a special freight line connecting with Akashat, where phosphate rocks are produced. There is also a warehouse for export in Umm Qasr, to the south of Basrah, from where products are exported.

6.1.3 Trend of SCP Operation

The table and figure below show the trend of production and sales volumes of each product for the last 27 years from the beginning of its operation in 1983 to 2009.

Table 6.1-1: Trend of Production and Sales Volumes of SCP Products (1983-2006)

(Unit: ton)

		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
TSP	Production	229,898	294,195	389,549	378,533	454,098	478,294	322,557	327,145	6,235	92,745	114,295	65,469	24,145	27,930
(Capacity 600,000 tons)	Sales	178,538	337,294	349,866	361,631	483,651	387,112	293,529	731,520	17,052	13,800	25,597	3,369	5,428	29,724
MAP	Production	76,142	74,649	115,253	153,509	101,358	173,964	203,208	108,640	14,145	69,250	64,445	48,786	62,645	4,854
(Capacity 280,000 tons)	Sales	26	53,501	21	17,624	59,338	60,770	64,480	37,427	0	20	48	16	9,955	5,994
NP & NPK	Production	82,932	110,179	224,080	181,168	212,715	363,242	281,323	244,618	175,718	314,507	409,583	394,942	276,890	227,350
(Capacity 655,000 tons)	Sales	49,312	123,146	172,555	244,230	210,026	69,563	375,150	390,076	162,715	325,612	406,546	393,740	273,561	224,051
Phosphoric Acid	Production	140,342	148,207	220,032	230,032	235,210	272,880	258,089	211,050	13,855	80,696	100,580	69,598	53,785	36,235
(Capacity 400,000 tons)	Sales														
Sulphuric Acid	Production	514,807	507,217	763,507	753,330	885,190	1,023,500	984,147	784,080	65,176	338,424	431,090	323,930	278,700	217,550
(Capacity 1,500,000 tons)	Sales														

Table 6.1-1 continued

		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
TSP	Production	27,900	6,790	13,030	51,525	73,110	112,210	25,690	0	0	0	8,100	1,000	4,800	3,529,243
(Capacity 600,000 tons)	Sales	27,603	4,412	5,895	52,642	87,100	122,381	25,998	1,122	0	0	5,368	5,645	0	3,556,277
MAP	Production	0	11,135	3,900	3,900	11,595	11,595	5,860	0	0	0	0	0	0	1,318,833
(Capacity 280,000 tons)	Sales	132	35	2,717	942	45	4	221	0	0	0	0	0	0	313,316
NP & NPK	Production	288,000	192,370	242,900	228,220	247,340	343,340	81,600	16,600	82,550	81,500	35,450	112,650	147,800	5,599,567
(Capacity 655,000 tons)	Sales	293,860	190,255	218,644	167,833	378,999	164,612	65,421	33,721	45,110	54,409	69,736	12,069	126,268	5,241,220
Phosphoric Acid	Production	39,095	18,135	25,665	37,485	50,075	75,540	18,870	0	2,400	0	4,567	385	1,850	2,344,658
(Capacity 400,000 tons)	Sales														0
Sulphuric Acid	Production	191,918	134,940	182,910	193,250	232,200	282,500	49,050	3,700	19,000	25,900	0	21,800	30,650	9,238,466
(Capacity 1,500,000 tons)	Sales														0

(Source: SCP Data, April 2000)

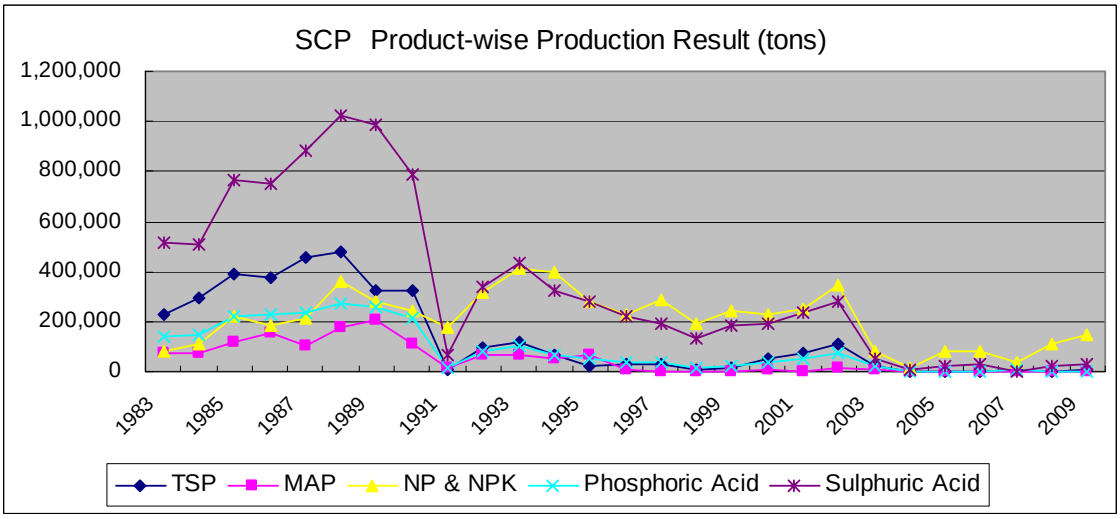


Figure 6.1-1: Trend of SCP Production Volume by Product

(Source: Compiled by Study Team based on SCP document)

The table below shows the average of production and sales volumes of each product for the last 27 years from the beginning of its operation in 1983 to 2009.

Table 6.1-2: SCP Activities

		Average of production and sales volumes for 27 years (ton/year)	Average of production and sales volumes for 27 years Ratio of design capacity
TSP (Design capacity 600,000 tons)	Production volume	130,713	21.8%
	Sales volume	131,714	22.0%
MAP (Design capacity 280,000 tons)	Production volume	48,846	17.4%
	Sales volume	11,604	4.1%
NP&NPK (Design capacity 655,000 tons)	Production volume	207,391	31.7%
	Sales volume	194,119	29.6%
Phosphoric Acid (Design capacity 400,000 tons)	Production volume	86,839	21.7%
	Sales volume		
Sulphuric Acid (Design capacity 1,500,000 tons)	Production volume	342,165	22.8%
	Sales volume		

(Source: Compiled by Study Team based on SCP document)

SCP's operation grew at a relatively steady pace since its opening in 1983 in the midst of the long-lasting Iran-Iraq War (1980-1988). Specifically, the operation rate by product and process grew to 80% for TSP, 55% for NP, 68% for phosphate and 68% for sulphate in 1988. However, following the Iran-Iraq War, Iraq had to take a wartime regime continuously because of the breakout of the Gulf War II in 1990 when Iraq invaded Kuwait. The invasion of Iraq that began in 2003 led by the US and UK military forces, which is also called Gulf War III, led to the demise of Saddam Hussein's regime and further battered the Iraqi economy. This series of events forced SCP's business performance to drop significantly. Study Team will first discuss the relationship between the wartime economy (especially relationship with Gulf War II) and the business performance of SCP.

- The Iran-Iraq War that broke out in 1980 and lasted eight years posed a huge economic and social burden to Iraq. The two countries attacked each other's oil plants that are their economic lifeblood, causing serious damage to them. Crude oil exportation on which Iraqi economy depended declined significantly, the costs of the war increased, and inflow of investment funds from overseas was hindered for a long time. As a

result, the nation's economy became short of funds and stagnant inevitably. The war is said to have caused at least 100-billion-dollar economic damage to Iraq.

- Gulf War II that broke out on August 2, 1990, worsened the situation. According to Iraq, Kuwait extracted a huge volume of crude oil from Rumaila Oil Field that is originally Iraqi territory and the war broke out to prevent the extraction. However, the aerial bombardment from January 17,1991, by the allied forces caused damage to Iraq to successfully prevent it from making a move and the war ended about one month later on February 28, 1991. It is undoubtable that the damage caused to various production facilities in Iraq accelerated its economic exhaustion. The international sanctions imposed on Iraq (1990-2003) for its invasion of Kuwait is one of the key factors that prevented the recovery of Iraqi economy.
- Against the backdrop, SCP's operation further deteriorated. Its management worsened due to a shortage of funds and goods, serious shortage of quality goods, for example, (because the oil export was significantly restricted and its purchasing power dropped remarkably), due to the international economic sanctions. As a result, SCP had no other way but to use low-quality parts, which prevented it from maintaining the facility properly. Furthermore, SCP plant was seriously hit by the airstrikes by the allied forces in February 1991 (about 70 strikes, according to sources) and its production facility was severely destroyed.
- As a result, SCP's operation rate dropped significantly. The war had a catastrophic impact on the operation of most of the processes in 1991 and 1992. The operation rate (to its design capacity) in 1991 was 1 % for TSP, 26% for NP, 1.6% for phosphoric acid and 4.3% for sulfuric acid. The low operation rate has not changed much until today through Gulf War III in 2003.
- Ammonia production required for producing MAP that is a raw material for compound NP was completely suspended at the Al-Qaim plant. In order to obtain ammonia, it is transported from the Baiji plant by tank truck. However, it has become difficult to secure a necessary amount because of the worsening safety of the areas along the transportation route and the rising transportation cost. As a result, MAP production fell drastically after 1997, having a serious adverse impact on the production of compound fertilizer. There is a rising momentum toward the construction of a large-scale ammonia and urea facility in the Al-Qaim plant for the improvement of the condition and development of the plant. This will be discussed later.
- Iraqi Ministry of Industry and Minerals has led the production plant reconstruction plan and great efforts have been made to restore the facilities to the level of the design capacity since the end of Gulf War II. However, the negative impacts described

earlier, especially the impact of the international economic sanctions, have severely hindered the pursuit of the reconstruction plan.

- Going through the 2003 Iraq War (the Saddam Hussein's regime collapsed as a result of the invasion by allied forces led by the US and the UK), the situation is worse mainly due to nationwide worsening security and political turmoil. It is true that its economic activities are mostly stagnant.
- Against the backdrop, SCP's situation has further deteriorated. Production of TSP, MAP and phosphate has been close to zero since 2004 and the operation rate of NP and sulfuric acid is around 12% and 1.2%, respectively. It is highly regrettable to say that the plant as a whole is not functioning at all.
- Analysis of the profit and loss statement and balance sheet is of great importance to understand corporate management conditions in a normal situation. However, Study Team have yet to acquire financial statements of SCP. Although Study Team cannot assure firmly, it is estimated that SCP has a huge amount of cumulative losses when the very low operation rate for a long time is taken into consideration. Its accounting and financial conditions would threaten its survival if it were not a state-owned company.
- The figure below amplifies the conditions stated above, showing the situation in which production volume of crude oil that is lifeblood of Iraq inevitably dropped drastically after each major conflicts including the Iraq-Iran War. The figure shows the trend of crude oil production volume based on UN document. (Unit: 10,000 tons)

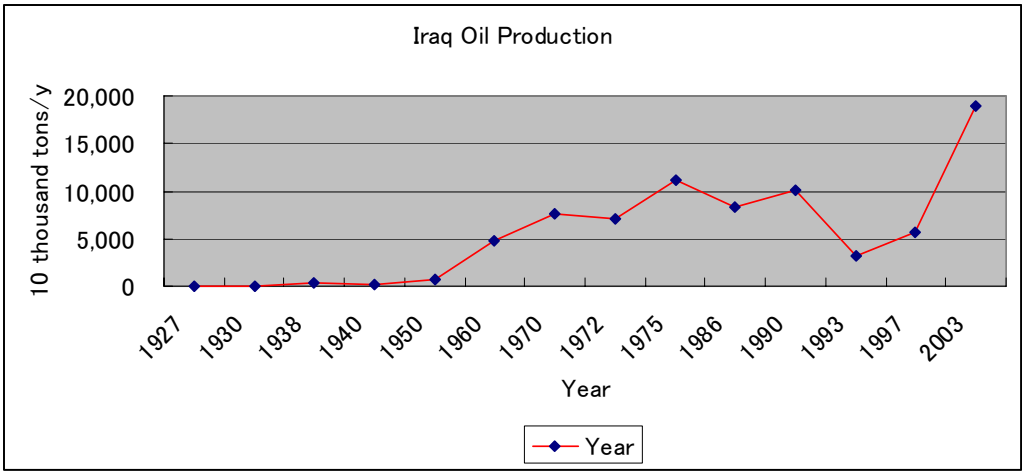


Figure 6.1-2: Trend of Crude Oil Production Volume in Iraq

(Source: Compiled by Study Team based on UN document)

6.1.4 SCP Product Prices

SCP document (Investment File of Rehabilitation, The Fertilizer Complex for State Company for Phosphate, April 2009) gives the product prices information in the table below. Because it is unclear when the prices were used, exchange rate in 2007 (1,267ID/$) is used for convenience.

Table 6.1-3: SCP Product Prices

	Prices for domestic sale		Prices for importation	
	ID/ton	$/ton	ID/ton	$/ton
NP	425,000.0	335.4	506,800.0	400.0
TSP	750,000.0	591.9	506,800.0	400.0
Sulphuric acid	500,000.0	394.6	-	-

(Source: Calculated by Study Team based on SCP document)

6.2 Current Status of Operation of Al-Qaim Phosphate Fertilizer Complex (Result and Review of Field Survey)

The basic information of SCP (including the outline of each unit) is described in Section 6.1. In this section Study Team will discuss the design capacity, current production capacity, operation status, issues and technical observations drawn through information gathering and field survey about Akashat phosphate rocks mines and Al-Qaim Phosphate Fertilizer Complex.

As previously stated, study team applied a local partner who was able to enter Iraq because it was difficult for the study team to conduct survey in the country due to still remaining concerns about security. The local partner conducted field survey from February 15 to 17, 2010. The study team received their feedback about the survey, photos and video of the sites in a report meeting held in Beirut on March 1 and 2, 2010.

6.2.1 Overall Process Flow and Plant Overview of Al-Qaim Phosphate Fertilizer Complex

The overall process flow of Al-Qaim Phosphate Fertilizer Complex is shown in Figure 6.2-1 and the Complex overview in Figure 6.2-2.

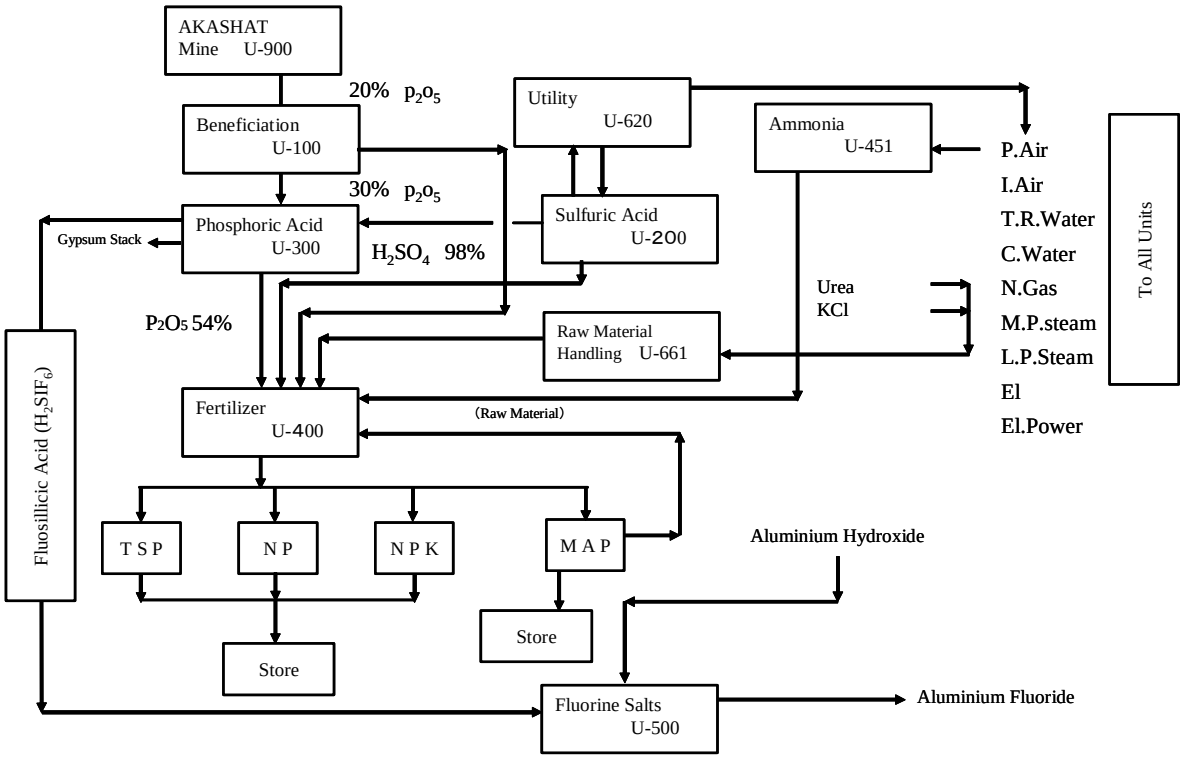


Figure 6.2-1: Overall Process Flow of Al-Qaim Phosphate Fertilizer Complex

(Source: Compiled by the Study Team based on SCP data)

Plant overview of AL-Qaim

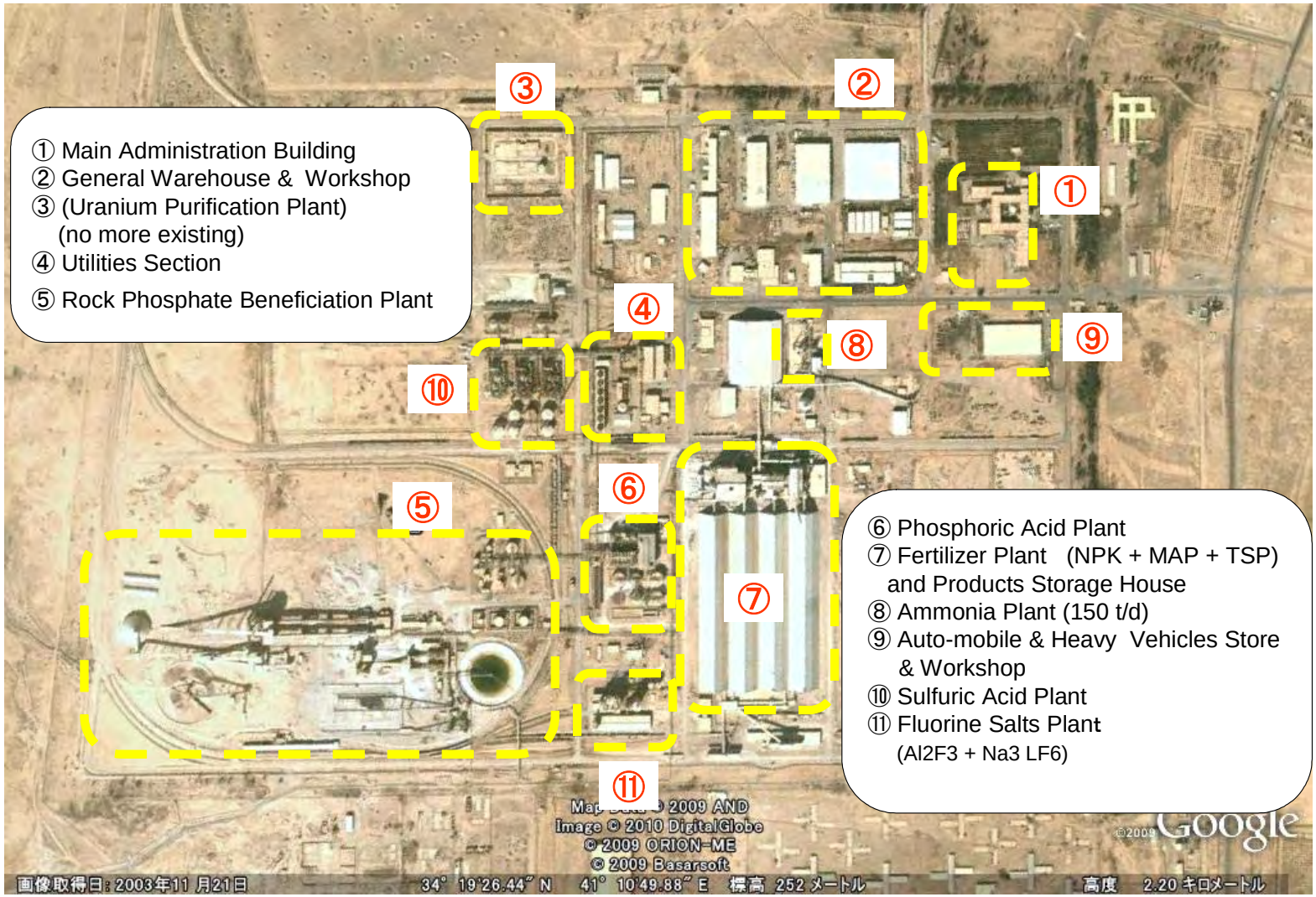


Figure 6.2-2: Complex Overview
(Source: Compiled by the Study Team based on SCP data)

6.2.2 Flow (Block) Diagram, Design/Current Capacity, Issues and Technical Observations of Each Unit

6.2.2.1 Akashat Mine (Phosphate rocks Mining Unit)

1) Block Flow of this unit is shown in Figure 6.2-3.

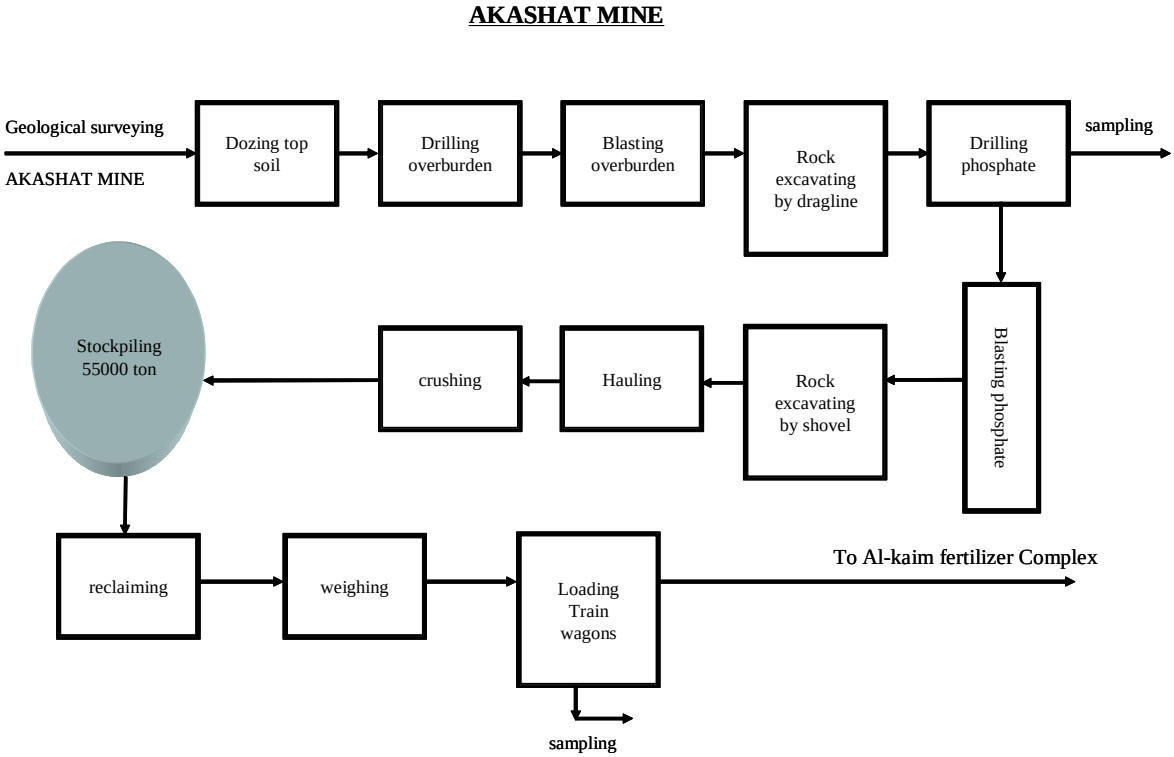


Figure 6.2-3: Akashat Mine (Phosphate rocks Mining Unit) Block Flow

(Source: Compiled by the Study Team based on SCP data)

2) Design capacity, current capacity, issues and technical observations of this unit

2-1) Design capacity and current capacity

Although the design capacity of this unit is 3,400,000 tons/year, the current production capacity is about 27% of it.

2-2) Issues, technical observations and others (photos of issue examples attached)

Restoration of the production capacity requires repair and new purchase of major equipments such as bulldozers, rock drills, mechanical shovels, storage facilities (chutes) and measuring instruments.

Supply of necessary explosives for excavation is another important factor. (Currently explosives are controlled by the army and not supplied to SCP.)

180 workers are engaged in the operation and maintenance of this unit.

2-3) Diagnosis of the facilities (A: No Problems B: To be repaired C: To be renewed)

Unit No.	Equipment	Piping	Instrument	Structure/ Foundation	Soil	Unit Overall
900	B	B	C	A	A	B

Figure 6.2-4: Current Status of Storage Facilities for Phosphate rocks

(Source: Compiled by the Study Team based on SCP data)

Phosphate rocks are released at a long distance from the unloading point, which prevents proper loading. Chutes need repairing.

6.2.2.2 Beneficiation Unit

1) Block Flow of this unit is shown in Figure 6.2-5.

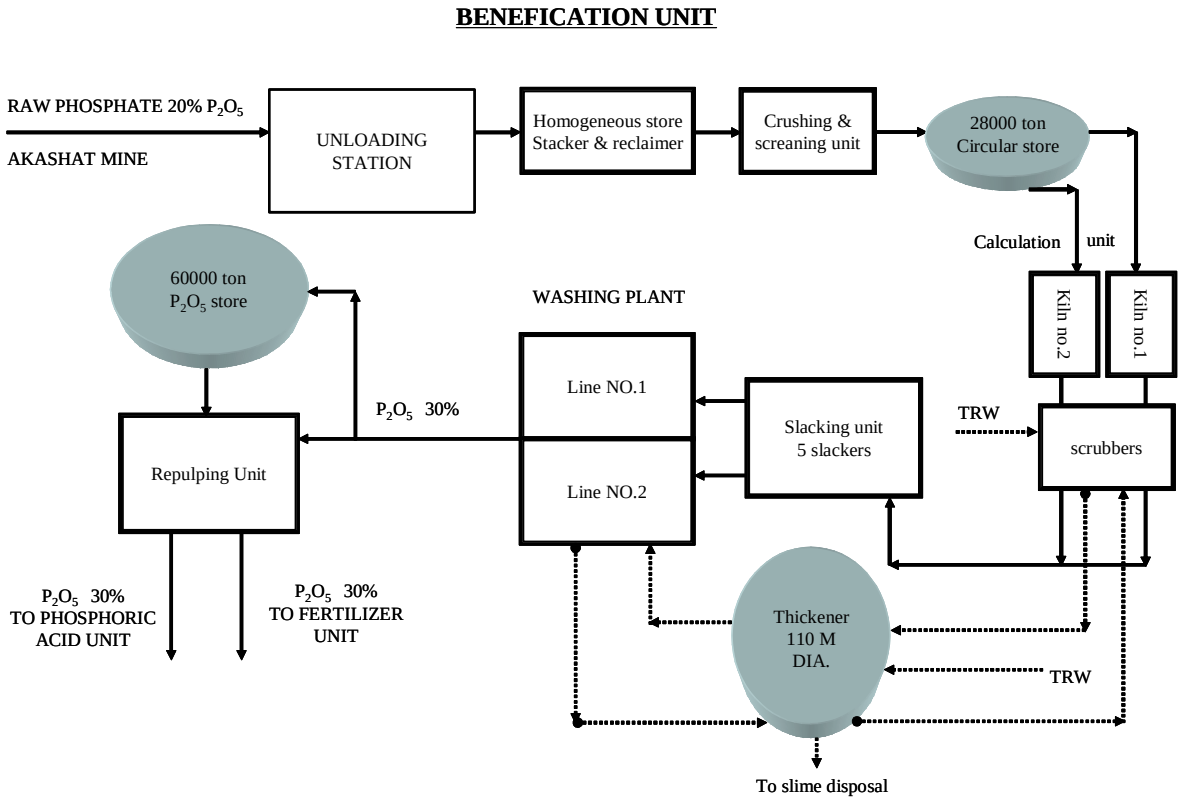


Figure 6.2-5: Beneficiation Unit Block Flow

(Source: Compiled by the Study Team based on SCP data)

2) Licensor, design capacity, current capacity, issues and technical observations of this unit

2-1) Licensor: F.L. SMITH (Denmark)

2-2) Design capacity and actual production

Compared with the design capacity of 1.7 million/year, the actual production of concentrated phosphate rocks in 2009 was 19,500 tons.

2-3) Issues, technical observations and others (photos of issue examples attached)

Restoration of the production capacity requires the following actions.

- Increase of spare (replacement) parts for the stackers and reclaimers and setup of a new management system (currently operated manually)
- Set-up of a cleaning system (to remove impurities)

- Repair or replacement of an electromagnetic motor of a screen
- Replacement of a hammer of a crusher
- Repair of fireproof bricks of a calciner
- Increase of spare (replacement) parts for other devices such as pumps and motors

231 workers are engaged in the operation and maintenance of this unit.

2-4) Diagnosis of the facilities (A: No Problems B: To be repaired C: To be renewed)

Unit No.	Equipment	Piping	Instrument	Structure/ Foundation	Soil	Unit Overall
100	B	B	C	A	A	B

Figure 6.2-6: Stacker and Reclaimer

According to the report by the local partner, they are currently operated and controlled manually.

A new control system is required.

Figure 6.2-7: Current Status of Washing System

Corrosion is seen all over the equipments and pipes. They need to be replaced with new ones.

Figure 6.2-8: Kiln 2

Support rollers do not touch the main body and therefore are not in operation. Inner refractory materials may be damaged.

6.2.2.3 Sulfuric Acid Production Unit

1) Block Flow of this is shown in Figure 6.2-9.

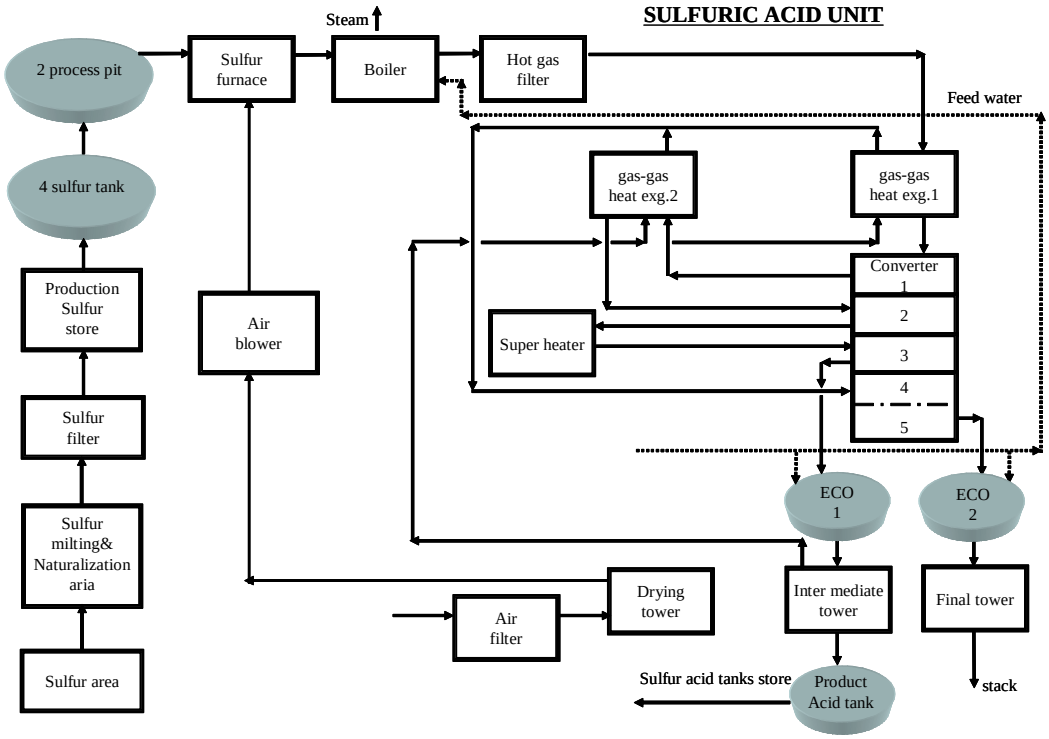


Figure 6.2-9: Sulfuric Acid Production Block Flow

(Source: Compiled by the Study Team based on SCP data)

2) Licensor, design capacity, current capacity, issues and technical observations of this unit

2-1) Licensor: PRAYON (Belgium)

2-2) Design capacity and actual production

Although there are 3 lines that have a total design capacity of 1.5 million tons/year, only one line is currently in operation. The actual production in 2009 was 30,650 tons, which is only 2% of the design capacity.

2-3) Issues, technical observations and others (photos of issue examples attached)

Components, pipes, instruments and other items of this unit are badly damaged, and even the ground is settled because the soil is contaminated with leaked acid. It seems extremely difficult to recover the production capacity only by rehabilitating the existing facilities.

100 workers are engaged in the operation and maintenance of this unit.

2-4) Diagnosis of the facilities (A: No Problems B: To be repaired C: To be renewed)

Unit No.	Equipment	Piping	Instrument	Structure/ Foundation	Soil	Unit Overall
200	C	C	C	B	C	C

Figure 6.2-10: Sulfur Melting & Neutralization Area

Damage is seen all over, such as cracks on reinforced concrete pits and corrosion of pipes.

Figure 6.2-11: Sulfur Furnace

Corrosion is seen all over the unit. The whole unit was under repair when the photos were taken. It is unknown whether this reactor is still under repair or is usable.

Figure 6.2-12: Current Condition of Sulfuric Acid Tank and Soil Condition

There is almost no insulation/insulation cover on the tank.

Moreover, the ground is settled because the soil is decreased by the reaction of soil components to leaked sulfuric acid. (The tank is lifted by a hydraulic jack.)

6.2.2.4 Phosphoric Acid Production Unit

1) Block Flow of this unit is shown in Figure 6.2-13.

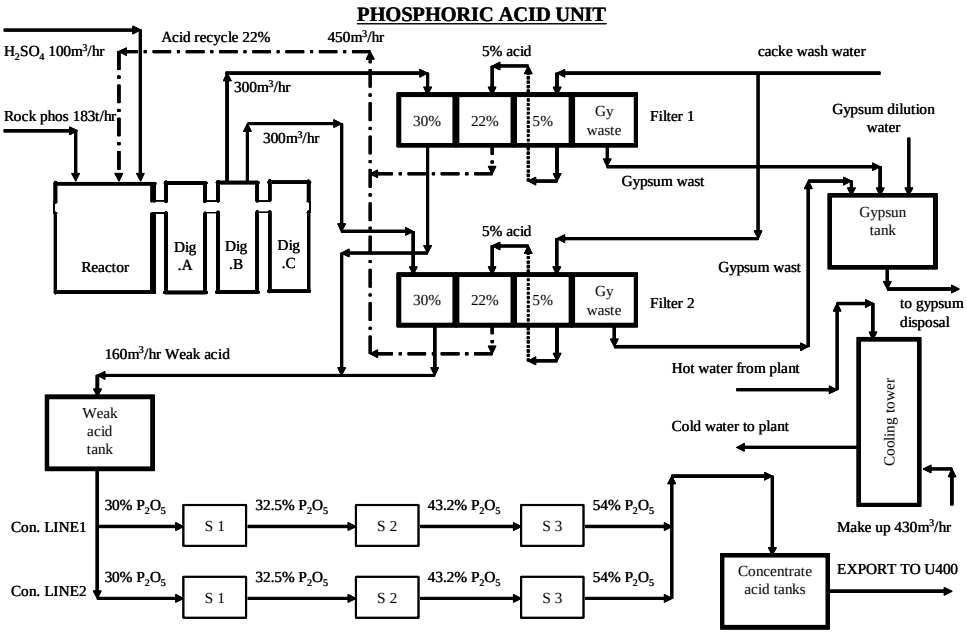


Figure 6.2-13 Phosphoric Acid Block Flow

(Source: Compiled by the Study Team based on SCP data)

2) Licensor, design capacity, current capacity, issues and technical observations of this unit

2-1) Licensor: COPPEE-RUST

2-2) Design capacity and actual production

Although the total design capacity of these 2 lines is 400,000 tons/year, the actual production in 2009 was only 1,850 tons. (Maximum approx. 130 tons/day)

2-3) Issues, technical observations and others (photos of issue examples attached)

The following components and pipes need to be replaced or repaired.

- Gear Box and mixer on in the reactor
- Damage of pump lining (synthetic rubber)
- Gypsum (removal) filter
- Graphite heat exchanger
- Circulation pumps and motors
- Phosphoric acid storage tank
- Pipes with synthetic rubber lining

150 workers are engaged in the operation and maintenance of this unit.

2-4) Diagnosis of the facilities (A: No Problems B: To be repaired C: To be renewed)

Unit No.	Equipment	Piping	Instrument	Structure/ Foundation	Soil	Unit Overall
300	B	C	C	B	B	B

Figure 6.2-14: Gear Box and Motors on Phosphoric Acid Reactor

According to the report by the local partner, gear box of mixer is corroded and need to be replaced.

Figure 6.2-15: Current Condition of Filters

Gypsum filters including frames need to be replaced as they have deteriorated with age.

6.2.2.5 Fertilizer Production Unit

1) Block Flow of this unit is shown in Figure 6.2-16.

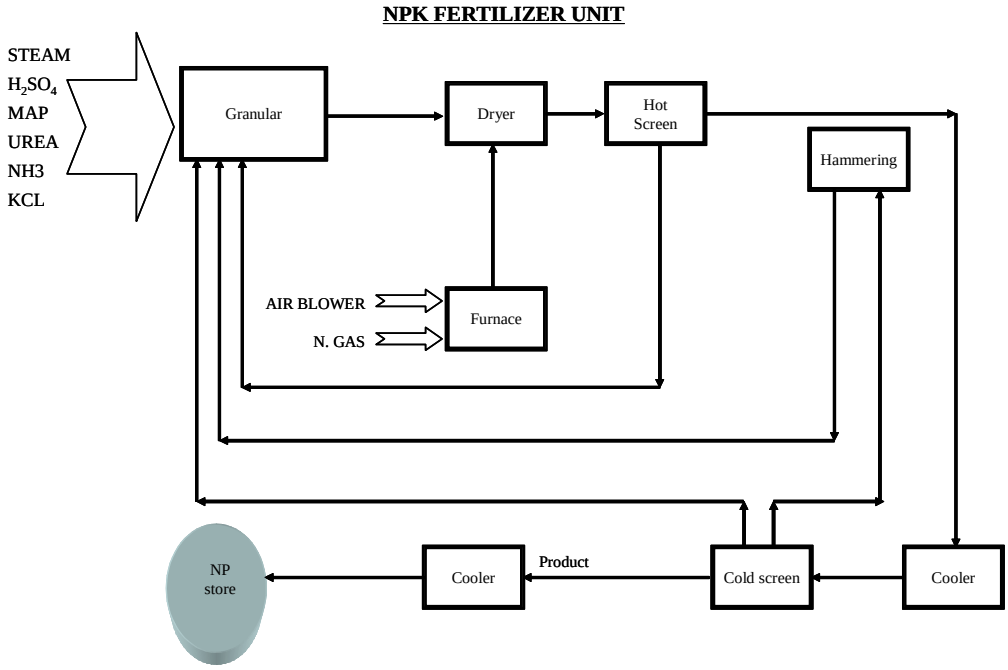


Figure 6.2-16 Fertilizer Production Block Flow

(Source: Compiled by the Study Team based on SCP data)

2) Licensor, design capacity, current capacity, issues and technical observations of this unit

2-1) Licensor: DARY POWER GAS (UK)

2-2) Design capacity and actual production

Unit	Design Capacity	Production in 2009	Current Capacity
TSP	600,000 tons/year	4,800 tons	200 tons/day
MAP	280,000 tons/year	0 ton	300 tons/day
NP/NPK	655,000 tons/year	147,800 tons	400 tons/day

2-3) Issues, technical observations and others (photos of issue examples attached)

The following devices of each unit especially require repair or replacement.

TSP: Reaction tank, granulator, filters, cooler and furnace

MAP: Evaporator, dryer, eliminator and storage house

NP/NPK: Granulator, dryer, screen, cooler, crusher and furnace

All units: Large-scale repair of a de-dusting system is required.

2-4) Diagnosis of the facilities (A: No Problems B: To be repaired C: To be renewed)

Unit No.	Equipment	Piping	Instrument	Structure/ Foundation	Soil	Unit Overall
400	B	C	C	B	A	B

186 workers are engaged in the operation and maintenance of this unit.

Figure 6.2-17: Current Condition around TSP Reaction Tank

Corrosion is seen around the tank and surrounding pipes. Repair work is required.

Figure 6.2-18: Current Condition of Fertilizer Product Storagehouse

The building is damaged and needs to be repaired.

Figure 6.2-19: Current Condition of De dusting System

According to the report by the local partner, the de-dusting system has never operated since the beginning of the operation of the complex, and serious damages such as corrosion and choking have been caused by dust generated by the unit operation. Large-scale repair work is required.

6.2.2.6 Ammonia Production Unit

1) Block Flow of this unit is shown in Figure 6.2-20.

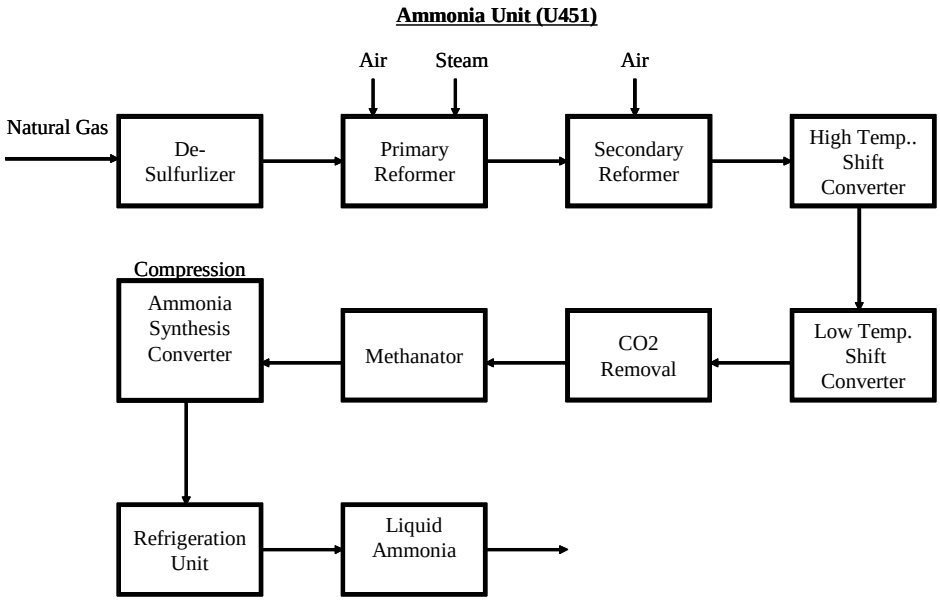


Figure 6.2-20 Ammonia Production Block Flow

(Source: Compiled by the Study Team based on SCP data)

2) Licensor, design capacity, current capacity and issues of this unit

2-1) Licensor: HOWE-BAKER

2-2) Design capacity and actual production

Although the unit has a design capacity of 500,000 tons/year, the operation has stopped since 1991.

2-3) Issues, technical observations and others (photos of issue examples attached)

As the unit has been left with no appropriate provisions for preservation since the operation was stopped in 1991, not only the synthetic gas compressor, which is the most important component, but also Primary Reformer (Tube/hose), heat exchangers and other devices seem to need replacing. Moreover, many components including pumps, motors and instruments have been removed to be used for other units.

Under such conditions, it seems extremely difficult to restore the production capacity by rehabilitating the existing unit.

Further, current compressor system (multi-purpose) has difficulties for operation/control. Therefore, new compressor system (individual-use) should be applied.

This will cause change of process scheme considering above Conditions, this ammonia production unit should be newly designed and constructed.

2-4) Diagnosis of the facilities (A: No Problems B: To be repaired C: To be renewed)

Unit No.	Equipment	Piping	Instrument	Structure/ Foundation	Soil	Unit Overall
451	B	B	C	A	A	C

Figure 6.2-21: Existing Multi-purpose Compressor

As the operation method for the existing compressor is complicated and difficult, this multipurpose system needs to be replaced with single-purpose compressors.

Figure 6.2-22: Current Condition of Primary Reformer

All tubes and hoses are corroded and need to be replaced.

6.2.2.7 Fluorine Salts Production Unit

This unit had production lines that have annual design capacities to produce 11,000 tons of aluminium fluoride (AlF3) and 6,400 tons of cryolite (Na3AlF6). However, the unit is not in operation for various reasons such as lack of materials, damage caused by the Gulf War and decreased market demand.

6.2.2.8 Utility Supply Units

Processing capacity, current status, issues and technical observations of each unit

1) Water treatment unit

- Although the current capacity is only approx. 50% of the design capacity of180,000 m^3/day, the current demand is met.

2) Compressed air unit

- The design capacity is 144,000 m^3/day.

  Although there are 6 compressors that have a capacity of 2,084 m^3/hour, the STC report points out that two of them need to be replaced.

3) Electric power supply unit

- The design capacity is 34.8MW, with two 28.8 MW power sources (turbine) and two 6 MW sources (diesel).

  The local partner's report says that 50 MW turbine power sources are required. The current condition of the operation of the existing equipments seems unstable.

4) Wastewater treatment unit

- There are two lines (for acidic wastewater and other types of wastewater). Wastewater is sent to a reservoir via a pit with synthetic rubber lining.

  There is no serious issue now.

5) Diagnosis of the facilities (A: No Problems B: To be repaired C: To be renewed)

Unit No.	Equipment	Piping	Instrument	Structure/ Foundation	Soil	Unit Overall
620	B	B	C	A	A	B

6.2.2.9 Summary of Diagnosis of the facilities

Unit-wise diagnosis is summarized into below table.

It should be so judged that there are almost no equipment/Piping system/Instruments that can be used as their present conditions. And, even though the assessment is 'B', it might need quite large-scale repairing. Therefore, there will be many cases that replacement (renewal) instead of repairing would be more effective and economical, according to further detail investigations.

Unit 200 (Sulfuric Acid Plant) and Unit 451(Ammonia Unit) should be newly constructed in adjacent area.

Unit No.	Facility	Equipment	Piping	Instrument	Structure/ Foundation	Soil	Unit
100	Beficiation	**B**	**B**	**C**	**A**	**A**	**B**
200	Sulfuric Acid	**C**	**C**	**C**	**B**	**C**	**C**
300	Phosphoric Acid	**B**	**C**	**C**	**B**	**B**	**B**
400	Fertilizer	**B**	**C**	**C**	**B**	**A**	**B**
451	Ammonia	**B**	**B**	**C**	**A**	**A**	**C**
620	Utility	**B**	**B**	**C**	**A**	**A**	**B**
900	Akasht Mine	**B**	**B**	**C**	**A**	**A**	**B**

6.3 Outlook of Akashat Mine Phosphate Rock Production

6.3.1 Akashat Mine

The mine is located about 150 km to the south-west of the Al-Qaim city and it covers over 50 km^2 with proven reserves of 500 million tons of raw material (Calcium Phosphate, Concentration of average 21~23 % of P_2O_5).

Akashat mine is an open pit mine equipped with many mining equipment, production facilities and infrastructure, including housing complex of 600 units.

This phosphate production facilities have obtained International Stands of "ISO-9001".

The original production facilities with the design capacity of 3.4 million tons/year (one shift per day – base) were constructed from 1977 and they started operation from 1984.

6.3.2 Summary of the existing facilities

- ▪ Nos. pf Production Line : No.1 & No.2 lines for two quarries focused among five quarries
- ▪ Current Operation : One line is working and another is not operated due to the performance draw back of the chemical plant in Al-Qaim. (Approximately 30% ±α Operating rate and maximum production capacity reached to 71% of design capacity in 1988)
- ▪ Annual Production Volume : Ave. 600,000 tons/year (1995~2003) After March, 2003 decreased due to war
- ▪ Original Design Production Capacity : 3,400,000 tons/year (12 hrs/day base)
- ▪ Mining Equipment : Bull-dozer, Excavators, Shovel-cars, Dragline Machines Drilling Machines, Wheel Loaders, Off-road Dump Trucks
- ▪ Nos. of Quarry : Five main quarries of Calcium Phosphate Deposit spread over in the area of 50 km^2, which was found in 1963.
- ▪ Proven Reservoir : Approx. 500 million tons
- ▪ SYBETRA : Belgian company brought the mine into production after 1975 Site facilities and infrastructure were also constructed by them.
- ▪ Related Projects : - Water pipeline project (170km) for feed water to Akashat site
  - Rail way project connecting between Akashat site and Al-Qaim complex
  - Housing complex with 600 housing units besides the site
- ▪ Start of Operation : July, 1981 Commissioning run was started
  July, 1982 Commercial operation was commenced

6.3.3 Observation of the existing facilities working conditions

In general there are not so much sophisticated equipment existed and the facilities are partially operated at low load factor (Ave, 600,00 tons per years)

The Major reasons for such low level of production against the design capacity seem to be as follows:

* Performance draw back of Chemical plants in Al-Qaim (Low demand of feedstock)

* Mining equipment are working under not good condition due to no spare parts and poor maintenance activities

Power and water supply have had not so serious problems in capacity and meet current demand of both the mine facilities and housing complex. However power failure seems to have occurred very often.

Elec. power supply : HT 132 KV lines from Al-Qaim plant

Power consumption : ≦ 7 MWH at mine facilities, including housing complex

6.3.4 Necessity of Rehabilitation

- Production equipment : To be partly replaced with new mining equipment, such as Bulldozer, Excavator, Power Shovel and Drilling Rig.
- Utilities supply system : Currently no need to rehabilitate largely subject to minor repairing and remedical work to be done
- Civil Infrastructure : There may be not serious as per photographs

- Transportation System : Railway seems to have no serious defects.
  Operation management system might have potentially inferior aspects to be improved and/or upgraded.
  Traffic control system seems to have had the damages so that, their control system could be necessary to be restored.

6.4 Related Infrastructure

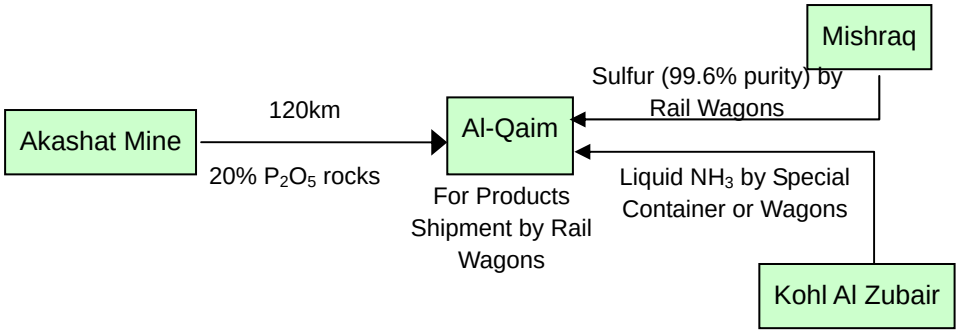
Generally main road network are maintained to be working well accrossing SCP Complex in Al-Qaim and extending to Akashat Mine upto Syrian border.

The railway system is still working and phosphate rocks are transported from Akashat mine to Al-Qaim Complex.

Iraqi missions' comment is that the control units of train operation control system are currently not worked well.

The summary of the related infrastructure to SCP Complex is illustrated below:

1. Railway system: Currently working

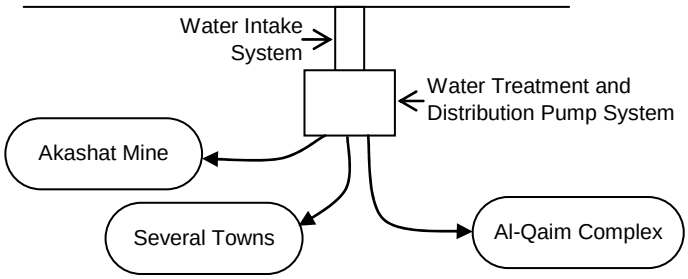


2. Road : Working

3. Telecommunication : Not good at this moment!

4. Electricity : Available, but not good supply performance which has caused frequent power failures.

5. Water : River water is used for both industrial and town-use



6.5 Other topics, concern

6.5.1 To Build up control system of whole complex

At present, it was found that in each unit of the complex, instrument and control system are not functioned according to its design, and that they are to be newly installed.

After restoring of complex capacity, it should be required to build up control system of the whole complex.

6.5.2 Human Resource Development for operation/maintenance

To utilize new control/maintenance system effectively after rehabilitation and/or renewal, it should be required to train the related employees with sufficient preparing time

6.5.3 Improvement of Management System

At present, actual production capacity of the complex is in general around 10% of its design capacity and therefore, it is expected that there are not much difficulties for the management of the resources (workforce/equipment and materials/finance) in quality and quantity. However, after restoring of the capacity of the complex, the resources would be some times of the current conditions, then remarkable improvement of management system and staff shall be required.

6.5.4 Procurement of Spare Parts

Many equipment in this complex had been stopped of their production, and it is expected that obtaining spare parts that is essential for the plant operation is difficult.

It is required to prepare technical specification to procure alternatives and to find the vendors.

6.5.5 Waste Disposal (Gypsum)

Big quantity of gypsum is produced as by-product in the process of producing phosphoric acid. At present, there are no problems to waste the gypsum without any treatment.

However, restoring the plant capacity would cause jumping up of volume of waste gypsum.

Then investigation of the treatment of waste gypsum, including utilizing it, shall be made.

6.6 Rehabilitation Plan by SCP

6.6.1 Rehabilitation Plan Formulated by SCP (Investment File)

It is discussed in Chapter 4 that SCP's phosphate chemical fertilizer complex in Al-Qaim has been identified as an investment opportunity for the private sector. It has also been described that individual SOEs draw up rehabilitation plans for their factories and plants in form of "Investment Files" and release them to potential investors in the effort to attract private investment. In accordance with this investment scheme, SCP compiled its rehabilitation plan in an "Investment File" in April 2009. According to the Iraqi counterpart, the file is currently under review by the government.

In its Investment File, SCP plans to recover the production capacity of the Al-Qaim Complex to the 90% level of the design capacity. It stipulates that the investor will be responsible for procuring necessary costs for executing the rehabilitation plan and for recovering the fund invested and earning profits by operating the plant and selling the outputs from the plant themselves after the rehabilitation is completed. The restoration of the Complex

is intended to further develop the phosphate mine in Akashat, which produces the raw materials of fertilizers, supply sufficient fertilizers to meet agricultural demand, and shift from imported goods to domestically-produced items, thereby strengthening the foundations of the Iraqi economy. The following summarizes the rehabilitation plan, subject to investment, as described in the Investment File.

(1) Outline of SCP's rehabilitation plan

Project contents: Rehabilitation of the phosphate chemical fertilizer complex in Al-Qaim, operation and maintenance of the plant, sale of the products, and financing for the project.

Facility included: Phosphate chemical fertilizer production equipment, and others (including utility equipment)

Target: The operator is required to recover the plant's production capacity to the 90% level of the design capacity.

Table 6.6-1: SCP's Rehabilitation Goal

Product	Design production capacity (ton/year)	Production target (ton/year)
TSP	600,000	540,000 (90%)
NP	655,000	589,500 (90%)
MAP (interim product)	280,000	252,000 (90%)
Total	1,255,000	1,129,500 (90%)

(Source: Investment File by SCP)

Term of implementation: To be determined (to be proposed by the operator.)

(2) The investor will be entitled to the following rights and bound by the following obligations in the course of implementing the plan.

- The operator shall set up a corporation or a branch (hereinafter referred to as the "operating company") which is registered and located in Iraq. The operating company may be a joint concern based on collaboration among multiple Iraqi or non-Iraqi enterprises.

- The operator shall finance the project by itself, rehabilitate the existing Al-Qaim

Complex, and operate and maintain the rehabilitated plant. The investors shall be entitled to market the accomplished production in such quantities that are proportional to their shares of capital contribution.

- The operator shall procure electricity necessary for the operation of the plant by itself. (It needs to build a private power generating facility.)

- The operator shall be entitled to remit hard currency or the Iraqi currency to inside and outside Iraq in accordance with the rules stipulated by the Central Bank of Iraq.

- The operator shall carry out an environmental impact assessment (EIA) and conform to ISO14001, ISO9001 and other relevant European guidelines. The Ministry of Industry and Minerals shall guarantee the operator an expropriation of land necessary for disposing of wastes generated at the Complex.

- The operator shall construct a security structure by deploying security guards throughout the term of the project, in collaboration with relevant ministries and agencies. The operator shall be responsible for security inside the premises of the plant and the governing authority shall undertake security outside.

- The operator shall not assign the right to the project, in whole or in part, to any third party without the consent of the Ministry of Industry and Minerals.

- For the purpose of carrying out the project, the Investment Law 2006, No.13 enacted in 2006 shall be applicable (refer to Chapter 4 for the details of the law). The Law on SOEs (Law No.22) may also be applied at some point in the future.

(3) Rehabilitation costs

SCP gathered quotations for various types of equipment necessary for the rehabilitation plan as part of their work to create the Investment File. The following lists the equipment concerned and their estimated amounts.

Equipment	Estimated amount
	(million U.S. dollars)
Phosphate mine	50
Rock sorters	30
(2 systems, including utilities)	
Sulfuric acid production plant	130
(3 systems, including utilities and soil treatment)	
Phosphoric acid production plant	105
(3 systems, including utilities and soil treatment)	
TSP production plant	30
(2 systems)	
NP production plant	30
(2 systems)	
MAP production plant (granulating line)	40
Ammonia production plant	40
Utility facilities	100
(Waste disposal facility, a set of equipment for environmental protection)	
Transport equipment for raw materials and products	20
Laboratory	20
Vehicles and heavy machines	20
Soil inspection and treatment facility	15
Total	630

6.6.2 Objective Observations on the Rehabilitation Plan

SCP's rehabilitation plan was objectively examined from the standpoint of private investors. The following points were identified as possible obstacles.

(1) Public safety in Iraq

Public safety in Iraq is yet to be satisfactory enough for many private companies to participate in project in the country. Further improvement of public safety is a minimum condition to be met for overseas private investors to participate in projects in Iraq.

(2) Technical difficulty of rehabilitation plan

As mentioned in Chapter 6.2, Al-Qaim Complex has not performed sufficient maintenance due to lack of spare parts and funds for a long time and facilities are seriously damaged. The

rehabilitation project with maintaining the current facilities as much as possible is predicted to be very difficult technically and there will not be many contractors that will perform the duty on site.

(3) High production target of rehabilitation plan

Although the operation rate of Al-Qaim Complex was once somewhere between 85 and 89% around 1989, it has been low since then. Investors are committed to recovering the rate to 90%, which is a very ambitious goal.

(4) Huge investment

Partly because many facilities need to be replaced or repaired, the rehabilitation of the complex requires a huge fund. The quotation SCP produced by itself is based on a quotation by a supplier around 2007. The amount needs to be reexamined.

(5) Commitment during project term

The operator needs to commit itself during the term until the operation rate reaches the target level of 90%. It is difficult to estimate how long the rehabilitation project will require for various reasons. If a penalty is imposed when the project cannot be completed within the period, this is a severe condition for investors.

(6) Unstable domestic market

SCP products are purchased at a stable price with the subsidy from the Ministry of Agriculture. Investors are very interested in whether the subsidy program will be applied and whether the subsidy program may be revised at some point.

(7) Difficulty in product exportation

Exportation of products of Al-Qaim Complex has a disadvantage of transportation cost because it is located inland. Competition with neighboring countries with phosphate rocks is also a matter of concern.

Taking these obstacles into consideration, it must be noted that it is fairly difficult for SCP to attract private investment based on this Investment File.

Chapter 7

Environmental and social impact in Industry and Mineral sector in Mid-Western district of Iraq

Chapter 7 Environmental and social impact in Industry and Mineral sector in Mid-Western district of Iraq

7.1 Environmental Assessment

7.1.1 Current environmental situation in Mid-Western district of Iraq

It is said that the land area of Iraq can be roughly divided into four major geographical zones as follows.

-Desert plateau: It locates on Mid-Western Iraq to occupy about 40% of Iraqi territory.

-Northeastern highlands: It occupies about 20% of the country territory.

-Northwest upland region: About 10% of Iraq territory

-Alluvial plain: Deltas of the Tigris and Euphrates Rivers to occupy 30% of Iraq

The major part of land area of 3 Governorates in Mid-Western of Iraq, where the possibility of industrial rehabilitation project is surveyed, consists of both side of the Euphrates River and huge area of desert plateau geography at west of the Euphrates River. The most of inhabitants live on the banks of the Euphrates River. The desert plateau in this region consists of a broad, stony plain with scattered stretches of sand, and sparsely inhabited by pastoral nomads. A network of seasonal watercourses, so called wadis, runs from the country's western borders towards the Euphrates River. The density of industrial activities in this region is not so high that the environmental issues brought by industries might be rather mild.

(1) Atmosphere

The atmospheric air quality is mainly affected by the gas exhausted from such as industrial combustible facilities and vehicle engines. One of the important barometers to roughly estimate the air quality might be fuel consumption and/or carbon dioxide (CO_2) emission in the country and/or district. CO_2 emission intensity of Iraq, Iran and Saudi Arabia is compared in Table 7.1-1 and that in Japan for reference.

Table 7.1-1: Comparison of Energy Intensity

Country	Iraq	Iran	Saudi Arabia	Japan
CO_2 Emission Mt/y	91.45	465.90	357.90	1,236.34
Population Million	27.50	71.02	24.20	127.76
tCO_2/Capita・y	3.33	6.56	14.79	9.68
Area Mkm^2	0.43	1.64	2.15	0.37
tCO_2/Area・y	209.00	282.70	166.50	3,270.00
GDP (PPP) Bil.USD	28.52	554.02	360.74	3,620.00
tCO_2/GDP(PPP)	3.21	0.84	0.99	0.34

(Source: IEA 2007 Indicator and CIA World Factbook)

The Iraq's population-wise CO_2 emission intensity is the lowest and the area-wise intensity is intermediate position in the three countries. Through these two indexes, it is supposed that the current overall air quality in Iraq might not be inferior to that of in Iran and Saudi Arabia which have a border with Iraq respectively. The inferiority in GDP (PPP)-wise CO_2 emission intensity means that the air quality in Iraq will be able to further improve through energy conservation activities to decrease fuel consumption and subsequent CO_2 emission reduction.

The current air quality in the Mid-Western Iraq with less density of population and industrial activities can be considered to be better than that of average throughout Iraq.

(2) Water quality

Unlike other Middle East countries, Iraq has abundant water resources given through two international great rivers of the Tigris and the Euphrates which have been supporting agricultural culture since the ancient Mesopotamian civilization era more than 8,000 years ago.

However, it is said that the water quality of both the Tigris River and the Euphrates River has been gradually degrading caused by the flow reduction due to the dam and irrigation projects implemented in the upstream countries of Turk and Syria. The Tigris River and the Euphrates River join together in southeast town of Al-Qurnah in Iraq to form the Shat-Al-Arab. The length of Shat-Al-Arab is approximate 200 km from the confluent of the Tigris and Euphrates to mouth into Arabian Gulf. The salt content of Shat-Al-Arab water is about 1,500 ppm in the Al-Basrah, representative industrial city in southern Iraq, which locates on the middle of the Shat-Al-Arab. The industries around Al-Basrah unexceptionally utilize Shat-Al-Arab water for their production activities. Due to the gradual increase of salt content, the Shat-Al-Arab water is becoming difficult to be used without desalination treatment.

In Mid-Western Iraq, the target district to investigate the possibilities of industrial rehabilitation projects, the Euphrates River water is utilized for both domestic and industrial

activities. Unlike the degraded Shat-Al-Arab water around Basrah, there is no qualitative problem in the Euphrates River water to use it for industrial activities without special treatment such as desalination. As mentioned above, the water inflow of Euphrates River to Iraq has recently decreased. According to the US UPI news in July, 2009, Turk agreed with Iraq to increase the water inflow of the Euphrates River to Iraq from 360 m3 a second to 570 m^3. Although the water inflow to Iraq through the Euphrates River seems to have increased in 2009, it has extremely decreased from approximate 950 m3 a second in 2000. The decrease of water supply through the Euphrates River might be serious problem for domestic, agricultural and industrial activities in Mid-Western district of Iraq on the long term viewpoint.

(3) Solid/Liquid wastes

The enormous desert area, in Mid-Western Iraq, where scarce inhabitant exists, can be utilized for harmlessness treatment and/or final disposal of both domestic and industrial wastes. There might be no serious problem in solid waste disposal by landfill at unoccupied desert area located far from residential zones. Also, there might be no serious problem to dry liquid wastes in the sun and final landfill disposal at desert area.

(4) Hazardous materials (Heavy metal, poisonous materials)

After the harmlessness treatment by such as neutralization of acidic and/or alkali wastes and passivation of heavy metal by cementation, the hazardous wastes can be handled as well as non-hazardous wastes to final disposal by landfill. However, the heavy metal contained in the catalysts is generally recycled by the catalyst regeneration in the manufacturer's shop without landfill disposal.

7.1.2 Environmental impact caused by the expected project

The working ratio of most industrial facilities which need rehabilitation is currently very low not to bring the serious impacts to environment. The rehabilitation project is carried out to restore the deadbeat production facilities to original one. Accordingly, the intensity of environmental and/or social impact from the rehabilitated facilities will go back to that a few decades ago when the working ratio of the facilities was high enough. In order to mitigate additional environmental impact at high working ratio operating condition after rehabilitation project, it might be important to apply environmentally mild technologies as far as possible. Anyway, the environmental countermeasure of rehabilitation project should meet not only domestic regulations and rules but also the internationally prevailing standards and/or guidelines such as the EHS (Environmental, Health and Safety) Guidelines specified by IFC (International Finance Corporation).

(1) Atmosphere

The representative industries in Mid-Western district of Iraq, most of which require rehabilitation, are phosphorous fertilizer plant, cement plants and glass and ceramic plants. One of the common features in these three types of the plant is to operate combustible facilities emitting air pollutants more or less.

SOx emission will indispensably increase at high working ratio operating condition of the facilities in proportion to the multiplication of fuel consumption and sulfur content in fuel. However, it might be possible to mitigate the additional SOx emission by applying energy conservation technologies developed after the initial construction of plant to be rehabilitated or reduce SOx emission by applying flue-gas desulfurization technology.

In addition to the application of energy conservation technologies, the combustible technologies to reduce NOx formation in the combustible facilities and/or flue-gas denitration might be applicable for rehabilitation project to mitigate NOx emission from rehabilitated plant.

In order to reduce or not extremely increase the particulate matter (PM) emission from combustible facilities, the necessity and availability to additionally install the electric dust collector, bag filter or scrubber in the flue-gas exhaust system should be carefully studied.

(2) Water quality

The water consumption and effluents will undoubtedly increase after the implementation of the rehabilitation project to raise the working ratio of the plant. The flow of the Euphrates River has reduced during recent 10 years to make it difficult to expect limitless dilution of the water pollutants in the effluent from domestic and/or industrial facilities into the Euphrates River. Considering the less water flow in the Euphrates River in comparison with that a few decades ago, the countermeasures to reduce water intake and drainage from and to the Euphrates River will have to be included in the rehabilitation implementation plan in order to minimize water pollution issues in downstream districts. For example, the deep treatment of effluents and/or recycle use of treated effluents will be worth to study for rehabilitation project.

(3) Industrial wastes

Unlike air pollutants and water pollutants, industrial wastes do not essentially disperse or move to other places. With sufficient landfill area for industrial wastes disposal at the adequate location isolated from residential or public zone, industrial wastes does not cause environmental issues. Even if the quantities of industrial wastes will increase after rehabilitation project of specific plant, there will be generally no qualitative variation in wastes dumped into landfill area.

7.1.3 Possible social impact from expected project

The negative social impact from rehabilitation project might be basically minimal excluding the temporary impact during field construction works.

(1) Living environment

Most of industrial facilities in Iraq, which currently need rehabilitation projects, have been operating at lower working ratio rate to scarcely produce profit during a few decades. Accordingly, the societies and inhabitants surrounding such industrial facilities could not enjoy the economic merit which might be brought to them by the positive production activities of the industrial facilities. If rehabilitation project can restore the industrial activities of the facilities to produce profits, the local economic condition will be improved. As shown in Chapter-2 the per capita GDP (PPP) in Iraq is currently by far inferior to the neighboring countries of Iran and Saudi Arabia which are oil-producing countries as well as Iraq. Through the successful implementation of rehabilitation projects, Iraq will be able to increase its per capita GDP (PPP) near that in Iran and Saudi Arabia in the future to improve the living standards of Iraqi nation.

(2) Inhabited Area and Expected Project Area

In Iraq, the environmental law specifies that the location of industrial project has to be several kilometers away from inhabited area. (See next paragraph) Accordingly, the inhabited area and industrial facilities are not coexistent in Iraq. As far as the rehabilitation project is carried out within the existing territory of the plant, it will bring scarce environmental impact to inhabited area at normal operating condition after construction works. During equipment transportation stage and field construction stage, some impacts of noise and/or traffic congestion might affect the inhabited area. However, these impacts will be only temporary ones under field construction stage and it will not be so serious for the inhabitants near the project site. In most of cases, an enormous number of field workers engaged in the project gather in the site at construction stage to possibly make troubles with inhabitants. However, the most of State Company in Iraq, which this investigation primarily targets for the rehabilitation project owner, have enough man-power to carry out the most of field works of the project by itself not to require so many external man-powers for the project implementation. Accordingly, the possibility of conflict between construction workers and inhabitants might be low.

(3)Transportation of equipment during construction and its impact on residents

Because of deadbeat industrial activities in current Iraq, most of equipment and materials for any kinds of rehabilitation project will have to be imported from foreign countries. The transportation of equipment and materials is one of the most important matters for successful

project implementation. Not only oversea transportation by the vessels, but also long distance inland transportation by roads and/or railway might be indispensably required for the rehabilitation project carried out in Mid-Western district of Iraq. As the inland transportation by roads possibly cause the traffic congestion and/or traffic jam and/or traffic accidents, the routes and schedule of major equipment transportation should be carefully decided to mitigate the impact to the residents alongside the transportation roads.

7.2 Environment relating law in Iraq

7.2.1 Law of country

(1) Law for air pollution abatement

In the most of country and/or region, the combination of the air quality standards and air pollutants emission standards is employed for ambient air pollution abatement. However, there is neither independent air quality standard nor independent air pollutants emission standard in Iraq at present. The occupational health preservation standards seem to correspondingly substitute for the air quality standards and the Site Restrictions specified by Environmental Regulation for Industrial, Agricultural and Service Projects seem to substitute for air pollutants emission standards in Iraq.

a. Air quality standard

As for air quality, OSHA standard specified by US Occupational Safety & Health Association is commonly applied in Iraq. However, it should be noted that the exposure time a day is different between OSHA standard and usual air quality standards such as WHO (World Health Organization) guidelines. The former basically specifies the exposure time to be 8 hours a day and the later to be all day long. Accordingly, the maximum acceptable concentration of air pollutants of OSHA standards is by far higher than that of WHO guidelines as shown in Table 7.2-1.

Table 7.2-1: Maximum Acceptable Concentration of Pollutants in Air

(mg/m_3)

Pollutant Standard	Sulfur Dioxide	Nitrogen Dioxide	Particulate Matter (PM2.5)	Ozone
OSHA	13	9	5	0.2
WHO	0.125	0.04	0.035	0.16 (8h/d)

(Source: WHO guidelines)

As the pollutants in the air can easily and limitlessly disperse over the borders, the air pollution is recently considered as worldwide multilateral issues. It will be impossible for Iraq

to substitute OSHA standards for the most popular WHO guideline. It is recommendable for project owner, who intends to carry out the project in Iraq hereafter, to employ WHO guideline or equivalent for air quality management concerning the project.

b. Air pollutants emission standards

There are several methodologies of air pollutants emission standards or guidelines to regulate the air pollutants mainly emitted from individual combustible facilities in order to fulfill the ambient air quality specified by the domestic rules or guidelines

- Height of stacks for wider dispersion of flue gas and air pollutants to lower the ground level concentration of air pollutants
- Limitation of the ground level concentration of air pollutants by individual combustible facility
- Limitation of sulfur content in fuel to decrease sulfur dioxide emission from combustible facilities and lower the ground level concentration of air pollutants
- Limitation of air pollutants content in flue gas to decrease air pollutants emission and lower the ground level concentration of air pollutants

Environmental Regulation for Industrial, Agricultural and Service Projects specifies the Site Restriction for total 93 types of project in Iraq not to directly or indirectly damage the public health and environment.

For example, it specifies the Site Restriction for Development Projects of Chemical, Petrochemical and Oil Industries to be located away from residential zone more than 15 km in the direction of prevailing wind and at least 10 km in other direction. In case of Development Projects of Chemical, Petrochemical and Oil Industries which operate small and medium scale combustible equipment, the air pollutants in flue gas emitted from stack will sufficiently disperse into air to scarcely damage public health outside Site Restriction or inside residential zone more than 10 km or 15 km away from the air pollutants emitter.

However, in case of Electric Power Plant, the Site Restriction is specified to be located away from residential zone more than 8 km in the direction of prevailing wind and at least 6 km in other direction. In case of power stations which operate huge steam boiler, the point of maximum air pollutants concentration on ground level might possibly be at more than 10 km away from boiler stack. It means that flue gas emitted from boiler stack possibly damage public health outside Site Restriction or within residential zone.

Thus, Site Restriction specified by Environmental Regulation for Industrial, Agricultural and Service Projects can not always substitute for air pollutants emission matters. It is recommendable for project owner, who intends to carry out the project in Iraq hereafter, to

employ some analytical technologies to check whether Site Restriction is sufficient guard for air pollutants emission exhausted from planned combustible equipment. For reference, air pollutants emission guidelines of IFC (International Finance Corporation), which specify the limit of air pollutants content in the flue gas from stationary emission source are summarized in Table 7.2-2.

Table 7.2-2: Air Pollutants Emission Guidelines of World Bank [1)]

Fuel	Maximum Allowable Air Pollutant Emission (mg/dry-Nm^3)			Residual Oxygen (%)
	Particulate Matter	Sulfur Dioxide	Nitrogen Oxides	
Gas	—	—	320	3
Liquid	50~150 [2)]	2,000	460	3
Solid	50~150 [2)]	2,000	650	6

1) Applicable for combustible equipment with heat input from 3 MWth to 50 MWth

Environmental assessment required for combustion equipment with heat input more than 50 MWt

2) With environmental assessment, emission can increase up to 150

(Source: Guidelines of International Finance Corporation)

c. Monitoring of air pollution relating matters

Without Air Quality Standards or Air Pollutants Emission Standards at present in Iraq, the plant operators are not legally required to monitor the air quality relating matters. However, it is very important to continuously or periodically monitor the air pollution matters i.e. air pollutants emission condition of combustible equipment and fixed point observation of air quality for complete management of air quality.

In general, government and/or municipals are fully responsible to manage the whole air quality matters to completely preserve public health by establishment including air quality standards and air emission standards. However, there is neither complete air quality standard nor complete air pollutants emission standard at present in Iraq.

Accordingly, it is recommendable for project owner, who intends to carry out the industrial project which includes air pollutants emission equipment in Iraq hereafter, to adequately manage the air quality matters.

As for monitoring of air pollutants emission, the combustible equipment shall be provided with following continuous analyzers for flue gas.

-Residual Oxygen

-Carbon Monoxide

-Nitrogen Oxide as Nitrogen Dioxide

-Sulfur Dioxide

-Particulate Matter

The former three analyzers might be utilized for not only air pollutants monitoring but also combustion control of the equipment.

As for monitoring of ambient air quality, of air quality, periodical fixed point observation might be recommendable by mobile monitoring station of vehicle provided with following air pollutant analyzers.

-Carbon Monoxide

-Nitrogen Oxide as Nitrogen Dioxide

-Sulfur Dioxide

Note; Monitoring of Particulate Matter (PM) is intentionally omitted here, because it might be difficult to separately measure PM by industrial activities from total PM including natural PM in desert condition of Mid-Western of Iraq. The necessity of PM analyzer should be investigated at the project implementation stage considering the project site condition.

Because the periodical fixed point observation of atmospheric air quality is carried out in place of the government and/or municipal, it is recommendable to negotiate with government and/or municipal to share the total or partial expenditure for it.

(2) Law for water pollution abatement

With abundant water resources of both the Tigris and Euphrates River, the agriculture has been developed since the ancient era on the land where current Iraq situates. The water management has been regarded as one of the most important matters in Iraq. Accordingly, unlike air quality and air pollutants emission matters, the Regulation for Protecting Rivers No.25 established in 1967 completely specifies the quality of water resources and water pollution issues by effluents.

a. Water quality standards

Regulation for Protecting Rivers No.25 specifies the limitation of toxic and/ or harmful material content in the water resources. It specifies that content of major toxic material in water exceed the value shown in Table 7.2-3 shall be considered harmful.

Table 7.2-3: Limitation of Toxic Material Content in Water

（mg/l）

Material	Limitation	Material	Limitation
Lead	0.1	Hydrocarbon	0.1
Arsenic	0.05	Free Chlorine	Trace
Copper	0.1	Sulfide	0.5
Nickel	0.1	CCl4	5.0
Selenium	0.05	DDT/Org. Chlorides	0.2
Mercury	0.005	Dinitro-Naphthalene	2.0
Cadmium	0.1	Chloro-Benzene	0.1
Zinc	5.0	Trinitro-Toluene	0.5
Chromium	0.1	Dinitro-Benzene	0.5
Cyanides	0.1	Tetranitro-Methane	0.5
Hydrogen Sulfide	0.5	Fluoride	1.0

(Source: Regulation for Protecting Rivers No.25)

The Regulation for Protecting Rivers No.25 established in 1967 classifies the inland water resources in Iraq into four categories. Table 7.2-4 shows maximum allowable concentration of major pollution substances in the water resources by the categories. In Mid-Western region of Iraq, the most of municipals and industries take the water from the Euphrates River of which quality is classified into Category a-1.

Table 7.2-4: Water Quality Standard in Iraq

(mg/l)

Category	a-1	a-2	a-3	a-4
Pollutants	River, tributaries and branches	Creek, water -course, canal and original and secondary branches	Lakes, ponds and other gathered waters	Springs, wells and ground water
PH	6.5~8.5	6.5~8.5	6.5~8.5	—
Dissolved Oxygen	5 <	5 <	5 <	—
BOD5	<5	<3	<3	—
Ammonium	1.0	1.0	1.0	—
Cyanide	0.02	0.02	0.02	0.02
Phenol	0.005	0.005	0.005	0.005
Lead	0.05	0.05	0.05	0.05
Arsenic	0.05	0.05	0.05	0.05
Mercury	0.001	0.001	0.001	0.001
Cadmium	0.005	0.005	0.005	0.005

(Source; Regulation for Protecting Rivers No.25)

b. Effluent standards

As well as water resource classification, the Regulation for Protecting Rivers No.25 also classifies the effluents into four categories by the destination of the effluent as shown in Table 7.2-5. Some parts of effluent discharged from municipals and/or industries in Mid-Western region of Iraq might be indispensably returned to the Euphrates River. In such a case, Environmental Regulations for Industrial, Agricultural and Service Project might be applied. It prescribes that the effluent drainage point should be at a distance from potable water intake more than 3 km at upstream and more than 1 km at downstream.

Table 7.2-5: Effluent Standard in Iraq

(mg/l)

Category	b-1	b-2	b-3	b-4
Major Pollutants	Drainage into water resource	Drainage into public sewage	Drainage into the drainer	Drainage into marshes
Temperature	35℃>	45℃>		
PH	6~9.5	6~9.5		
Suspended Solid	60>	750>		
BOD_5	40>	1,000>		
COD（$K_2Cr_2O_7$）	100>	—		
Cyanide	0.05>	0.5>		
Phenol	0.01~0.05	5~10		
Lead	0.1>	0.1>		
Arsenic	0.05>	0.05>		
Mercury	0.005>	0.001>		
Cadmium	0.01>	0.1>		

(Source; Regulation for Protecting Rivers No.25)

c. Monitoring of effluent quality

The plant operators who discharge effluents into the water resources in Iraq have to periodically monitor the quality of the effluents and submit the result of monitoring to the public authorities.

(3) Industrial waste disposal standard

In Iraq, nontoxic or harmless industrial wastes can be treated as same as municipal garbage. The major methodology of municipal garbage is the landfill of pans and natural quarries. The Environmental Regulations for Industrial, Agricultural and Service Project specifies the necessary condition of landfill of municipal garbage as follows.

- The landfill site has to be located at least 4 km distance away from residential area in dominant direction of wind and 2 km in other direction.
- The site has to be more than 1 km away from the public roads.
- The landfill site has to be left at least 20 years before utilization. Within this duration, it is recommended to use the landfill site as green area or car parking and it is not allowed to build any facilities.

The Environmental Regulations for Industrial, Agricultural and Service Project also

specifies the necessary condition of landfill of dangerous and poisonous wastes as follows.

- Landfill site for hazardous industrial wastes has to be at long distance away from residential area. It is recommended to be in the desert.
- Landfill site for hazardous industrial wastes has to be at distance more than 5 km away from water resources.
- The underground water level at landfill site has to be more than 100 m in depth.
- The soil of landfill site has to be silt and impermeable.
- The depth of landfill has to be less than 4 or 5m.
- The bottom of landfill pan or quarry has to be lined with appropriate materials not to leak liquid into underground water.
- Minimum 4 closed monitoring well have to be dug to check the underground condition of landfill site.
- The landfill site has to be left untouched for 30 years not used for any purpose.
- The dangerous or toxic wastes have to be mixed with harmless wastes for landfill.

In Mid-Western of Iraq, the most of the land area consists of deserts with scarce inhabitant which might be adequate for landfill of wastes. The project owner who intends to carry out the industrial project in the Mid-Western of Iraq will not be so much suffered from the industrial wastes disposal whether they are harmful or harmless.

(4) Others

Iraqi Noise Prevention Law established in 1966 specifies the permissive noise level outside building as shown in Table 7.2-6. The noise level outside buildings specified by Iraqi Noise Prevention Law specifies the threshold noise level what normal environmental regulation and/or guidelines specifies. The permissive noise level by the Noise Prevention Law in Iraq is a little more stringent than that of worldwide applicable standards such as IFC Standards. As the industrial facilities locate on the area far from residential zone in Iraq, it might be rather easy for the operators of industrial facilities to meet the noise level specified by the Noise Prevention Law.

Table 7.2-6: Noise Level Measurement outside Buildings Measurement Unit dB

Location	Noise Level Night	Noise Level Morning
1. Hospital & Resting Areas	40	50
2. Resident Area inside City	45	60
3. Resident Area outside City	45	55
4. Hotels	50	55
5. Schools, Nursery, Universities and Educational Centers	45	55
6. Industrial & Public Areas	65	70
7. Services & Trading Areas	60	65
8. Private Areas:	60	70
a- Airpots		
b- Train Stations		
c- Ports		
9. Educational & Cultural Areas	50	60
10. Tourist Areas	50	60
11. Resident Location inside Industrial Areas	45	60

(Source: Iraqi Noise Prevention Law)

7.2.2 Local regulations and rules

Through the discussion with local contractors employed for this survey, the survey team did not encounter the special environmental regulations or rules applied to the project carried out in Mid-Western district of Iraq. As a result, the survey team understands that there might not be special environmental rule applied to the project carried out in Mid-Western district of Iraq where neither biologically precious species nor historical and cultural remains probably exist or if any, they might be protected by the restriction of industrial project location specified by the Environmental Regulation for Industrial, Agricultural and Service Projects. Needless to say, if it is clarified that there are some local rules to be applied to the specific rehabilitation project for existing industrial facilities, the rules shall be included in the feasibility study as apart of it.

7.2.3 Environmental Impact Assessment

Recently, the project owners in most of countries are legally required to carry out the Environmental Impact Assessment (EIA) to clarify the influence by project implementation on health and life of inhabitants, regional society and economy, natural environment and cultural and historical heritages. If negative impact is predicted through EIA, the project owner has to establish the countermeasure in order to remove or mitigate the negative impact. The project owners are required not only to meet the local and/or worldwide common environmental standards but also to take environmental conservation countermeasure to meet the peculiarity of the project site.

As for the project implementation in Iraq where EIA system is not yet legally established, the project owner is not legally required EIA. However, if the project owner intends to apply the loan offered by international financial institutes for project implementation which include the possibility of major environmental impacts, it will have to carry out EIA, because the most of international financial institution unexceptionally has own implementation and evaluation program of EIA so that the project might not be disturbed by environmental and/or social issues.

The EIA implementation and evaluation programs of the international financial institutes are not so much different from each others, rather very much similar, because the purpose of each EIA is commonly to preserve the inhabitants, society and natural environment from negative influences brought by the project implementation.

For example, Japan Bank for International Cooperation (JBIC), one of the candidates to provide the project with loan, requires EIA as a precondition of financing for the projects which include major environmental impacts. JBIC classifies the projects into 27 categories to clarify the checkpoints of each category.

Table 7.2-7: JBIC's Classification of Project

(1) Mining	(10) General Manufacturing	(19) Water Supply
(2) Oil/Natural Gas Development	(11) Thermal Power Generation	(20) Sewage/Wastewater Management
(3) Pipelines	(12) Nuclear Power	(21) Waste Management and Disposal
(4) Iron and Steel	(13) Hydro Power, Dams and Reservoir	(22) River/Channel Project
(5) Nonferrous Metal Smelting/Refining	(14) Other Electric Generation	(23) Irrigation Project
(6) Petrochemical	(15) Power Transmission and Distribution	(24) Agriculture and Livestock Project
(7) Petroleum Refining	(16) Road, Railway and Bridge	(25) Forestry
(8) Paper and Pulp	(17) Airport	(26) Fishery project
(9) Chemical Manufacturing	(18) Port and Harbor	(27) Other Infrastructure Project

(Source: JBIC's Clarification of Project)

The list of environmental and social checkpoints for all 27 project categories is shown in the Table 7.2-8

Table 7.2-8: Checklist of Environmental and Social impact by Project

No. of Checklist		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Class	Items	Mining	Oil and Natural Gas Development	Pipelines	Iron and Steel	Non-ferrous Metals Smelting and Refining	Petrochemicals	Petroleum Refining	Paper and Pulp	Chemical Manufacturing	General Manufacturing	Thermal Power	Nuclear Power	Hydro Power, Dams and Reservoirs	Other Electric Generation	Power Transmission and Distribution Lines	Roads, Railways and Bridges	Airports	Ports and Harbors	Water Supply	Sewage and Wastewater Treatment	Waste Management and Disposal	River and Channel Projects	Irrigation Projects	Agriculture and Livestock Projects	Forestry Projects	Fishery Projects	Other Infrastructure Projects
		Natural Resource Development			Manufacturing							Power Generation and Transmission					Infrastructure											
1 Permits and	(1) EIA and Environmental Permits	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	(2) Explanation to the Public	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
2 Mitigation Measures	(1) Air Quality	○	○		○	○	○	○	○	○	○	○	○		○		○	○	○	○		○				○		○
	(2) Water Quality	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	(3) Waste	○	○	○	○	○	○	○	○	○	○	○	○	○	○			○	○	○	○	○	○		○	○	○	○
	(4) Soil Contamination		○	○	○	○	○	○	○	○	○				○			○			○	○		○		○		○
	(5) Noise and Vibration	○	○	○	○	○	○	○	○	○	○	○	○		○		○	○	○	○	○	○					○	○
	(6) Subsidence	○			○	○	○	○	○	○	○	○	○		○			○		○			○	○				○
	(7) Odor		○		○	○	○	○	○	○	○	○	○		○			○	○		○	○			○		○	○
	(8) Sediment																		○									
3 Natural Environment	(1) Protected Areas	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	(2) Ecosystem and biota	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	(3) Hydrology		○	○											○		○	○	○				○			○	○	○
	(4) Topography and Geology		○	○										○	○	○	○	○	○				○			○	○	○
	(5) Management of Abandoned Sites	○																				○				○		
4 Social Environment	(1) Resettlement	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	(2) Living and Livelihood	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	(3) Heritage	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	(4) Landscape	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	(5) Ethnic Minorities and Indigenous Peoples	○		○										○	○	○	○	○	○	○	○	○	○		○	○		○
	(6) Working conditions (including occupational safety)	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
5 Others	(1) Impact during construction	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	(2) Accident Prevention Measures	○	○	○	○	○	○	○	○	○	○	○	○	○														
	(3) Monitoring	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

These 27 categories are not exclusive ones rather supplementary ones for each other.

Assuming that new phosphate fertilizer plant same scheme to that of existing one in Al-Qaim-Anbar, Iraq is built, EIA will probably have to cover the checkpoints specified for following project categories.

Mining

(5) Non-ferrous Metal Smelting and Refining

(9) Chemical Manufacturing

(10) Thermal Power

(16) Road, Railway and Bridge

(19) Water Supply

(21) Waste Management

The project owner who applies loan offered by international financial institute has to finally submit EIA report to the loan provider for its examination. EIA report shall basically include following items which come from the World Bank Operational Policy - OP 4.01, Annex B.

-Executive Summary

Discussing concisely the significant findings and recommended actions.

-Policy, Legal and Administrative Framework

Discussing the policy and the legal and administrative framework within which the EIA report is to be carried out.

-Project Description

Describing the proposed project and its geographic, ecological, social, and temporal context, including any off-site investments that may be required (e.g., pipelines, access roads, power plants, water supply, housing, and raw material and product storage facilities). Indicate the need for any resettlement or social development plan. Normally includes a map showing the project site and the area affected by the project.

-Baseline Data

Assessing the dimensions of the study area and describing relevant physical, biological, and socioeconomic conditions, including all changes anticipated before the project commences. Additionally, takes into account current and proposed development activities within the

project area but not directly connected to the project. Data should be relevant to decisions about the project site, design, operation and mitigation measures; the section indicates the accuracy, reliability and sources of the data.

-Environmental Impacts

Predicting and assessing the project's likely positive and negative impacts, in the most quantitative terms possible. Identify the mitigation measures and any negative environmental impacts that cannot be mitigated. Explore the opportunities for environmental improvement. Identifies and estimates the extent and quality of available data, essential data gaps, and uncertainties associated with predictions; and specifies topics that do not require further attention.

-Analysis of Alternatives

Systematically comparing feasible alternatives to the proposed project site, technology, design and operation, including the "without project" situation, in terms of their potential environmental impacts; the feasibility of mitigating these impacts; their capital and recurrent costs; their suitability under local conditions; and their institutional, training and monitoring requirements. For each of the alternatives, the analysis quantifies the environmental impacts to the extent possible, and attaches economic values where feasible. States the basis for selecting the particular project design proposed and justifies recommended emission levels and approaches to pollution prevention and abatement.

-Environmental Management Plan (EMP)

Describing mitigation measures, monitoring and institutional strengthening to be taken during construction and operation to minimize adverse impacts, offset them, or reduce them to acceptable levels.

-Consultation

Record of consultation meetings, including consultations for obtaining the informed views of the affected people, local Non-governmental Organizations (NGOs) and competent authorities.

The EIA report is examined using the checklist where key checkpoints of the project are mentioned. For reference, the checklist for Non-ferrous Metal Smelting and Refining is shown in Table 7.2-9.

Table 7.2-10 shows the usual procedure to carry out EIA and Table 7.2-11 the standard schedule in Japan. In case of seasonal fluctuation of such as tidal current and wind direction, it sometimes takes more than one year to grasp the environmental situation before project implementation. Table 7.2-11 shows EIA schedule which take more than one year to clarify the current environmental situation before project implementation. It shows the case that EIA takes approximate 4 years. EIA schedule should be carefully studied because it might be one of the possible critical paths in project implementation.

EIA is generally carried out after basic design of the project has been defined, in other words, after Front End Engineering and Design (FEED) has been completed.

In case major deviation has been issued from original FEED and subsequent EIA at detailed design phase, the project owner is required to carry out the EIA again. In general, if the environmental impacts of the project increase in comparison with original EIA by more than 10 %, the project owner has to carry out EIA again in Japan. In such a case, the project implementation schedule might completely delay. Accordingly, the project owner has to carefully and precisely carry out the original EIA.

Table 7.2-9: EIA Check List for Non-Ferrous Metal Smelting and Refining Project

Category	Environmental Item	Main Check Items	Confirmation of Environmental Considerations
1 Permits and Explanation	(1) EIA and Environmental Permits	① Have EIA reports been officially completed? ② Have EIA reports been approved by authorities of the host country's government? ③ Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? ④ In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	
	(2) Explanation to the Public	① Are contents of the project and the potential impacts adequately explained to the public based on appropriate procedures, including information disclosure? Is understanding obtained from the public? ② Are proper responses made to comments from the public and regulatory authorities?	
2 Mitigation Measures	(1) Air Quality	① Do air pollutants, such as soot and dust (containing heavy metals, such as Cu, Fe, As, Cd, Pb, Hg, Zn), and sulfur oxides (SOx) emitted from the nonferrous smelting processes, including copper, lead and zinc, and the other ancillary facilities comply with the country's emission standards? Is there a possibility that air pollutants emitted from the project will cause areas that do not comply with the country's ambient air quality standards?	
	(2) Water Quality	① Do pollutants, such as SS, heavy metals (Cu, Pb, Cd, Zn, As, Hg), pH contained in effluents from the smelting processes and other ancillary facilities comply with the country's effluent standards? Is there a possibility that the effluents from the project will cause areas that do not comply with the country's ambient water quality standards? ② Are adequate measures taken to prevent contamination of surface water and groundwater by these effluents?	
	(3) Wastes	① Are wastes, such as slags and sludges generated from copper and nickel smelting properly treated and disposed of in accordance with the country's standards? ② Is red mud (an alkaline waste containing oxides of Al, Si, Fe, Ti, Na, Ca and others) generated from alumina plant properly treated and disposed of in accordance with the country's standards? ③ Are wastes, such as spent cathodes, dross, and fluxing slags generated from aluminum smelting processes properly treated and disposed of in accordance with the country's standards? ④ Are adequate measures taken to prevent contamination of soil and groundwater by leachates from the waste disposal sites?	
2 Mitigation Measures	(4) Soil Contamination	① Has the soil in the project site been contaminated in the past, and are adequate measures taken prevent soil contamination by leaked materials, such as chemical agents?	
	(5) Noise and Vibration	① Do noise and vibrations comply with the country's standards? ② Is there a possibility that noise generated by large vehicle traffic for transportation of materials, such as raw materials will cause impacts?	
	(6) Subsidence	① In the case of extraction of a large volume of groundwater, is there a possibility that the extraction of groundwater will cause subsidence?	
	(7) Odor	① Are there any odor sources? Are adequate odor control measures taken?	

3 Natural Environment	(1) Protected Areas	① Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	
	(2) Ecosystem and biota	① Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? ② Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? ③ If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? ④ Is there a possibility that the amount of water (e.g., surface water, groundwater) used by the project will adversely affect aquatic environments, such as rivers? Are adequate measures taken to reduce the impacts on aquatic environments, such as aquatic organisms?	
4 Social Environment	(1) Resettlement	① Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? ② Is adequate explanation on relocation and compensation given to affected persons prior to resettlement? ③ Is the resettlement plan, including proper compensation, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? ④ Does the resettlement plan pay particular attention to vulnerable groups or persons, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? ⑤ Are agreements with the affected persons obtained prior to resettlement? ⑥ Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? ⑦ Is a plan developed to monitor the impacts of resettlement?	
	(2) Living and Livelihood	① Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary? ② Is there a possibility that large vehicle traffic for transportation of materials, such as raw materials and products will cause impacts on traffic in the surrounding areas, impede the movement of inhabitants, and cause risks to pedestrians? ③ Is there a possibility that the amount of water used (e.g., surface water, groundwater) by the project will adversely affect the existing water uses and water area uses?	
	(3) Heritage	① Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage sites? Are adequate measures considered to protect these sites in accordance with the country's laws?	
	(4) Landscape	① Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	

4 Social Environment	(5) working conditions	① Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project? ② Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials? ③ Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public sanitation) for workers etc.? ④ Are appropriate measures being taken to ensure that security guards involved in the project do not violate safety of other individuals involved, or local residents?	
5 Others	(1) Impacts during Construction	① Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? ② If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? ③ If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?	
5 Others	(2) Accident Prevention Measures	① Are adequate accident prevention plans and mitigation measures developed to cover both the soft and hard aspects of the project, such as establishment of safety rules, installation of prevention facilities and equipment, and safety education for workers? Are adequate measures for emergency response to accidental events considered? ② Are adequate accident prevention measures (e.g., installation of prevention facilities and equipment and establishment of prevention management framework) taken for storage, loading/unloading, and transportation of hazardous and dangerous materials?	
	(3) Monitoring	① Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? ② Are the items, methods and frequencies included in the monitoring program judged to be appropriate? ③ Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? ④ Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	
6 Note	Reference to Checklist of Other Sectors	① Where necessary, pertinent items described in the Mining checklist should also be checked (e.g., projects including mine development). ② Where necessary, pertinent items described in the Ports and Harbors checklist should also be checked (e.g., projects including construction of ports and harbor facilities). ③ Where necessary, pertinent items described in the Thermal Power checklist should also be checked (e.g., projects including construction of large-scale power plants used for smelting plants, such as aluminum smelters).	
	Note on Using Environmental Checklist	① If necessary, the impacts to transboundary or global issues should be confirmed (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, and global warming).	

1) Regarding the term “Country’s Standards” mentioned in the above table, in the event that environmental standards in the

country where the project is located diverge significantly from the World Bank Safeguard Policy as a general rule, or the International Finance Corporation Performance Standards for private sector limited or non-recourse project finance cases, or other standards established by other international financial institutions, or other internationally recognized standards or good practices established by developed countries such as Japan regarding environmental and social considerations, the background and rationale for this deviation, and the measures to rectify it if necessary, are to be confirmed. In cases where local environmental regulations are yet to be established in some areas, considerations should be based on comparisons with international standards such as the World Bank Safeguard Policy, and appropriate standards of other countries(including Japan).

2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which it is located.

Table 7.2-10: Japanese EIA Procedure

EIA-Related Tasks / Party in charge	Proponent	National Government	Local Government	Citizens	Remarks
1. EIA Methodology (scoping) Document					
Preparation of EIA Work Plan	○				
Consultation on the Work Plan	○	○	○		
Drafting/examination of Scoping Document	○	△	△		
Public announcement & inspection	○			△	The public announcement/inspection period lasts 1 month.
Submission of written opinions	△			○	Within 2 weeks after the public inspection period
Distillation of opinions, possible examination Distilled Opinions & Possible Responses	○	△	△		Within 90 days after the submission
2. Environmental Impact Statement (EIS) Draft					
Present Status Survey	○				In case of seasonal fluctuation, survey throughout the year is required
Forecast assessment	○				
Preparation of EIS Draft/Executive Summary	○				
Consultation on EIS Draft/Executive Summary	○	○	○		
Public announcement, inspection & hearing	○			△	The public announcement/inspection period lasts 1 month.
Submission of written opinions	△			○	Within 2 weeks after the public inspection period
Distillation of opinions, possible responses, of Distilled Opinions & Possible Responses	○	△	△		Within 120 days after the submission examination
3. Environmental Impact Statement (EIS)					
Preparation of EIS/Executive Summary	○				
Examination/revision of EIS/Executive Summary	○	△			
Public announcement & inspection	○				

○: Active party　△: Passive party (including examiner)

Table 7.2-11: Example of EIA Schedule

EIA-related tasks \ Time period		Year-1				Year-2				Year-3				Year-4				Year-5				Remarks
		1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	
EIA Scoping	Preparation of EIA Work Plan																					
	Preparation of Scoping Document																					
	Consultation on Scoping Document																					
	Public announcement & inspection																					
	Submission of written opinions																					
	Distillation of opinions, possible responses, examination																					
EIS Draft	Present status survey																					Examples of present status surveys throughout the year
	Forecast assessment																					
	Preparation of EIS Draft/Executive Summary																					
	Consultation on EIS Draft/Executive Summary																					
	Public announcement, inspection & hearing																					
	Submission of written opinions																					
	Distillation of opinions, possible responses, examination																					
EIS	Preparation of EIS/Executive Summary																					
	Examination/revision of EIS/Executive Summary																					
	Public announcement & inspection																					

7.3 Requirement of environmental protection in expected project area

Because of following reasons, the industrial rehabilitation projects of existing facilities to be carried out in Mid-Western of Iraq will not bring serious environmental or social issues to the surrounding area of the projects.

- The industrial facilities have to be located on the area far from residential zone to meet the specification of Environmental Regulation for Industrial, Agricultural and Service Projects.

- The density of industrial activities is not so high in Mid-Western district of Iraq that the integrated air or water pollution by plural facilities will not easily emerge.

- There is abundant unoccupied desert area in Mid-Western of Iraq which can be utilized for landfill of industrial wastes not to bring nuisance to neighboring inhabitants and society.

- There is probably neither biologically precious species nor historical and cultural remains to be paid protective consideration near the industrial area in Mid-Western district of Iraq.

Thus, the survey team has attained to a result that the industrial rehabilitation projects of existing facilities in Mid-Western of Iraq will not require special environmental countermeasures.

Chapter 8

Conclusion and Recommendations

Chapter 8 Conclusion and Recommendations

8.1 Macroscopic Observations

The sector study was carried out to cover the major three industries under MIM, and the depth of study on chemical fertilizers industry was relatively deeper than other two industries. It was derived mainly because the target in this sector study was preset to highlight the "Phosphate Fertilizers Production Industry".

Under the above background the brief study result on major industries is summarized as follows:

8.1.1 Current Status of MIM Sector in IRAQ

The all industrial production companies under MIM are "State-Owned Enterprises (SOEs)" and are categorized into the following six sectors as shown in the table.

These industries were very vibrant and competitive in the past and also were growing constantly. However due to the political and economical situation which came up in the late 1980s and had continued up to the turn of the century, these industries had badly been affected. Some of them had seriously deteriorated.

Table 8.1-1: MIM Sectors & SOEs

Industrial Sectors	Nos. of SOEs	Nos. of Plants & Factories			Total Employees
		Total	Operational Factories	Non-Operational Factories	
Engineering	21	99	67	12	56,217
Construction	8	45	27	10	31,481
Chemical & Petrochemical	15	48	34	11	33,009
Food & Pharmaceutical	6	21	15	5	23,717
Textiles	8	34	32	2	34,925
Industrial Services	9	4	1	0	6,243
Total	67	251	176	40	185,602

(Source: "IRAQ : OPEN FOR BUSINESS 2010" (Investment Guidebook) prepared by MIM)

The following politically and economically difficult conditions have caused the most industries to the status which makes them economically less feasible to continue with their industrial activities;

Negative Factors

- Lack of investments,
- Lack of imported raw materials,
- Lack of spare parts and component,
- Lack of equipment and machineries
- Lack of industrial materials, such as steel pipes & tubes etc.,
- Lack of other needed commodities
- Economic sanctions for 13 years

Such downfall in all industrial activities caused the chaotic situation in all industries.

It is reported that consequently a wide looting deed of materials, machinery, equipment, industrial commodities had occurred frequently at any factory and plant.

Meantime process of "Privatization of all Iraqi SOEs" started in 2004, and a process of "Leasing of SOEs" was also offered by MIM to the private sector.

However it was successful in very few locations due to the following reasons:

* Security problem

* Excessive employment by SOEs

Consequently "Rehabilitation Strategy" has come up with the financing structure of Governmental Budget Allocation, ODA Loans and Grants from donating countries.

8.1.2 Cement Industry

The cement industry is one of the oldest industries in Iraq. In 1936 the first plant was established in Baghdad by the Iraqi private sector and its production was started in 1949.

In 1966, however, the Government announced the nationalization of cement industry, and under such new strategy and policy, many cement plants were constructed through out the country.

In 1980 ~ 1981, MIM decided the large expansion of cement production capacity from 7 million tons per annum to 21 million tons per annum.

Since then, many plants were constructed, but its production volume in cement industry has become declined due to lack of investments, spare parts and industrial management capability in the past twenty (20) years.

Today many of such plants including their distribution facilities have been listed up as rehabilitation factories from Iraqi State Company for Cement, State Company for Northern

Cement and State Company for Southern Cement.

If these plants with design capacity of 14 million tons per annum plus 2 million tons per annum in Kurdistan will be rehabilitated, the 10 million tons per annum production capacity could be attainable and meet the local demand.

Currently production volume seems to be around 4 million tons per annum plus production from Tasluja plant in Kurdistan region. Then the gap between local demand and local production has been made up with the imported cement, which is dealt by private sector in 100%.

Meanwhile some of plants have been leased to private investors, who were requested to be rehabilitated as follows:

- Tasluja plant : Rehabilitation was already done by French company.
- Al-Qaim plant : Already leased to an Iraqi private investor and now producing around 2,200 tons/day. (726,000 tons/year)
- Kubaisa plant : Now in the process of leasing to Iraqi private investor.
  Currently producing 300,000 tons/year against the design capacity of 2 million tons/year.

8.1.3 Glass & Ceramic Industry

The glass and ceramic industry is one of the oldest industrial establishments in Al-Anbar Governorate.

The first production was started in 1970 in Ramadi, capital city of the province.

Current production status of “State Company for Glass & Ceramic Industry” is as follows:

* Production start in 1971 in Ramadi in Anbar province
* Major products and current production status are shown in the following table:
* Iraqi market has great demand for the above products, and particularly the sheet glass for housings which have been planned to construct 1.5 million houses.

As per the above table, all of the production lines are serious damaged and deteriorated in its production capacity.

When considering Iraqi Housing Plan, item 1~4 facilitates should be rehabilitated and/or scrapped and built.

Table 8.1-2: Glass & Ceramic Products and Production Volume

Name of Plant		Major Products	Design Capacity (t/y)	Actual Capa. in 2008 (t/y)	Rehabilitation Target (%)
1.	Ceramic Floor Tile	31 x 31 cm Tile	20,790	460	35,640
2.	Sanitary Ware	Sink wash, Toilet basin with accessories	5,000	60	4,224
3.	Wall Tile	Ceramic wall tile 30 x 20 & 40 x 40cm	24,750	Stopped	39,600
4.	Sheet Glass	3~6 m/m x 220 x 200cm 3~6 m/m x 190 x 180cm	39,600	Stopped	31,680 (80%)
5.	Bottles & Jars	All kinds of glass bottles and jars	79,200	32	63,360
6.	Table ware	All kind of glass table wares	24,750	Stopped	19,800
7.	Medical bottles	25-125 ml size	39,600	Stopped	31,680

(Source: 2006 document of Iraqi Ministry of Industry and Minerals)

8.1.4 Chemical Fertilizer Industry

There are two Ammonia/Urea Plants and one compound fertilizer plants in Iraq.

* Fertilizer Complex at Baiji:

  A Plant which was commissioned in 1990.

  It has a design capacity of:

  - Ammonia: 1,000 tons/day
  - Urea: 1,250 ton/day

  Marubeni Corporation is rehabilitating the complex for the time being.

* Fertilizer Complex at Khor-Alzubair:

  The plant was commissioned in 1977

  It consists of 2 lines with a design capacity of 3,200 tons/day Urea.

  Now the Plants have been under rehabilitation with Japanese ODA loan.

* The SCP Complex in Al-Qaim which this survey has been focusing on, needs also complete rehabilitation.

Further to the above, Abu Al-Khasib Chemical Fertilizer plant in Basrah province could not be rehabilitated since it was seriously damaged during the First Gulf War, and therefore many

equipment and machineries were removed from the site to be used in other plant sites.

Local demand figures these chemical fertilizers are not found in any statistical data, and only current production data are available as precisely stated in Chapter 5.

Then actual demand, not potential demand is limited by supply-side volume, which have given the greatly negative affection on Agriculture Industry.

Many farmers abandoned their farming due to the following reasons and conditions:

* Stoppage of irrigation systems
* Lack of electric power for motor-driven pumps
* Economical sanctions
* Security problems

Under the circumstances surrounding the farming activities in agricultural industry, all figures for chemical fertilizer demands, even if available, seem to be hypothetical ones and do not have a solid base for such estimation.

According to the local information of Iraqi farm land conditions Study Team's local partner have conducted the need of different chemical fertilizers as followings, but these do not represent the real local demand:

Urea : Approx. 1 million t/y

NP & NPK : Approx. 1.25 million t/y

TSP : Approx. 0.6 million t/y

As per Study Team study in the manner of document reviews and verbal information, we have assumed that the following vicious cycle has happened to occur in regards to agriculture and fertilizers, and it is envisaged that this vicious cycle was formed by many complicated factors.

Typical factors, some of many complicated factor are indicated in the flowchart.

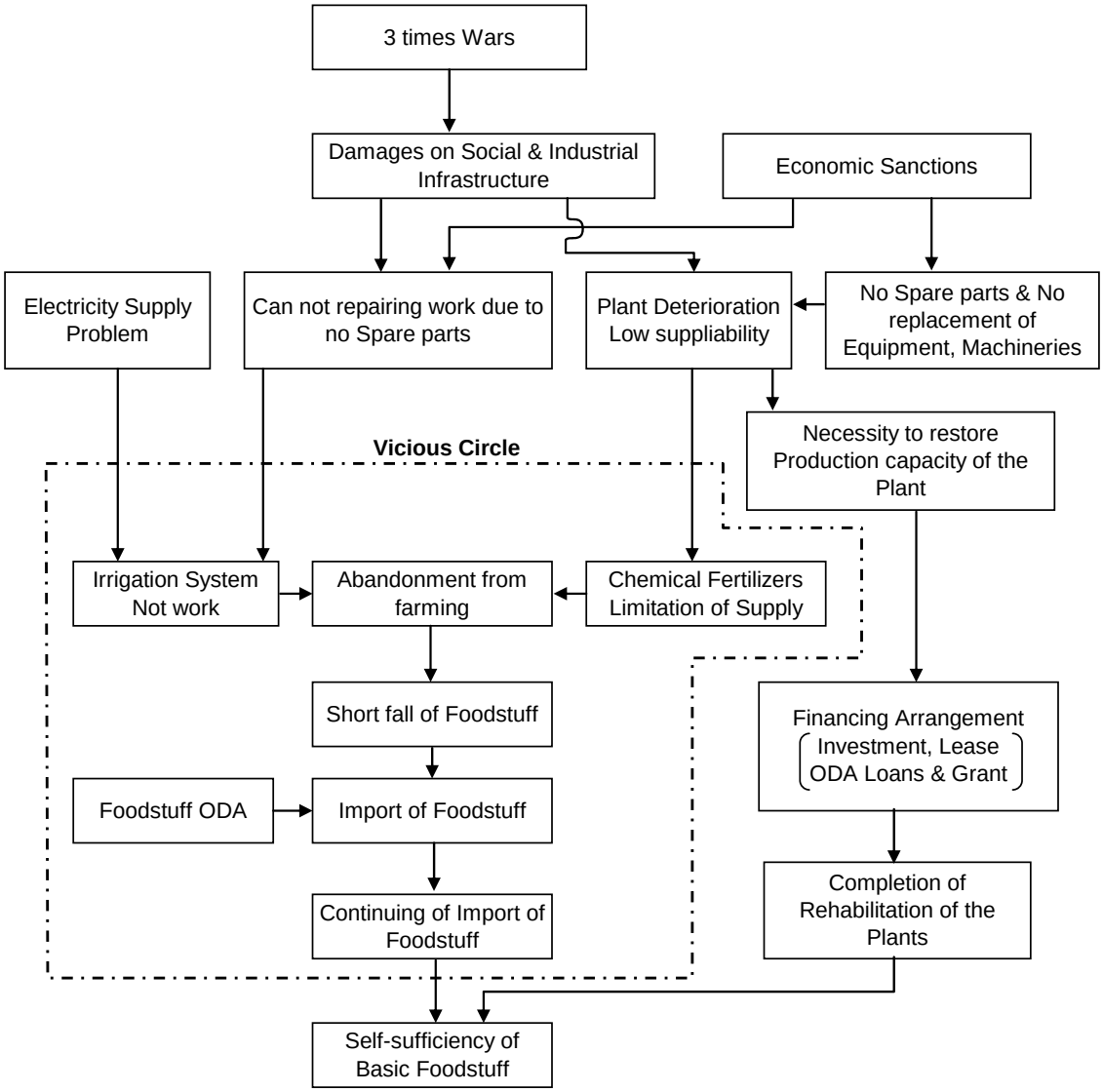


Figure 8.1-1: Assumed Vicious Cycle of Industrial Activities

(Source: Compiled by Study Team based on SCP data)

As shown in the above Block Flow Diagram, the restoration of fertilizers facilities in production capacity in any way is the most important to improve each yield of crops.

In this regard the good balance of N.P. K fertilizers is absolutely required together with the required quantity of them and irrigation water.

From the volumetric point of view, restoration of fertilizer facilities is priority issue.

8.2 Microscopic Observation of Phosphate Fertilizer Industry

8.2.1 Feedstock of Phosphate Rock

The large deposits of Phosphate rock was found in 1960s and the proven reserves are around 500~700 million tons, concentrated in Iraqi's western desert, in the region of Akashat.

The mine is located about 150 km to the south-west of the Al-Qaim city and one shift operation capacity is designed to be 3.4 million tons per year.

P-rock quality is good with average concentration of 22% (around between 21 – 23% concentration of P_2O_5).

8.2.2 Current Operating Conditions

(1) Akashat Mine

1) Present operational situation

In general there are not so much sophisticated equipment existed and partially operated at low load factor (Ave. 600,000 tons/3,400,000 tons per year)

Major reasons for low production profile seem to be as follows:

* Performance draw back of Chemical plants in Al-Qaim (Low demand of feedstock)
* Mining equipment are working under not good condition due to no spare parts and poor maintenance activities

2) Utilities

Power and water supply has enough capacity and meet current demand of the mining facilities and housing complex, however power failure seems to have occurred very often.

Elec. power supply : High tension 132 KV lines from Al-Qaim plant

Power consumption : It is below 7 MWH at mine facilities

3) Needed rehabilitation

Necessity of Rehabilitation is anticipated for the following equipment and system:

- Production equipment : To be partly replaced with new mining equipment, such as Bulldozer, Excavator, Power Shovel and Drilling Rig.
- Utilities supply system : Currently no need to rehabilitate largely subject to minor repairing and remedial work to be done
- Civil Infrastructure : There may be not serious.

- Transportation System : Railway seems to have no serious defects.
  Operation management system might have potentially inferior aspects to be improved and/or upgraded.
  Traffic control system seems to have had the damages, then the existing control system could be necessary to be restored.

(2) Compound Fertilizers Complex (SCP in Al-Qaim)

1) Present operational situation

-1. General remarks

Generally speaking the external appearances of the existing production facilities are not good, under the limited judging materials of the photographs of each plant and its equipment, piling system, tank and structures.

Internal conditions of equipment and piping system are not ascertained. Accordingly, at next investigation stage, more concrete survey shall be required. "Action Flowchart for Materialization of Rehabilitation Project" attached hereinafter shows its necessity.

-2. Plant-wise condition

Sulfuric acid plant is currently working with 20% of the design capacity due to multiple technical and process problems.

* Phosphoric acid plant is currently working with approx. 23% of the design capacity due to the aging deterioration of equipment (deterioration) and no spare parts & no replaceable equipment.

* Phosphate fertilizer production plant, especially, TSP plant is currently working with approx. 40% of the design capacity due to the less supply of phosphoric acid due to obsolescent equipment, and no spare parts & equipment.

* Compound fertilizers (NP and NPK) plants are currently working also at low production rate (40%) for the design capacity due to the lack of ammonia and urea as feedstock.

* Mono-Ammonium Phosphate (MAP) fertilizer plant is not working well due to the lack of ammonia.

  MAP is one of raw materials in production of compound fertilizers.

* Ammonia plant is completely stopped due to the damage of multi-purpose compressor and aging problems of major equipment.

  Ammonia production unit (Unit 451) should be replaced with new one, however the same capacity unit as the existing one is not recommendable.

SCP has desired to construct a new ammonia plant with the capacity of 1,000 t/d and 1,500 t/d urea production.

* Utilities facilities meet the demand of Compound fertilizers plants except the instability of electricity supply.

2) Common problems to all facilities

- Instability of the electricity supply
- No spare parts
- No spare equipment
- No reparing materials available

Further to the above production facilities, the products packing and loading facilities could be also rehabilitated. Currently unpacked products are shipped out.

At this moment it is not clear about the supply ability of paper sacks for compound fertilizers.

Overall productivity of a whole facilities are estimated to be the plant utilization ratio of around 15% of the designed capacity due to the above several reasons.

From the technical viewpoints, it is rather recommendable to properly judge what is better solution to the restoration of production capacity, such as rehabilitation of the existing seriously-damaged, deteriorated and de-graded plants or new construction of complete plants.

8.3 Conclusions

Study Team has conducted the following conclusions:

* Almost all of the SOEs under MIM are necessary to be modernized and restored through the rehabilitation projects in order to meet the local demand for industrial products.

(1) Construction sector

Particularly the rehabilitation of construction sector is priority issues for the purpose of improvement in supply conditions for the reconstruction of social and industrial infrastructures.

(2) Cement sector

Potential demand of cement in Iraq is assumed to be approximately 15 million tons/year and actual supply was reported to be 6 million tons/year including imported cement. The long-term demand forecast indicates 30 million tons in 2030, therefore cement production facilities should be urgently rehabilitated.

(3) Glass sector

Government has launched the big housing complex plan to newly construct 1.5 million houses, therefore sheet glass production facility should be re-constructed.

However now it is under rehabilitation at Government budget of 18 million dollars with modern production process (old one: by the "FSU Techno export") in the manner of upgrading is both production capacity from 30 t/d to 120 t/d and product quality.

This information was conveyed by local partner, not by Iraqi mission, then it is not sure whether the above rehabilitation works cover the full range of necessary rehabilitation or not.

8.4 Recommendations

8.4.1 General remarks

In this sector study Chemical Fertilizer Industry in Al-Anbar Governorate (SCP) has been relatively focused on the investigation of necessity of "Rehabilitation Project" among other industries belonging to MIM.

Then in this clause, the projects related to SCP Complex are stated with Study Team's recommendation.

When focusing on the specific project of "Rehabilitation Project of SCP Complex in Al-Qaim", further detailed study is needed to justify the necessity of the project, its project cost and schedule, including "Project Execution Plan", which will indicate rehabilitation of the existing facilities or new construction of complex at different location.

* Final project scenario will be pictured at the next detailed Feasibility Study stage.

Regarding to "Chemical Fertilizers Industry" in Al-Anbar, in Mid-Western District of Iraq, State Company of Phosphate (SCP) is only one production company to supply compound fertilizers of N.P.K and its raw material of MAP.

This SCP is also only one production company of compound fertilizers in Iraq, therefore the supply-ability of required volume of P-fertilizers definitely depends on the SCP complex.

In this connection, the restoration of production capacity of SCP Complex in Al-Qaim is urgent and essential as well as reconstruction of irrigation system for the urgent recovery of self-sufficiency of basic foodstuff.

8.4.2 Verification of the necessity of rehabilitation project of SCP

Before getting into such Detailed F/S、the importance of the rehabilitation project of SCP

Complex in Al-Qaim was recognized by the Iraqi Mission. Responding to Study Team's questionnaires, the Iraqi side's considerations were expressed as below;

(1) Why SCP Complex Rehabilitation is priority project among other major industries in Al-Anbar?

1) Reasons assumed by Study Team	Yes/No
● The improvement of "Food situation" is politically urgent issue! (from Central Government point of view and from Provincial Government point of view)	☑/☐
● SCP has enough market for additional production level after rehabilitations! (Classified in MIM privatization program)	☑/☐
● SCP / Al-Qaim project is listed as the most urgent target (Glass & Ceramic industry is also listed in!)	☑/☐
● To solve the problem of unemployment! (Especially in really remote area of Al-Qaim)	☑/☐
2) Reasons expected by Iraqi side for applying Japanese ODA Loan	Yes/No
● SCP rehabilitation cost is relatively higher than other two industries rehabilitation cost.	☑/☐
● Rather difficult to execute the rehabilitation SCP Al-Qaim Complex in the manner of Investment by domestic and foreign private enterprises !	☑/☐
● Expectation for modernization of the facilities by Japanese Companies !	☑/☐

(2) Methodologies of Modernization of SCP Complex

Clarification of Execution Plan	Comments by Iraqi Mission
1. Is there any possibility of modernization in other location ? (ex) Outside Al-Qaim Complex site, such as: (1) Other place close to Akashat Mine (2) New site adjacent to New Gas Field (Akass)	There is no possibility to newly construct phosphate fertilizers complex outside the existing Al-Qaim complex area.
2. Is there any problem in case of rehabilitation at the same location of each existing unit ?	Technically no problem in the case of rehabilitation of the existing facilities inside Al-Qaim complex site.
3. During the rehabilitation works, Al-Qaim Complex may be forced to completely stop the production. What is your idea to overcome such situation?	- It should be considered demand peak of P-Fertilizers might be limited to be in winter season (max. three months). - Possible solution will be stock piling or alternatively import.

(Observasion)

1) Rehabilitation in Al-Qaim is possible and practical due to enough numbers of maintenance staff available, such as around 800 persons and other technical staff plus operation engineers.

2) In Akashat area there are not available of construction workers and it is difficult to gather them from outside Al-Qaim area due to no life infrastructure.

3) In Akaz area almost the same situation as in Akashat is anticipated.

4) From the employment point of view, at present, about 4,000 people are working at Al-Qaim Complex, that figure is larger than for the full production of Complex. Anyhow, these amount of people should always be employed because of the relief measures for the unemployed. Therefore, even after the completion of the rehabilitation, these level of working people will have to be employed. This is an essential issue from the viewpoint of employment in Al-Qaim area.

(3) Restoration of Al-Qaim complex v.s. New construction

What are the prevailing conditions of restoring Al-Qaim Complex over building new complex at other location?

1. Economical condition:
   Judging that restoring is more economical than new building.

2. Existing utility supply facility availability (Water/Electricity/etc.):
   So far meets the demand of plants and new power generation units are under placing order

3. Existing wastes handling facility availability (Gypsum/Waste water/etc.)
   From Anti-pollution point of view, the currently applicable countermeasures are still effective.

4. Existing infra-structure (Road/Railway/etc.)
   Not serious and those are still workable.

5. Work force availability (for operation/maintenance)
   SCP Al-Qaim has kept enough manpower to execute the project. If in other location it is more difficult to obtain workforce and it will be more costly.

6. Feedstock delivery conditions (other than phosphate rock)
   So far there is no significant difference due to the availability of rail and road.

7. Other conditions / restrictions, if any.
   Difficulties of relocation of housing complex and not better life conditions.

Accordingly to the above clarification it was recognized that SCP in Al-Qaim has taken the

possible maintenance actions at minimum level in the way of national budget allocation, then they have considered that the rehabilitation of the existing facilities is the shortest way to materialize the restoration of production capacity.

(4) Why you need urgent rehabilitation of SCP Complex?

1) Factors Analysis in Encouragement Policies of Agriculture

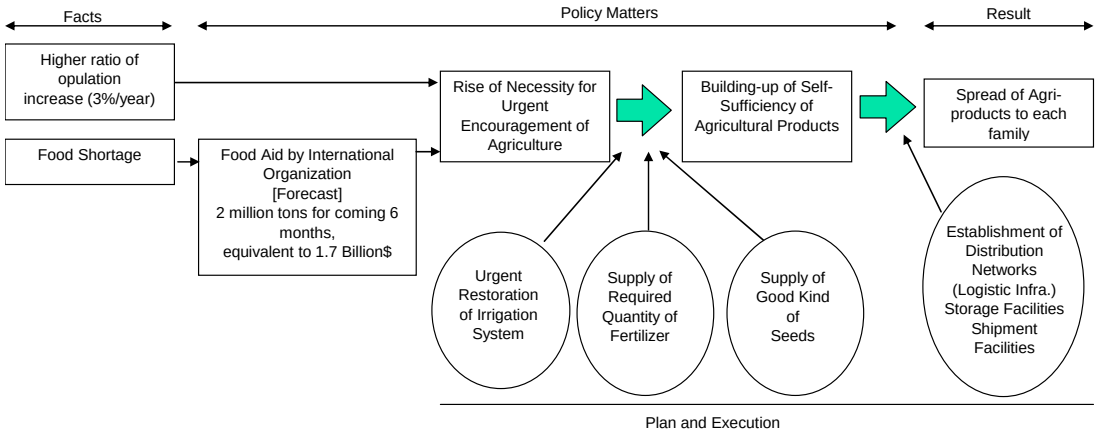


Figure 8.4-1: Factors Analysis

(Source: Compiled by the Study Team)

2) Historical Change of Agricultural Policies

- ➢Upto 1980 : Inconsistent agricultural policies under Hussein Government discouraged domestic market production. Despite its abundant land and water resources, Iraq was a net food importer.
  Under the "UN Oil for Food" program, Iraq imported large quantities of grains, meat, poultry and dairy products.
- ➢1981 : The Government abolished its farm collectivization program, allowing a greater role for private enterprises in agriculture.
- ➢1997 : The International "Oil-for-Food" program (1997-2003) further reduced farm production by supplying artificially-priced foreign foodstuffs.
- ➢2003 : The military action of 2003 did little damage to Iraq agriculture. Favorable weather conditions in 2003 led to produce grain 22% higher than in 2002.
- ➢2004 : The growth of grain production continued, but Iraq was an importer of agricultural products. It was predicted to continue for the foreseeable future.

Iraqi Government has seriously planned to get out of the difficult position of an importer of

agricultural products by encouraging agricultural industry.

3) Current Solutions for "Plan & Execution required in Agricultural Sector"

- ➢Baiji Fertilizers Complex : - Spare parts were purchased with USAID of 5 million US$
  - Under rehabilitation by a domestic private company under the corporation with Marubeni Corporation
- ➢Khor Al Zubair SCF/South : Under rehabilitation in the manner of Japanese ODA Loans (18,100,000,000 JPY ≒ 200 million US$)
- ➢Al-Qaim SCP Complex : Planned "Rehabilitation in the manner of Investment by Private Enterprise. However, so far, not materialized yet due to no local and foreign investors are interested in the plan.

4) Statistical Analysis of P-Fertilizers Consumption

- ➢ Comparison between Iraq and other countries and areas

Table 8.4-1: Comparison of P-Fertilizers Consumption by "INDEX"

Area and Country	N-Fertilizers	P-Fertilizers	K-Fertilizers	Grand Total
World Total	85,500 **(1.00)**	33,800 **(0.39)**	23,600 **(0.28)**	142,900
America Total (N.C.S. America)	15,900.5 **(1.00)**	7,898.8 **(0.49)**	8,270.7 **(0.52)**	32,070
Europe	10,876.5 **(1.00)**	3,321.1 **(0.31)**	3,888.9 **(0.36)**	18,077.5
Middle East	2,893 **(1.00)**	1,059.3 **(0.37)**	248 **(0.08)**	4,200.3
Iran	884.2 **(1.00)**	305.5 **(0.42)**	101.7 **(0.11)**	1,291.4
Iraq	510.7 **(1.00)**	127.4 **(0.25)**	0.7 **(0.0014)**	638.8

(Source: Compiled by Study Team based on FAO data)

<Observation>

(1) The ratio of P-Fertilizers against N-Fertilizers in Iraq is too small in comparison with ones of Iran, America total and world total.

(2) When considering weather and soil nature, P/N ratio of Iraq should be close to the figure of Middle East at least.

(3) As per table 8.4-1 the consumption ratio of N:P=1:0.4 is the minimum average (World total 1:0.39), then the ratio in Iraq should be upgraded first from 0.25 to around 0.4 and secondary conditions to improve the yield of the crops is to lift up the production level of N-P fertilizers to the level of N-Fertilizer plants design

capacities and P-Fertilizer plants design capacities.

For the increase of N. P. K compound fertilizers production, N & P production (K is imported from Jordan) are essential.

- Comparison of Specific Consumption (per ha) P-Fertilizers in Iraq and other countries and areas

Table 8.4-2: Country-wise Fertilizers Specific Consumption/Ha

	Agricultural Field (x Million ha)	Fertilizers Consumption (tons/ha)		
		N-Fertilizers	P-Fertilizers	K-Fertilizers
Iraq	5.7	0.089	0.022	0.00012
Egypt	3.5	0.305	0.041	0.016
Iran	18.1	0.049	0.017	0.006
Saudi Arabia	3.8	0.059	0.035	0.006
Syria	5.5	N.A.	N.A.	N.A.
Brazil	50.7	0.036	0.055	0.060
USA	187.8	0.058	0.021	0.024
France	19.5	0.117	0.037	0.049
UK	5.9			

(Source: Compiled by Study Team based on FAO data)

According to the above factors analysis of the necessity of urgent rehabilitation of Al-Qaim SCP Complex, the further detailed study must be recommendable.

Through such further detailed study, the project definition will be established.

8.5 Way Forward

8.5.1 Information to be collected for the restoration of phosphate fertilizer industry

For the improvement of the survey results, study team tried to collect many kinds of data and information. Especially, in the case of forecasting the phosphate fertilizer demand in Iraqi, followings are urgently needed;

1. Verification of soil quality of cultivated land in Iraq
2. What type of crops are cultivated, actually in what regions and how many amount of phosphate fertilizers are needed there.
3. Alternative uses of other fertilizers in the case of shortage of phosphate fertilizers.
4. Forecasted export amount of phosphate fertilizers.
5. Introduction of some typical demand forecast data in Iraq.

Unfortunately, however, study team could not find these suitable data mentioned above.

8.5.2 Information to be collected for materializing the rehabilitation proposal by Japanese ODA loan

The following page show the “Way Forward” until the completion of the “Project Plan” including “Diagnoses of the Facilities”, which will be possibly executed in parallel with D-F/S and/or as a part of D-F/S.

As the last message to MIM, the following items to be clarified by MIM in accordance with “JICA Operational Guidance for Japanese ODA Loan”.

For further consideration proceeding with current plan (rehabilitation of Al-Qaim or new construction of ammonia/urea) by Japanese ODA Loan, the following items (example) should be clarified by MIM so that JICA could judge reasonableness of providing Japanese ODA Loan.

(JICA operational guidance: http://www.jica.go.jp/english/operations/schemes/oda_loans/oda_op_info/guidance/)

- Current activity of MIM in the Chemical Fertilizer industry (ex. progress of rehabilitation project of the ammonia/urea plant in Baiji)
- Study of the possibility of new construction of Phosphate Fertilizer complex (in Al-Qaim or other area)
- In case of the rehabilitation of Al-Qaim complex, re-study of the realistic rehabilitation plan (Recovery up to production rate of 90% is realistic?)
- In case of the rehabilitation of Al-Qaim complex, priority of units to be urgently rehabilitated
- Re-study of necessary cost for rehabilitation plan
- Study by MIM of market demand of Phosphate Fertilizer in Iraq
- MIM’s action plan for current policy of Chemical Fertilizer
- Condition of sublet from MIM to SCP
- Expected technical cooperation (management, operation skill,,,,)
- In case of the construction on an ammonia/urea plant in Anbar, relation in plants in Baiji and Basrah?

8.6 Auxiliary Support to Rehabilitation Project of SCP Complex

If SCP Complex rehabilitation project could be materialized, the following additional supports are quite essential and effective for smooth execution of the project. This support will be needed for the stable operation and maintenance of the facilities after the completion of the rehabilitation.

* Special support with the supply of inspection equipment and tools for diagnosis of the internal and external of existing facilities, including training at vendors.

* The introduction of DCS (Distributed Control System) is strongly desired for Al-Qaim Complex, so that special technical training of DCS is preferable prior to the installation in Complex.

  Because DCS will be supplied by Supply Contractor however the piping and instrumentation works shall be locally done by SCP members in advance prior to the installation of major equipment and machineries.

  Therefore it is essential to be understood the substance of DCS.

* Laboratory and workshop equipment are also necessary for smooth plant operation, including technical training.

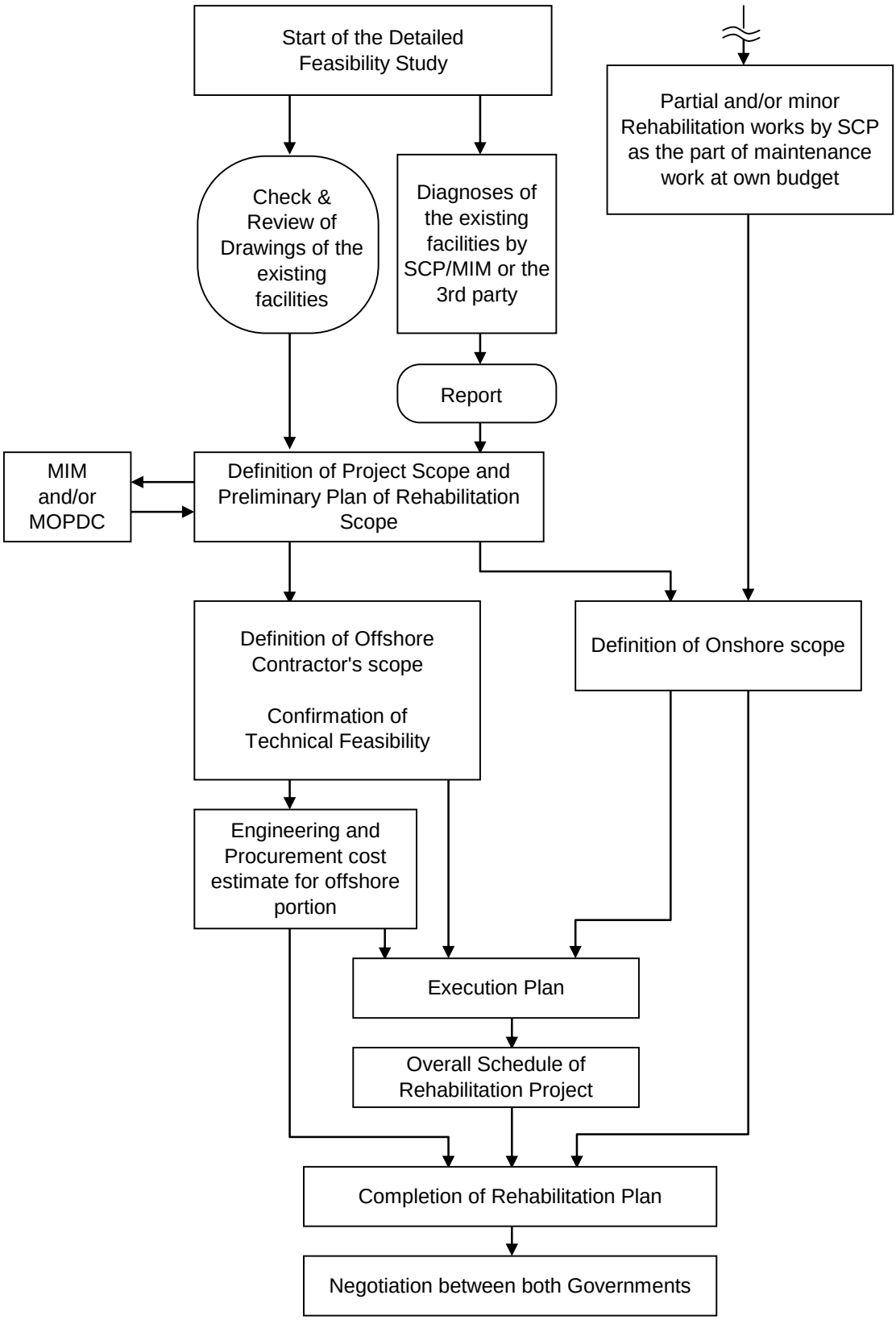


Figure 8.6-1: Action Flow Chart for Materialization of Rehabilitation

(Source: Compiled by Study Team)

APPENDIX

The Investment Law No (13) of 2006

In the name of the people
The Presidency Council

Pursuant to what was approved by the Council of Representatives and endorsed by the Presidency Council and based on the provisions of paragraph (First) of Article (61) and paragraph (Third) of Article (73) of the Constitution, the following law is promulgated:

No (13) of 2006
The Investment Law

Chapter One

Definitions

Article (1)
The following terms, wherever mentioned in this Law, shall have the following specific meanings unless the context indicates otherwise:

A. The Council: The Council of Ministers
B. National Commission for Investment: The Commission established in accordance with this law responsible for drawing up the national policy and laying out its guidelines and monitoring the implementation of these guidelines and instructions in investment. It shall specialize in investment projects of a federal nature exclusively.
C. Region's Commission: The investment commission of the region responsible for granting investment licenses in the region.
D. Governorate Commission: The investment commission of the governorate not organized in a region responsible for investment planning and granting investment licenses in the governorate.
E. The Commission: The National Commission for Investment or the Region's Commission or the Governorate Commission as the case.
F. Chairman of the Commission: The Chairman of the National Commission for Investment
G. The Project: The economic activity subject to the provisions of this law.
H. The Assets: The tools, apparatuses, equipments, machineries, requirements, gear, transportation means and office furniture specified for exclusive use in the project, and the furniture, furnishings and the requirements of the hotels, tourist cities, hospitals, schools and colleges

I. The Foreign Investor: Is the investor who does not hold the Iraqi nationality in the case of a real person, and is registered in a foreign country in the case of a juridical or legal person
J. The Iraqi Investor: Is the investor who holds Iraqi Nationality in case of a real person and is registered in Iraq in the case of a juridical or legal person.
K. Taxes and Fees: All types of taxes and fees levied in accordance with the applicable laws.
L. The designed production capacity: Is the production capacity designed within a specific unit of time (hour, unit, day … etc) in accordance to what is fixed in the documents incoming with the machines of the supplier.
M. Investment Portfolio: A collection of investments in shares and bonds.
N. Investment: Is the investment of capital in any economic or service activity or project that results in a legitimate benefit for the country.

Goals and Means

Article 2

This law aims at the following:

First: To promote investment and transfer modern technologies in order to contribute to the process of developing and enhancing Iraq, and expanding and diversifying its production and service base.

Second: To encourage the Iraqi and foreign private sector to invest in Iraq by providing the required facilities for establishing investment projects and enhancing its competitive capacities in the local and foreign markets for projects included in this law.

Third: To develop human resources based on market demands and provide work opportunities for the Iraqis.

Fourth: To protect the rights and properties of investors.

Fifth: To expand exports and improve the balance of payments and the balance of trade of Iraq.

Article 3

The following means shall be adopted to realize the objectives of this law:

First: To grant projects covered by the provisions of this law the necessary privileges and guarantees for its continuation and development by providing support in a way that enhances the competitive capacities of these projects in the local and foreign markets.

Second: To grant projects that obtained an investment license from the Commission, additional facilities and exemptions from taxes and fees in accordance with the stipulations of this law.

Chapter Two
The National Commission for Investment and the Investment Commissions in the Regions and Governorates

Article 4

First: A Commission shall be established and called the "The National Commission for Investment". It shall enjoy a juridical personality and shall be represented by the Chairman of the Commission or the person authorized by him. It shall be responsible for drawing up the national policies for investment and drawing up its plans, regulations and guidelines as well as monitoring the implementation of these guidelines and instructions in investment. It shall specialize in strategic investment projects of a federal nature exclusively.

Second: The National Commission for Investment" shall be managed by a Board of Directors comprised of nine members who must be competent and specialized, and hold a college degree that suits the specialty of the Commission. They must not have been sentenced for a felony or misdemeanor of moral turpitude, or have declared their bankruptcy

Third:

A. Upon a request by the Prime Minister, the Council of Ministers shall nominate a Chairman of the Commission at a grade of Minister and a Deputy Chairman at a grade of Deputy-Minister for a period of five years and present them to the Council of Representative for approval.
B. The Prime Minister shall appoint four members for a period of five years at a grade of Director General.
C. The Prime Minister shall select three members from the private sector for five years after their nomination by Chairman of the Commission and specifying their compensations according to the bylaws.
D. At the conclusion of the membership of any member of the Commission referred to in Paragraph (A and B) of this Article in cases not involving dismissal and resignation, the Prime Minister shall assign them to any governmental entity at the same grade. Those mentioned in (A) of this article shall be retired on pension when not assigned to a government position equivalent to their grade.
E. The Council of Representatives may directly dismiss the Chairman of the National Commission for Investment and his Deputy, or upon a request by the Prime Minister for compelling reasons.

F. The Council of Ministers may dismiss or replace any member of the Commission or replace him with others in case he does not adhere to the standards and regulations of the Commission.
G. The Board of Directors of the National Commission for Investment shall meet at the invitation of its Chairman. A bylaw issued by the Commission shall specify the quorum, decision taking, making recommendations and the course of work of the Commission and any other issue.
H. The National Commission for Investment shall be connected to the Prime Minister.
I. The salary scale and entitlements of the Commission's employees shall be determined by a decision of the Prime Minister based on a proposal from the Chairman of the National Commission for Investment.

Fourth:
The Commission's headquarters shall be in Baghdad and it may appoint representatives in the regions and governorates.
Fifth: The National Commission for Investment shall draw up an overall national strategic policy for investment identifying the more important of the sectors and shall prepare a map of investment projects in Iraq in the light of the information it receives from the regions and governorates. It shall also prepare lists of investment opportunities in strategic and federal investment projects with initial information about these projects and making it available to those wishing to invest.

Article 5

First: The regions and governorates not organized in a region may form investment commissions in their areas. The latter shall enjoy the powers of granting the investment licenses, investment planning, promoting investment and opening branches in their areas within the provisions of this law in consultation with National Commission for Investment to guarantee the availability of the legal conditions.

Second: the Investment Commissions of the regions and governorates shall be composed of at least seven members including the chairman and the vice chairman of at least seven years of experience and competence and with a university degree appropriate to the specialization of the commission and not convicted in a felony or a misdemeanor involving turpitude or has declare his bankruptcy.

Third: The regions and governorates not organized in a region shall establish a mechanism of forming the investment commission of the region and the governorate and removing the Commission's members in case he/she does not adhere to the standards and charters of the Commission in a way which is not in conflict with the provisions of this law.

Fourth: The Investment Commissions of the regions and governorate shall coordinate their work with the National Commission for Investment, and shall

coordinate and consult with local governments regarding investment plans and facilities.

Fifth: The regions and governorates commissions shall draw up their investment plan in a way that does not contradict with the federal investment policy and shall prepare list of the investment opportunities in the areas that are subject thereto, with initial data about these projects and offer it to those wishing to invest.

Sixth: The region's Commission shall be connected to the Prime Minister of the region and is subject to the scrutiny of the region's Council. The governorate commission shall be connected to the Governor and is subject to the scrutiny of the governorate council in way that does not contradict with the provisions of this law.

Seventh: Regions and Governorates Commissions board of directors shall convene upon an invitation from their chairman. The quorum of convening and adopting resolutions and recommendations shall be determined by absolute majority. The conduct of work shall be organized by by-laws issued by the Commission.

Article 6

In addition to ordinary correspondence, the Commission may adopt electronic mail with the official entities connected with the work and activity of the Commission through local networks or the Internet according to guidelines set by the Commission.

Article 7

A. The Commission shall accept investment license requests for projects whose capital is not less than the minimum amount determined by the Council of Ministers or the Council of Ministers of region as the case, by a regulation issued based on a proposal by the Commission.
B. The Commission must obtain the approval of the Council of Ministers before granting the license if the value of the investment project is more than two hundred and fifty million dollars.
C. The Commission shall make its final decision concerning the requests of investment license within a period not exceeding (45) forty five days from the date of filing a request.
D. The decisions of the Commission regarding the approved investments projects shall be obligatory for the purposes of this law.

Article 8

The Commission shall have an independent annual budget whose revenues shall be made up of its allocated amounts in the State General Budget.

Article 9

The Commission shall promote investment by working on the following:

First: Building confidence in the investment environment, identifying investment opportunities, and promoting and stimulating investment in them.

Second: Simplifying the procedures for registration, issuing of investment projects licenses, and following up on existing projects and giving them priority in processing with the official entities. Completing the procedures of answering investor requests and obtaining the required approvals for the investor and the project.

Third: Establishing one window at the National Commission for Investment and the Regions and Governorates Commissions, which includes authorized representatives from the ministries, and members nominated by the Councils of the regions and governorates as the case and the concerned authorities to undertake issuing licenses and obtain the approvals of other authorities in accordance with the law.

Fourth: Providing advice, information, and data to investors and issuing special manuals in this regard.

Fifth: Setting forth and implementing programs to promote investment in different areas of Iraq in order to attract investors.

Sixth: Facilitating the allocation of the needed lands and renting them out for establishing projects for a sum to be determined by the Commission in coordination with the concerned authorities.

Seventh: Establishing secure and free investment areas with the agreement of the Council of Ministers.

Eighth: Encouraging Iraqi investors (residing in Iraq) through providing them with easy loans and financial facilities in coordination with the Ministry of Finance and with the assistance of Banking Institutions, provided that the investor obtaining the loan shall employ a number of unemployed Iraqis proportional with the volume of the loan.

Ninth: Any other tasks related to its work and assigned by the Council of Ministers.

Chapter Three
Privileges and Guarantees

Article 10

The Investor irrespective of his/her nationality shall enjoy all privileges, facilitations and guarantees and shall be subject to the obligations stated in this law. The Iraqi and foreign investor shall have the right for, the purposes of housing projects, the use of the land for a sum to be determined between him and the land owner without land speculation according to conditions set forth by the National Commission for Investment and the approval of the Council of Ministers. The Commission shall facilitate the allocation of the required lands for the housing projects. The housing units shall be allocated for ownership by the Iraqis after the completion of the project.

Article 11

The investor shall enjoy the following benefits:

First: The investor shall have the right to take out the capital he brought into Iraq and its proceeds in accordance with the provisions of this law and pursuant to the instructions of the Central Bank of Iraq in an exchangeable currency after paying all his taxes and debts to the Iraqi Government and all other authorities.

Second: The foreign investor shall have the right to:

A. Exchange shares and bonds listed in the Iraqi Stock Exchange.
B. Form investment portfolios in shares and bonds.

Third: Renting or leasing lands needed for the project for the term of the investment project, provided that it does not exceed 50 years renewable with the agreement of the Commission, and provided that the nature of the project and its benefit for the national economy is taken into consideration when determining the period.

Fourth: Insuring the investment project with any foreign or national insurance company it deems suitable.

Fifth: Opening accounts in Iraqi or foreign currency or both at a bank inside or outside Iraq for the licensed project.

Article 12

This law shall guarantee the following for the investor:

First: Priority in recruitment and employment shall be given to Iraqi workers. The right to employ and use non-Iraqi workers in case it is not possible to employ an

Iraqi with the required qualifications and capable of performing the same task in accordance with guidelines issued by the Commission.

Second: Granting the foreign investor and non-Iraqis working in the investment projects the right of residency in Iraq and facilitating his/her entry and exit to and from Iraq.

Third: Non-seizure or nationalization of the investment project covered by the provisions of this law in whole or in part, except for projects on which a final judicial judgment was issued.

Fourth: Non-Iraqi technicians and administration employees working in any project shall have the right to transfer their salaries and compensations outside Iraq in accordance with the law after paying their dues and debts to the Iraqi government and all other entities.

Article 13:
Any amendment to this Law shall not have any retroactive affect regarding the guarantees, exemptions, and rights recognized by this Law.

Chapter Four
Investor Obligations

Article 14:
The investor shall observe the following:

First: To notify the National Commission for Investment (inserted in handwriting), the Region or Governorate Commission in writing immediately after the installation and equipping of the fixed assets for the purposes of the project and the date of the beginning of commercial activity.

Second: To keep proper records audited by a certified accountant in Iraq in accordance with the law.

Third: To provide an economic and technical feasibility study for the project and any information, data or documents required by the Commission or other competent authorities regarding the budget of the project and the progress made in its execution.

Fourth: To keep records of the project's duty-free imported materials in accordance with the provisions of this Law and specifying the depreciation periods of these materials.

Fifth: To protect the safety of the environment and to adhere to the valid quality control systems in Iraq and international regulations accredited in this field, also the laws related to security, health, public order and values of the Iraqi society.

Sixth: To adhere to the valid Iraqi laws regarding salaries, vacations, work hours and conditions and others as a minimum.

Seventh: Commitment to the correspondence of the work progress schedule submitted by the investor with reality provided that the time difference shall not exceed six months, and that the National Commission for Investment shall set forth punitive conditions in case of exceeding the six-month period and that the Commission shall have the right to withdraw the license.

Eighth: To train and rehabilitate its Iraqi employees as well as raising their efficiency, skill and capabilities. Priority in employment and recruitment shall be given to the Iraqis.

Chapter Five
Exemptions

Article 15

First: The project that has obtained an investment license from the Commission shall enjoy exemption from taxes and fees for a period of (10) ten years as of the date of commencing commercial operations in accordance with the areas of development defined by the Council of Ministers at the suggestion of the National Commission for Investment based on the degree of economic development and the nature of the investment project.

Second: The Council of Ministers shall have the right to propose draft laws to extend or grant exemptions in addition to the exemptions stipulated in paragraph (First) of this Article, or provide incentives, guarantees or other benefits to any project or sector or region and for the years and percentages it deems appropriate in accordance with the nature of the activity, its geographical location and its contribution to manpower employment and its effect on driving the economic development, and for considerations of national interest.

Third: The National Commission for Investment has the right to increase the years of tax and fees exemption in a way directly proportional to the increase in the Iraqi Investor share in the project to reach fifteen years if the Iraqi Investor share in the project was more than 50%.

Article 16

If the project is moved during the granted period of the exemption from a development area to another, the project shall receive, for the purposes of the exemption mentioned in paragraph (First) of Article (15) during the remaining term, the treatment of the projects in the development areas it is moving to, provided that the Commission is informed of such move.

Article 17

The project that obtains an investment license shall also enjoy the following:

First:

Assets imported for the purposes of the investment project shall be exempted from fees, provided that their entry to Iraq is made within (3) three years from the date of granting the investment license.

Second:

The imported assets required for the expansion, development or modernization of the project shall be exempted from fees in case they led to an increase in the designed capacity, provided they are brought in within three years from the date of notifying the Commission of the expansion or development. Expansion, for the purposes of this law, shall mean adding fixed capital assets aimed at increasing the designed capacity of the project in commodities or services or materials by a percentage exceeding (15%) fifteen percent. Development, for the purposes of this law, shall mean replacing project machines with more developed ones, totally or partially or making a development on the standing devices and equipments of the project by adding new machines and devices or parts thereof with the aim of raising the productive efficiency or improving and developing the quality of the products and services.

Third: Spare parts imported for the purposes of the project shall be exempted from fees if the value of these parts does not exceeded (20%) twenty percent of the fixed assets value, provided that they are not be used for any other purpose.

Fourth: Hotels, tourist institutions, hospitals, health institutions, rehabilitation centers and educational and scientific organizations projects shall be granted additional exemptions from duties and taxes on their imports of furniture, furnishings and requisites for renewing and updating purposes at least once every four years, provided that these items are brought into Iraq or used in the project within (3) three years from the date of the approval decision of the Commission on the import lists and their quantities, and provided that these items are not used for purposes other than the imported purposes.

Article 18

If it is found that the fixed assets exempted, in whole or in part, from taxes or fees were sold in violation of the provisions of this law or were used in anything other than the project or for purposes other than the authorized purposes, the investor must pay the taxes, fees, and fines incurred pursuant to the law.

Chapter Six
Procedures for Granting Investment and Project Establishment License

Article 19

First: The investor shall obtain the license in addition to obtaining the rest of the licenses for the purpose of enjoying the privileges and exemptions provided by the Commission.

Second: The Commission shall grant the license for investment or project formation based on a request submitted by the investor according to conditions facilitated and prepared by the Commission. The request submitted by the investor shall include the following:

A. Filling a request form prepared by the Commission
B. Financial competency from an accredited bank
C. Projects performed by the investor inside or outside Iraq
D. Details of the project intended to invest in and its economic feasibility.
E. A timetable for completing the project.

Article 20

First: The Commission must issue the establishing license through establishing one window in the region or the governorate not organized in a region that includes authorized representatives of the ministries and relevant bodies. The Commission shall grant project formation license and obtain approvals from the entities in accordance with the law.

Second: The Commission must help the investor to obtain licenses by approaching the competent authorities and exploring the opinions of the entities concerning the issuance of the formation license. These entities must issue the decision to reject, approve or request amendment within 15 days from the date of being notified. The failure to reply from the entity from which the opinion is solicited shall be deemed as an approval and in case of a rejection there must be cause for it.

Third: In case of disagreement between the National Commission for Investment decision and the other relevant entity regarding the granting of the license other than the Region's Commissions, the dispute shall be brought before the Prime Minister for settlement.

Fourth: In case the request for registration is rejected, the requestor may file a complaint to the Chairman of the region or the governorate Commission concerned within (15) fifteen days after receiving notification of the rejection decision. The Chairman of the Commission concerned shall take a decision concerning the complaint in question within a period of seven days. The petitioner may appeal the decision of the Chairman of the Commission concerned rejecting his complaint to the authority to which the Commission concerned is connected to within 15 days from the date the complaint's rejection and its decision is deemed final.

Chapter Seven
General Provisions

Article 21

The project capital subject to the provisions of this law shall be made up of the following:

First: Cash transferred to Iraq through financial banks and companies or any other legal means with the aim of investing it for the purposes of this law.

Second: The in-kind assets and incorporeal rights imported to Iraq or purchased from the local markets by the cash transferred into Iraq:

A. In-kind assets related to the project.
B. The machinery, tools, equipment, buildings, constructions, transportation means, furniture and offices appliances required for establishing the project.
C. The incorporeal rights that include patents, registered trade marks, technical know-how, engineering services, administrative and marketing services and the similar.

Third: Profits, proceeds and reserves resulting from the capital invested in Iraq in the project if the capital of such a project was increased or was invested in another project covered by the provisions of this law.

Article 22

The foreign investor shall enjoy additional privileges in accordance with international agreements signed between Iraq and his country or multilateral international agreements which Iraq has joined.

Article 23
If the project ownership is transferred during the granted period of the exemption, it shall continue to enjoy granted exemption, facilities and guarantees until the end of that period, provided that the new investor continue to work on the project in the same specialization or in another, with the approval of the Commission. The new investor must take the place of the former investor in the rights and obligations consequent to the provisions of this law.

Article 24

First: The investor, with the approval of the Commission, may sell exempted fixed assets or relinquish it to another investor benefiting from the provisions of this law, provided that he uses them in his project.

Second: The investor, after informing the Commission, may sell the exempted fixed assets to any person or other project not subject to the provisions of this law after paying the outstanding fees and taxes.

Third: The investor, with the approval of the committee, may re-export the exempted fixed assets.

Article 25
In the event two or more companies or enterprises merge, the new company or entity resulting from the merger must set up separate accounts for each project before the merger in order to register and apply exemptions and facilitations stipulated in this law during the remaining period of the exemption.

Article 26
Any project approved in accordance with the provisions of the previous applicable laws shall continue to benefit from all exemptions granted to it pursuant to that law and until the expiration of the exemption period and under the same terms.

Article 27
Disputes arising between parties who are subject to the provisions of this law shall be subject to the Iraqi law unless otherwise agreed, contrary to the cases that are subject to the provisions of the Iraqi law exclusively or the jurisdiction of Iraqi courts.

1. Disputes arising from the work contract shall exclusively be subject to the provisions of the Iraqi law and the jurisdiction of Iraqi courts. Non-Iraqi laborer shall be exempted if the work contract stipulated otherwise.

2. If parties to a dispute are non-Iraqis and in disputes not arising from a crime, the opponents may agree on the law to be applied, the competent court or any other agreement to resolve their dispute.
3. If a dispute between the partners or between the owner of the project and others in a project subject to the provisions of this law resulted in the stoppage of work for a period exceeding three months, the Investment Commission may withdraw the license and ask the owners of the project to settle the dispute within a period not to exceed three months. If such period elapsed without settling the dispute between the partners or between the owner of the project and others, the commission may take legal measures to liquidate the project and notify the owner of the project or one of the partners of such action. The liquidation money shall be deposited in one of the banks after paying the dues of the State or any other dues after final judgment of their entitlement is rendered.
4. If one of the parties to a dispute is subject to the provisions of this law, they may, at the time of signing the agreement, agree on a mechanism to resolve disputes including arbitration pursuant to the Iraqi law or any other internationally recognized entity.
5. Disputes arising between the Commission or any governmental entity and any of those subject to the provisions of this law on matters not related to violations of one of the provisions of this law shall be subject to Iraqi law and courts on civil matters. As for commercial disputes, parties may resort to arbitration provided that such an arrangement is stipulated in the contract organizing the relationship between parties.

Article 28

In case the investor violates any of the provisions of this law, the Commission shall have the right to warn the investor in writing to remove the violation within a specific period. In case the investor does not remove the violation within the specified period, the Commission shall summon the investor or who represents him to state his position and grant him other respite to settle the issue. Upon repeating or not removing the violation, the Commission shall have the right to withdraw the investor's license it issued and order stoppage of work on the project and retain the State's right to deny the investor the granted exemptions and privileges from the date of the violation and allow others to retain their rights to demand compensation for the damage caused by this violation, without breaching any punishments or other compensations stipulated in the applicable laws.

Article 29

All areas of investments shall be subject to the provisions of this law except:

First: Investment in Oil and Gas extraction and production.

Second: Investment in banks and insurance companies sectors.

Article 30
The Council of Ministers shall have the right to:

First: Issue regulations to facilitate the implementation of the provisions of this law.

Second: Issue bylaws defining the Commission's formations, divisions, tasks, process of its work, its authorities, financial affairs, employee affairs and any others matters.

Article 31
The Committee may issue instructions to facilitate the implementation of regulations issued by the Council of Ministers pursuant to the provisions of this law.

Article 32
The Provisions of this law shall be applied to the existing and operating projects of the mixed and private sectors which have commenced before the issuance of this law and upon a request from its management and the approval of the Commission with no retroactive effect.

Article 33
No text shall be valid which contradicts the provisions of this law.

Article 34
The (dissolved) CPA Order No. 39 of 2003 shall be revoked.

Article 35
The Arab Investment Law no (62) of 2002 issued by the dissolved Revolution Command Council shall be annulled.

Article 36
This Law shall enter into force from the date of its publication in the Official Gazette.

Justifying Reasons

For the purpose of driving the process of economic and social development and bringing technical and scientific experience and developing human resources, and for creating work opportunities for the Iraqis by encouraging investments and supporting the process of establishing investment projects in Iraq and their expansion and development at various economic levels and by granting privileges and exemptions for these projects, this law is legislated.