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Local Government of Mangistau Oblast
Government of the Republic of Kazakhstan

MASTER PLAN STUDY
ON
INTEGRATED REGIONAL DEVELOPMENT
FOR
MANGISTAU OBLAST
IN
THE REPUBLIC OF KAZAKHSTAN

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Abbreviations

AISCP	Aktau International Sea Commercial Port
BAC	Birch activated carbon
BOD	Biological oxygen demand
BTC	Baku Tbilisi Ceyhan Pipeline Company
CBD	Central business district
CDM	Clean development mechanism
CEP	Caspian Environmental Program
CIS	Commonwealth of Independent States
CTID	Committee for Transport Infrastructure Development
DLSP	Department of Labor and Social Protection
DNR&WM	Department of Natural Resources and Wildlife Management
DO	Dissolved oxygen
DOA	Department of Agriculture
DOCS	Department of Community Services
DOE	Department of Education
DOH	Department of Health
DSEC	Department of State Sanitary and Epidemiological Control
DUCER	Department of Use and Control of Environment Resources
EBRD	European Bank of the Reconstruction and Development
EIA	Environmental impact assessment
ELV	Emission limited value
EPZ	Export processing zone
EU	European Union
FCF	Fixed capital formation
FCI	Fixed capital investment
FDI	Foreign direct investment
FFHC	Forestry, Fishing and Hunting Committee
GDP	Gross domestic product
GHG	Greenhouse gas
GRDP	Gross regional domestic products
IAEA	International Atomic Energy Agency
ICOR	Incremental capital-to-output ratio
ICT	Information, communication technology
IMF	International Monetary Fund
IRDMP	Integrated regional development master plan
JI	Joint implementation
JICA	Japan International Cooperation Agency
JSC	Join stock company
KAZHYDROMET	Kazakhstan Hydro-Metrological Service
KAZINVEST	Kazakhstan Investment Promotion Center
KMG	KazMunaiGaz
Kolhoz	Former Collective Farms
KTO	KazTransOil
KTZ	Kazakhstan Temir Zholy (Kazakhstan Railways)
KZT	Kazakh tenge
LLP	Limited liability partnership
LQ	Location quotient
MAEK	Mangyshlak Atomic Energy Combine
MENR	Ministry of Ecology and Resources
MNU	Mangistau Oil Pipeline Management
MOE	Ministry of Energy
MOED	Ministry of Education

MOEP	Ministry of Environmental Protection
MOER	Ministry of Emergency Response
MPC	Maximum permissible concentrations
MPD	Maximum permissible discharge
MTC	Ministry of Transport and Communications
NBK	National Bank of Kazakhstan
NEDO	New Energy and Industrial Technology Development Organization
OJT	On-the-job training
PC	Personal computer
PCM	Project cycle management
pcu	Passenger car unit
PPP	Public-private partnership
PVC	Polyvinyl chloride
R&D	Research and development
SCADA	Supervisory control and data acquisition
SER	State Environmental Review
SEZ	Special economic zone
SME	Small and medium sized enterprise
Sovhoz	State Farms
SQ	Sector quotient
TB	Tuberculosis
TRACECA	Transport Corridor: Europe-Caucasus-Asia
TSHO	Tengizshevroyl
TSV&V	Heat, Water Supply and Sewerage Network
UMG	UzenMunaiGas
UNECE	United Nations Economic Commission for Europe
UNICEFF	United Nations Children's Fund
WTO	World Trade Organization
WWTP	Wastewater treatment plant

CHAPTER 1 POPULATION AND SOCIAL CONDITIONS

1.1 Population and Employment

1.1.1 Population

The population of Mangistau Oblast has been increasing consistently in recent years (Table 1). The growth has accelerated since 2001. The average annual growth rate increased from 1.49% in 1998-2001 to 3.35% in 2001-05. This is due to the increasing in-migration by the booming economy and the returned Kazakh. The population growth rates in the Oblast during this period are much higher than the national average of only 0.25% in 1998-2005. The population reached 397,600 in 2007 as estimated by the Oblast. The growth has decelerated slightly to the average of 3.05% per annum in 2005-07.

Table 1 Population in Kazakhstan for 1998-2005 and in Mangistau Oblast for 1998-2007

(Unit: 1,000)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Kazakhstan	14,955	14,900	14,863	14,846	14,863	14,951	15,075	15,219		
Mangistau	314.0	315.2	319.2	328.2	338.5	349.7	361.8	374.4	382.3	397.7

Source: Agency of Statistics, Regions of Kazakhstan, 2005 for 1998-2005; estimate by the Oblast for 2006-07

Most of the immigrants into Mangistau Oblast are returned Kazakh. It is reported that about 14,000 families and 42,000 people returned to Mangistau Oblast during 2000-05. The Oblast accepted 17,852 immigrants during 2003-05, the average of 5,900 immigrants per year more or less. Of this total, The Aktau city accepted 9,622 or 54%, the Beineu rayon 4,584 or 26%, and Zhanaozen 2,351 or 13%. The dominance of these three localities for immigrants reflects the deliberate policy for resettlement of the returned Kazakh by the Government.

The population changes by rayon in recent years are summarized in Table 2. Of the six rayons, Beineu has the highest population growth rates, reflecting the high rates of domestic and international immigration. Aktau has the second highest growth rates, followed by Zhanaozen. The population growth has been the lowest in the Mangistau rayon, followed by Tupkaragan. The population increased significantly in 2006 in Karakiya and Zhanaozen as well as in Beineu. Detailed migration data by rayon and by settlement in Mangistau are given in Table 3.

Table 2 Population of Mangistau Oblast, 2002~2006

(Unit: 1,000)

	2002	2003	2004	2005	2006
Mangistau Oblast	338.5	349.7	361.7	374.4	390.1
Increasing ratio (%)		3.31	3.43	3.51	4.19
Aktau city Akimat	168.3	174.3	180.6	187.6	194.3
Increasing ratio (%)		3.57	3.61	3.88	3.57
Zhanaozen city Akimat	72.8	75.2	77.4	79.2	83.1
Increasing ratio (%)		3.3	2.93	2.33	4.92
Beineu Rayon	30.3	32.3	34.6	37.1	39.9
Increasing ratio (%)		6.6	7.12	7.23	7.55
Karakiya rayon	23.6	24.2	25	25.6	27.2
Increasing ratio (%)		2.54	3.31	2.4	6.25
Mangistau Rayon	28.5	28.5	28.7	28.9	29.4
Increasing ratio (%)		0	0.7	0.7	1.73
Tupkaragan rayon	15	15.2	15.4	15.6	16.2
Increasing ratio (%)		1.33	1.32	1.3	3.85

Source: Mangistau oblast statistic 2006

Table 3 Migration by Rayon and by Settlement, 2003-05

(Unit: 1,000)

	2003			2004			2005			Total				
	In	Out	Bal.	In	Out	Bal.	In	Out	Bal.	In	Out	Bal.	Av.	%
Mangistau Oblast	6,106	875	5,231	6,387	700	5,687	5,359	678	4,681	17,852	2,253	15,599	5,200	100
Aktau City Adm.	3,266	802	2,464	3,605	667	2,938	2,751	651	2,100	9,622	2,120	7,502	2,501	48.1
Aktau City	1,901	788	1,113	2,260	662	1,598	1,619	650	969	5,780	2,100	3,680	1,227	
Mangistau village	1,365	14	1,351	1,336	5	1,331	1,102	1	1,101	3,803	20	3,783	1,261	
Zhanaozen City Akm.	1,108	44	964	819	13	806	424	16	408	2,351	73	2,278	759	14.6
Zhanaozen City	788	44	744	572	13	559	364	16	348	1,724	73	1,651	550	
Tenge village	157	0	157	188	0	188	42	0	42	387	0	387	129	
Kyzylsai village	63	0	63	59	0	59	18	0	18	140	0	140	47	
Beineu Rayon	1,300	20	1,280	1,552	7	1,545	1,732	3	1,729	4,584	30	4,554	1,518	29.2
Beineu village	1,244	17	1,227	1,489	6	1,483	1,716	3	1,713	4,449	26	4,423	1,474	28.4
Karakiyansky rayon	378	6	372	277	7	270	361	4	357	1,016	17	999	333	6.4
Kyryk village	77	5	72	74	2	72	131	3	128	282	10	272	91	1.7
Jetybai village	151	0	151	117	0	117	90	0	90	358	0	358	119	1.2
Munaishi village	84	1	83	42	0	42	63	1	62	189	2	187	62	1.2
Mangistau Rayon	99	0	99	120	6	114	74	4	70	293	10	283	94	1.8
Shetpe village	98	0	98	97	6	91	70	4	66	265	10	255	85	1.6
Tupkaragansky rayon	55	3	52	14	0	14	17	0	17	86	3	83	28	0.5
Fort Shevchenko city	8	3	5	1	0	1	0	0	0	9	3	6	2	0

1.1.2 Employment

(1) Labor force and employment

The labor force, defined here as the population over 15 years old, increased from 140,000 in 2001 to 188,000 in 2005, according to the Labor Force Department of the Oblast and statistics (Table 4). This represents the annual average increase at 7.65%, much higher than the average population growth at 3.35% per annum during the same period. This reflects the large number of job seeking immigration mainly of the returned Kazakh.

Table 4 Labor Force Indicators of Mangistau Oblast, 2001-05

(Unit: Persons)

	2001	2002	2003	2004
Economically active population	140,032	147,585	156,621	186,579
Economic activity population (%)	70.5	67.4	68.4	77.3
Employed population	130,639	133,172	141,388	168,341
Employees	99,554	112,502	128,805	153,499
Self-employed	31,085	20,670	12,583	14,842
Unemployed, total	15,393	14,413	15,233	18,238
Unemployment rate (%)	10.5	9.8	9.7	9.8
Youth unemployment rate (%)	19.2	14.3	19.4	19.9
Female unemployment rate (%)	13.7	15.1	12.6	12.9
Level of registered unemployment	3.8	3.5	2	1.6
Economically inactive population	61,034	71,446	72,495	54,877
Economically inactive population (%)	29.5	32.6	31.6	22.7

Source: Regional program of employment population for 2205 -2007 by Mangistau Oblast, Aktau, Statistics of Mangistau Oblast 2006.

During this period, the employment by enterprises increased also significantly from 99,600 in 2001 to 157,000 in 2005. Consequently, the number of unemployment increased only by 2,900 from 15,400 in 2001 to 18,300 in 2005, according to the official statistics. The unemployment rate decreased from 10.5% in 2001 to 9.7% in 2005. The unemployment ratio of women, however, is higher, at 12.9% in 2004. Also, the unemployment of youth between 15 and 24 years old is higher, 22.7% for young women and 17.1% for young men. The overall youth unemployment rate increased from 19.2% in 2001 to 19.9% in 2004.

The high youth unemployment is due primarily to a mismatch between what the youth can offer (supply) and what enterprises require (demand). This situation has been aggravated by the large

number of returned Kazakh, including those returned outside the quota on immigration from neighboring countries. Given this situation, the Department of Labor and Social Protection of Mangistau Oblast launched the program for the promotion of employment of younger generation, women and returnees from 205 to 2007. The program consists of vocational training and re-training, and creation of public and social works.

Changes in employment by sector are summarized in Table 5. The broad agricultural sector employed 5,700 in 2005, which accounts for only 3.35% of the total employment. The industry sector employed 49,900 in 2005 or 29.3% of the total employment, of which 64% was engaged in mining. In the services sector, transport and communication was the largest employer with a 20.0% share in the total employment, followed by trade, car maintenance and repair with 17.8%, and construction with 17.4% in 2005. The employment in education was also large with a 16.4% share, while health had a smaller share of 9.5% in 2005.

Table 5 Employment by Sector, 2003-05

(Unit: 1000)

	2003	2004	2005	%
Agriculture, hunting, forestry	3.1	5.9	5.7	3.35
Fishery & fish breeding	-	-	-	0
Industry	46.9	48.4	49.9	29.34
Mining	-30.3	-32.8	-32.1	-18.87
Processing	-7.6	-3.7	-7.8	-4.59
Production & distribution of electricity, gas & water	-9	-11.9	-9.9	-5.82
Construction	15	16.3	17.4	10.23
Trade, car maintenance, repair	14.6	20.4	17.8	10.46
Hotel & restaurant	3.9	3.3	4.8	2.82
Transport & communication	18.4	17.7	20	11.76
Financial activity	1	2.1	1.3	0.76
Real estate service for enterprise	2.7	7.2	13.2	7.76
Public administration	5	10.9	4.3	2.53
Education	13.8	14.8	16.4	9.64
Health care & social services	7.8	9.5	9.5	5.58
Other communal, social	9	7.8	9.8	5.76
Total	141.2	164.3	170.1	100

Source: Mangistau oblast statistics

The average wage of all the sectors in Mangistau Oblast in 2006 was KZT 63,958 in current prices, according to the Oblast statistics (Table 6). The wage variance is large with the average wage at KZT 80,663 for men and KZT 37,650 for women. The inter-sector variance is extremely large, ranging from KZT 14,899 in agriculture to KZT 109,986 in mining. Public administration also has the low average wage of KZT 44,836, which is considered to be a main reason for the shortages of teachers and medical personnel especially in rural areas.

Table 6 Nominal Monthly Average Wage by Economic Activity (2005)

(Unit: KZT/month)

	Average	Male	Female
Average wage	63,958	80,663	37,650
Agriculture, hunting, forestry	14,899	14,841	15,001
Fishery & fish breeding	-	-	-
Industry	94,885	101,512	69,704
Mining	109,986	114,227	89,928
Processing	50,743	59,359	30,660
Production & distribution of electricity, gas & water	45,824	50,247	36,513
Construction	62,595	65,027	47,043
Trade, car maintenance, repair	46,440	55,013	36,886
Hotel & restaurant	35,751	51,694	32,509
Transport & communication	83,033	88,510	67,618

(Unit: KZT/month)

	Average	Male	Female
Financial activity	54,752	65,857	49,035
Real estate service for enterprise	44,836	45,658	43,228
Public administration	29,867	33,196	27,071
Education	21,211	26,202	20,181
Health care & social services	19,212	24,092	18,353
Other communal, social	24,882	37,542	17,344

Despite the booming oil and gas economy, the unemployment is a continuing problem in Mangistau due to the large number of returned Kazakh, and the demand-supply gap especially among the youth and women. Also, the number of the long term unemployed is increasing. In 2004, those unemployed for 4-6 months accounted for 22.5% on the total unemployed, 14.1% unemployed for seven months to one year, and 12.6% unemployed for over one year.

(2) Existing programs

The Department of Labor and Social Protection (DLSP) of the Oblast receives information on job offers from enterprises, and provides the information and training to those registered at the job placement office. These services are in line with the Kazakh law of employment, requiring job placement and training for the returned Kazakh as part of welfare services. In 2004, out of 635 registered returned Kazakh, 213 received job placement, 232 were temporarily employed in public works, and 74 received training. In addition, 584 registered unemployed received training, including 219 women.

The jobs offered by enterprises are for teachers, doctors, electrical engineers, plastering, concrete making, paint coating, facilities management, PC operators, waitresses, cashiers, cosmologists, office managers, cooks etc. Jobs in over supply include drivers, accountants, operators, general services for oil and gas companies, vendors, cooks, assistant oil miners, kindergarten teachers, tractor operators, sewers etc. Most jobs required by enterprises fall in the primary and medium skill level categories, while 30% of those in cities and 65% in rural areas who register for job placement are unskilled. Therefore, the training program of DLSP is largely well targeted.

The job placement office of DLSP has been implementing the regional program of employment for 2005-07, targeting mainly at the returned Kazakh, youth, women and the long-term unemployed. It aims at reducing the unemployment rate to 7%. The program provides training and re-training, job creation by public and social works, and plans to formulate training courses based on a demand study. Also included in the program are empowerment of rural women through business training and micro credit provision, and activation of micro enterprises through the provision of land lease arrangements. These measures do not apply to those returned out side the quota as they are not eligible for job placement unless they obtain citizenship or permit to stay.

1.2 Health

1.2.1 Health conditions

The infant mortality rate in Mangistau Oblast was 41.7 per 1,000 live births, much higher than the average in Kazakhstan of 24.9 per 1,000 live births. It has improved to the 17-18 per 1,000 live births levels in recent years, but still the highest of all the oblasts in Kazakhstan. The maternal mortality rates vary widely in Mangistau, reflecting unstable health conditions caused partly by the increasing number of returned Kazakh.

The infant mortality rates are generally higher in rural areas as shown in Table 7. In 2005, the rate was highest in Kuryk, followed by Kyzylsai, the Mangistau village and the Beineu village. The rate was lowest in Fort Shevchenko, followed by the Tenge village, Shetpe and the Aktau city. This is

representative of the discrepancy in health conditions between urban and rural areas in Mangistau.

Table 7 Infant Mortality Rate in Mangistau Oblast

(Unit: 1,000 live births)

	2003	2004	2005
Aktau city Akimat	16.3	17.2	15.4
Aktau city	16.9	15.7	14.8
Mangistau village	10.4	30.1	22.8
Umirzak	34.5	-	-
Zhanaozen city Akimat	13.1	13.6	18.9
Zhanaozen city	15.5	13.7	20.4
Tenge village	6.9	6.4	6.6
Kyzylsai	-	30.8	27.3
Beineu Rayon	12.4	14.3	16.5
Beineu village	16.6	17.5	21.4
Karakiyansky rayon	18.4	9.1	20.4
Kyryk village	20.7	6.4	32.6
Zhetybai village	8.0	10.8	20.1
Munaishi village	59.5	10.8	-
Mangistau Rayon	13.7	17.8	15.6
Shetpe	12.6	16.9	10.6
Tupkaragan rayon	14.8	19.3	9.5
Fort Shevchenko city	18.6	18.3	4.8
Total in Mangistau Oblast (1000 persons)	15.2	17.8	17.7

Source: Mangistau oblast statistic, 2006

The most popular types of diseases in Mangistau are: 1) respiratory organs diseases, 2) digestive organs diseases, and 3) vascular and circulatory diseases (Table 8). Many cases of respiratory diseases are found in areas of oil and gas production. High incidence of digestive organs diseases is considered to be associated with low intake of fresh vegetables and marine products. Vascular and circulatory diseases are often associated with excessive drinking, eating and smoking as well as severe climate. Poor nutritional conditions of the returned Kazakh have also been noted, especially among those returned out side the quote system.

Table 8 Cases of Diseases by Type in Mangistau Oblast

	2003	2004	2005
Infectious & parasitic disease	3,105	2,840	3,642
New growths	381	117	352
Blood disease, blood forming organs endocrine system disease	3,969	4,388	3,921
Endocrine system disease, Stomach upset & Metabolic disorder	1,452	2,032	1,716
Mental disease & behavioral disorder	109	113	116
Nervous system diseases	3,020	3,025	2,869
Eye disease & Appendages of eye	6,184	7,083	5,375
Ear disease & mastoid bone	3,635	4,241	3,425
Blood circulation disease	3,035	2,862	2,665
Respiratory organs disease	22,856	29,152	23,047
Digestive organs disease	9,265	10,702	7,337
Skin disease & hypodermic tissue	5,236	6,707	5,863
Musculoskeletal system disease & connective tissue	2,567	3,377	2,458
Urinary system disease	3,772	3,822	3,489
Complication of pregnancy (Childbirth & puerperal period)	9,246	5,344	2,199
Congenital anomaly deformations &chromosomal abnormalities	226	160	289
Injuries & poisoning	4,559	3,619	5,168

Source: Mangistau Oblast Statistic, 2006

1.2.2 Health facilities

Health facilities in Kazakhstan consist of general hospitals equipped with beds, clinics for outpatients without beds, obstetrician hospitals, and aid posts or health posts where only medical personnel other than doctors are stationed. Mangistau Oblast has a state hospital and private hospitals. A health referral system is well established in Mangistau with many aid posts and clinics.

Health facilities in Mangistau consist of 33 hospitals, 2 obstetrician hospitals, 39 clinics and 15 aid posts as of 2005 (Table 9). Some aid posts are classified as clinics. Of these facilities, 59 concentrate in the Aktau and the Zhanaozen cities. Aktau has 150 beds per 10,000 population, while in other rayons, the numbers range in 44-69. The oblast had 1,189 doctors, of which 850 doctors are in Aktau. It is reported that the shortages of medical doctors amount to 270 in 2007.

Table 9 Health Facilities in Mangistau Oblast

Antenatal clinic	Hospital	Clinic	Aid post	Obstetrician hospital	No. of beds per 10,000	Beds for maternity
Aktau city	13 (2)	30	0	1	105.6	150
Zhanaozen city	6 (2)	5	0	1	68.8	80
Beineu Rayon	3 (2)	1	3	0	44.4	20
Karakiya rayon	3 (3)	1	6	0	64	20
Mangistau Rayon	6 (3)	1	4	0	58.8	-
Tupkaragan rayon	2 (2)	1	2	0	51.3	5
Total in Mangistau	33 (14)	39	15	2	72.7	275

Source: Mangistau Oblast Statistics, 2006

1.2.3 Ongoing efforts

Several health facilities are under construction in Mangistau. They include two clinics in the newly created rayon of Munajlinsky, and another clinic in Zhetybai, and six aid posts in the Mangistau rayon, two in Beineu, and one in Tupukaragan, and a TB hospital for children in Fort Shevchenko. Also, a hospital in the Aktau city is expanded to increase the bed capacity, and a specialized maternity blood center is under construction.

The Department of Health continues to implement its program for 2008-11 to improve the medical facilities with emphasis on the improvement of maternal and infant mortality and tuberculosis countermeasures. A total of 31 construction projects are going on as of Mach 2008 with the total budget of KZT 5.21 billion. They include the following:

1) Construction of seven hospitals, including a maternity hospital in Beineu
2) Construction of 12 aid posts in rural settlements
3) Construction of eight ambulance stations

With these projects, the number of hospitals will increase to 40, and the health and medical environment in rural areas will be much improved. Further expansion of medical facilities will not be necessary until 2015. Under the ongoing program, ultrasonic diagnostic equipment, mobile X-ray diagnostic equipment, electron microscope and others will also be improved.

As the health facilities are expanded, the need for medical personnel, especially doctors have increased. As of October 2007, additional 50 doctors have been recruited, while 220 more are in demand.

1.3 Education and Training

1.3.1 Education system

The education system in Kazakhstan is administered by the Education Department of the Ministry of Education (MOED). Higher education at the university/college level is directly under MOED

including budgeting, while general education is under the State Education Department. The educational system consists of pre-primary schools, general schools, vocational education establishments, colleges and universities (Figure 1). The education at a general school consists of grades 1-4 for primary, 5-9 for lower secondary, and 10-11 for upper secondary. Children have a choice to graduate after grade 9, or pursue through grade 11. The general education is provided free, including tuitions and textbooks.

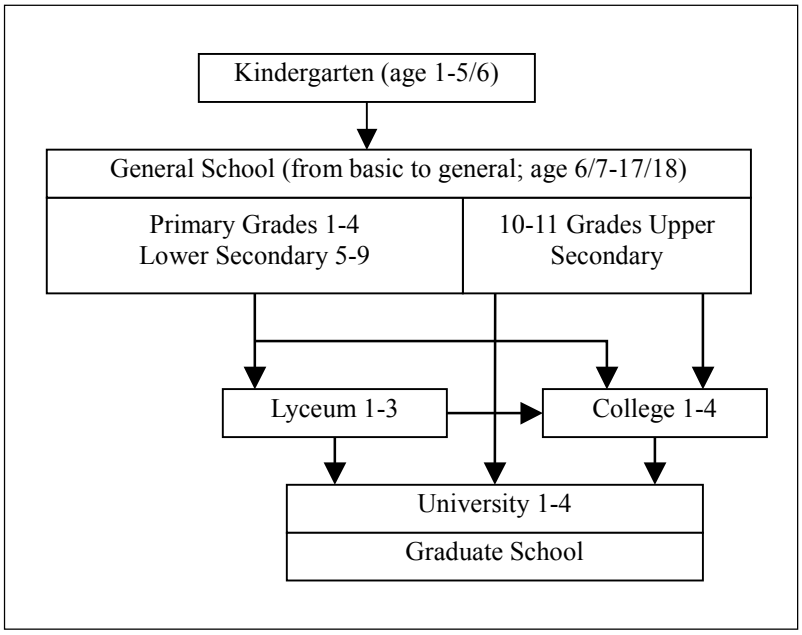


Figure 1 Educational System in Kazakhstan

Lyceum is a school for primary vocational education administered by the Oblast Education Department. Main enrollees are graduates from general schools, and the duration of the study is three years or one year for those completed grade 11 at general schools. This is a training institute for primary level skills in the fields of sewing, electrical work, computer operation and others.

College is a training organization for middle to advanced specialists in various industry fields. There exist single department colleges for foreign languages, medical science, art and others, and polytechnic colleges offering a wide range of industrial curricula. The study duration is four years for students who completed grade 9, or three years for those who completed grade11. Graduates obtain diplomas upon graduation.

University has faculties to cover industry-wide fields such as pedagogy, literature, economics and engineering. It offers 4-year bachelor's degree programs and 2-year master's degree programs. Many universities establish also colleges together.

1.3.2 Literacy rate and school attendance rate

As other CIS countries, the adult literacy rate in Kazakhstan is high at 99.5% including both men and women (Table 10). The enrollment at primary education is 95% for boys and girls, higher than the average in CIS countries. The enrollment at secondary education has been 91-92% levels, about the average in CIS countries.

Table 10 Literacy Rate and School Enrolment Rates

(Unit: %)

Country	Adult literacy rate (2000-2004)		Enrolment rate in primary education (1996-2004)		Enrollment rate in secondary education (1996-2004)	
	Male	Female	Male	Female	Male	Female
Kazakhstan	100	99	95	95	91	92
Azerbaijan	99	98	81	79	77	75
Tajikistan	100	99	97	91	94	78
Turkmenistan	99	98	86	84	-	-
Ukraine	100	99	84	84	97	96
Uzbekistan	100	99	81	80	97	94
ECC/CIS	99	95	89	87	91	93

Source: *The State of the World's Children*, UNICEF

1.3.3 Education facilities

There are 92 general schools in Mangistau, attended by some 87,000 pupils, 15 colleges with 15,300 students, and three universities with 17,700 students in 2006 (Table 11 and Table 12). There are six lyceums as well. Of the general school graduates, 79% completed grade 11, and the advancement rate to colleges from general schools is high at 68% or so. The Aktau city has all the three universities, 12 out of 15 colleges, and two lyceums in 2006. Zhanaozen has the remaining two colleges. All the rayons except Tupkaragan have a lyceum. Besides, there are schools for physically and mentally handicapped children.

Table 11 Number of Schools in Mangistau Oblast

	General school[*1]		Lyceum[*2]	College[*2,3]		University[*3]	
	Daytime	Nighttime		State	Private	State	Private
Mangistau Oblast	92	5	6	8	7	1	2
Aktau	32	2	2	5	7	1	2
Zhanaozen	15	1	1	2	0	-	-
Beineu	17	1	1	0	0	0	0
Karakiya	13	0	1	0	0	0	0
Mangistau	19	1	1	0	0	0	0
Tupkaragan	6	0	0	0	0	0	0

Note: [*1] 2005-2006 academic year; [*2] the number of nighttime schools included in the number of general schools; [*3] branch campuses of colleges & universities not included in total.
Sources: Documents provided by Dept. of Education in Sep. 2007 & statistics of Mangistau Oblast 2006

Table 12 Number of Pupils and Students Enrolled in Mangistau Oblast

	General school[*]		Lyceum	College		University	
	Daytime	Nighttime		State	Private	State	Private
Mangistau Oblast	87,300	1,800	-	15,300		17,700	
Aktau	39,400	900	-	13,100		17,700	
Zhanaozen	21,200	500	-	2,200			
Beineu	9,600	200	-	-	0	0	0
Karakiya	6,300	0	-	0	0	0	0
Mangistau	7,200	200	-	0	0	0	0
Tupkaragan	3,600	0	-	0	0	0	0

[*] Enrollment in 2005-2006 academic year.
Sources: ibid.

1.3.4 Vocational education at lyceums

The qualification to enroll at a lyceum is completion of the 9th grade at a general school. Tuitions and textbooks are free. There were 175 students who graduated from Aktau Lyceum in 2006, of whom 94% found jobs at local enterprises. The rest proceeded to higher education or went abroad.

The lyceum had 693 students under 45 full time and part time teachers as of September 2007. The students consist of 140 in cooking and customer relations, 125 each in electrical work and communications equipment, 89 in PC repairing, 74 in sewing, 72 in electrical measurement, and 68 in PC operation. The fields of job training offered at lyceums in each rayon are as follows.

Rayon	Fields
Aktau	Plaster-painter, hairdresser, sewer, arts and crafts, fancy knitting, flower design, secretarial, cooking, locksmith for vehicles, banking, taxes and taxation
Zhanaozen	Sewing, locksmith for vehicles, cooking, confectioner, computer operator, electrician, kindergarten assistant, operator of oil and gas equipment, hairdresser, automobile engineering
Mangistau	Automobile engineering, operator of oil and gas equipment, measuring laboratory assistant, basics of cattle rearing and mechanization
Beineu	Gas and electric welder, transport and communications, construction, typewriting, office work
Tupkaragan	Automobile engineering, sewer
Karakiya	Basics of clothing manufacturing, transport and communications, basics of agriculture, secretary and typist, trade, catering

1.3.5 Higher education

The number of colleges increased to 17 in 2007, of which 14 are in Aktau, two in Zhanaozen and one in Beineu. They consist of eight state and nine private colleges. Most fields are covered except agriculture and fishery, including education, foreign languages, economics, trade, craftwork, medical science, construction, transportation, industry, electricity, information science, and oil and gas. Two colleges are specialized in oil exploration and oil well drilling. In addition, three polytechnic colleges have established oil and gas faculties.

The Polytechnic College of Mangistau in Aktau city, established in 1972, has about 3,700 students and 162 proper teachers. It offers programs in oil exploration and drilling, architecture, construction works, operation of machines, PC operation and programming, trade and others. The private medical college in the Aktau city provides education to train nurses, assistant doctors, pharmacists, dentists, and dental technicians. They receive graduates from general schools, and 993 students are enrolled as of September 2007.

The Aktau State University, established in1976 as the first university in Mangistau Oblast, provides all round university education from art to science, including pedagogy, literature, economics, industry, chemical engineering and energy. There are 450 teaching staff and some 6,000 daytime students and 3,000 nighttime students at the university. It has institutions established in 2005 by each faculty and offers bachelor's and master's degree programs. It has acquired a 50ha land for a new campus.

1.4 Issues in Social Sector of Mangistau

The performance of general education is reasonable in Mangistau Oblast as in Kazakhstan as a whole. There exists the demand-supply gap in vocational training due to mismatch between the skills required by local enterprises and the qualification of workers, especially the youth and women. Opportunities for higher education are wide but overly concentrated in the Aktau city.

The performance of health services in Mangistau Oblast is considerably lower than the average levels in Kazakhstan as represented by the high infant and maternal mortality rates. Most medical facilities are located in the Aktau and the Zhanaozen cities, and doctors are concentrated in the Aktau city. Most popular diseases in Mangistau are due to local conditions such as air pollution by emission from the oil and gas industries and by dusts, and unbalanced diet with limited supply of fresh vegetables as well as the severe climate.

These unfavorable situations have been aggravated by the large number of returned Kazakh coming from neighboring CIS countries. Many returned Kazakh do not have skills required by local industries, and many suffer from low education level and poor nutritional conditions, especially those

returning out side the quota system.

Given the situations summarized above, the main issues in the social sector of Mangistau are identified as follows:

(1) Improvement of training programs and curricula especially for the youth, women and returned Kazakh
(2) Provision of basic services for returned Kazakh including those returned outside the quota system
(3) Introduction of an incentive system for social service providers serving remote rural areas,
(4) Generation of viable employment opportunities in rural areas
(5) Improvement of the distribution of social service facilities in favor of rural areas
(6) Alleviation of health conditions through the strict enforcement of emission standards for enterprises and enhancement of citizens' awareness and participation in monitoring

CHAPTER 2 ECONOMY

2.1 Regional Economic Structure

2.1.1 GRDP growth and structure in recent years

The GRDP by sector in 2000-05 and the GRDP estimates by the Oblast for 2006 and 2007 are summarized in Table 13. The GRDP growth averaged 14.2% per annum in 2000-07 in real terms, although the growth rates varied widely for different years presumably due to fluctuating production and prices of oil and gas.

Table 13 Gross Regional Domestic Product by Sector, 2002-05 and GRDP in 2006 and 2007

(Unit: KZT 10^6)

Sector	2000	2001	2002	2003	2004	2005	2006	2007
Agriculture	1.0	0.6	0.5	0.7	0.9	1.8		
Industry	67.9	76.3	103.8	131.0	189.1	290.2		
Construction	4.3	8.2	11.3	14.2	14.4	28.2		
Trade	5.3	4.2	5.4	6.1	8.4	10.3		
Transport& communication	23.6	22.6	27.0	16.4	16.6	23.3		
Other services	20.2	30.2	40.9	40.0	52.6	70.0		
GRDP of Oblast	122.3	142.0	188.8	208.4	282.1	423.7	585.5	661.6
GDP deflator (%)	117.4	110.1	105.8	111.7	116.1	117.9	120.8	108.6
GRDP of Oblast (2007 price)	260.4	274.6	345.1	341.2	404.5	555.8	635.9	661.6

Sources: Agency of Statistics, Regions of Kazakhstan 2005 for 2000-05; oblast estimates for 2006 and 2007

Industry accounted for 68.5% of the GRDP in 2005, the latest year for which the sector breakdown of the GRDP is available, owing much to the oil and gas production. Assuming the same structure, the GRDP in 2007 consists of KZT 2.5 billion in agriculture, KZT 453.2 billion in industry, KZT 44.3 billion in construction, KZT 15.9 billion in trade, KZT 36.4 billion in transport and communications, and KZT 109.2 billion in other services for the total of KZT 661.6 billion.

The industrial GRDP is further broken down by sub-sector for 2005, and assuming the same sub-sector structure, the GRDP by sub-sector is estimated for 2007 (Table 14). In the calculation, the value added ratio is assumed to be 35% for manufacturing and 50% for utilities, assumed respectively relatively low. Then, the value added ratio for mining is calculated to be 37.6%, while this value is 45.6% in Kazakhstan in 2005.

Table 14 Estimate of Industrial GRDP of Mangistau Oblast, 2005 and 2007

Industry sub-sector	2005			2007
	Production value (KZT 10^9)	Value added ratio (%)	Value added (KZT 10^9)	Value added (KZT 10^9)
Mining	735.6	37.6	276.4	431.6
Manufacturing	15.9	35	5.6	8.7
Utilities	16.3	50	8.2	12.8
Mangistau Oblast	767.8	37.8	290.2	453.2

Source: Estimate by the JICA Study Team

2.1.2 Productivity and wages

Based on the GRDP and employment statistics, the labor productivity by sector is calculated (Table 15). The productivity per employee is the lowest in agriculture at KZT 442,000, although it is still considerably higher than the national average of KZT 174,000 in 2004. The latter is due to the dominance of grain production, which has a very low value added ratio.

The surprisingly low productivity in trade may be due partly to the inclusion of good portion of foreign and wholesale trade within the vertically integrated mining companies. Retail activities are dominated by small outlets including kiosks, while large super markets are still very limited in Mangistau.

Table 15 Sectoral Value Added, Employment and Labor Productivity in 2006

	GRDP ($KZT\ 10^6$)	Employment	VA/worker ($KZT10^3$)
Agriculture	2,506.7	5,667.0	442.3
Industry	399,224.4	49,618.0	8,046.0
Construction	55,753.2	19,482.0	2,861.8
Trade	17,209.0	17,942.0	959.2
Transport and Communications	27,174.8	20,450.0	1,328.8
Other services	83,640.9	9,409.0	8,889.5
Total	585,509.0	171,980.0	3,404.5

The relatively high productivity in other services is difficult to explain. Public administration, health and education services constitute important part of this sub-sector, where the average salaries are among the lowest (Table 16). The same low salary structure seems to be true of all the other services sub-sectors. Presumably, this is a reflection of the lack of well-educated specialized staff in these segments of the regional economy.

Table 16 Average Monthly Nominal Salary by Rayon and by Type of Economic Activity, 2005

Item	Mangistau Oblast	Aktau city	Zhanaozen city	Beineu Rayon	Tupkaragan
Agriculture, hunting, forestry	14,899	22,196	25,923		16,886
Fishery & fish industry					
Industry, total	94,885	85,758	118,210	79,420	40,668
Mining	109,986	106,547	122,784	79,420	43,590
Manufacturing	50,743	52,116	32,609		
Utilities	45,824	48,139	25,972		32,273
Construction	62,595	62,953	61,763	11,629	60,504
Trade	46,440	43,023	61,905	37,647	62,487
Hotels & restaurants	35,751	36,657	33,580		51,089
Transport & communications	83,033	84,812	43,377	75,689	122,208
Financial services	54,752	54,880	14,892		22,575
Real estate	44,836	47,239	30,027		
Public administration	29,867	31,285	27,732	25,764	24,737
Education	21,211	23,218	19,925	17,932	20,697
Healthcare & social services	19,214	19,765	18,587	20,300	15,542
Communal, social and personal services	24,882	28,806	22,738	13,112	14,455
Services for households					
Average	63,959	62,688	84,607	50,201	36,994

2.1.3 Industry linkages

Aside from the salaries paid by the Government, mining is the only source of export revenue for Mangistau Oblast. While being the only single source of regional economic growth, mining has provided limited demand for the output of local firms, particularly manufacturing and service firms.

The literature on regional economic development sates that every unit of the export activity in a region would create 2-3 times as many jobs and income in local indigenous activities. This multiplier becomes larger as the regional economy diversifies and the proportion of locally supplied goods and services in final demand increases. This multiplier is less than 1.0 in Mangistau if mining and the government are taken together as the external sources of income for the Oblast.

2.2 Agriculture and Agro-industries

2.2.1 Agricultural land use and land holdings

(1) Land use

Mangistau Oblast has a total land area of 16.5 million ha, of which 12.7millon is categorized as agricultural land. Practically all the agricultural land is used for grazing, while less than 1,000ha are cultivated (Table 17).

Table 17 Agricultural Land Use, 2006

(Unit: 1,000ha)

	Total land area	Total agricultural land	Cultivated land	Hayfields	Pastures
Aktau	80.1	50.9	0.1	-	49.9
Zhanaozen	51.5	41.4	-	-	41.4
Beineu	4,051.9	2,936.6	-	0.3	2,936.3
Karakiya	6,583.6	5,158.3	-	-	5,158.3
Mangistau	4,759.6	3,751.8	0.1	-	3,751.7
Tupkaragan	1,037.9	761.2	0.2	-	761.0
Oblast total	16,564.2	12,700.2	0.4	0.3	12,698.6

Source: Statistical Yearbook of Mangistau Oblast, 2004 & 2006, Table 16.2

(2) Land holdings

Of the agricultural land in Mangistau, about 4.5 million ha are in the state land reserve. The distribution of the remaining agricultural land by user is summarized in Table 18. Most of the pasture land is under the control of incorporated companies and cooperatives, which are the remnants of former collective farms (Kovhoz). There were 21 state farms (Sovhoz), four in Beineu, three each in Tupkaragan and Karakiya, two in Aktau and nine in Mangistau. The first three rayons have similar sized farms, while those in Mangistau rayon were smaller. In addition, a large number of individual farm plots exist in Mangistau Oblast, but no Kovhoz. The Sovhoz farms in Mangistau appear to have largely maintained their control over the agricultural land after the independence, ensuring transition to a market economy.

Table 18 Land Holdings by Farm Type, 2007

	Number	Area (ha)	Av. (ha/farm)
Public Enterprises	7	283.0	40.43
Incorporated companies	73	5,330,793.0	73,024.56
Joint Stock Companies	3	10,233.0	3,411.00
Cooperatives	38	1,961,279.0	51,612.61
Other farms	7	124.0	17.71
Peasant farms	979	942,001.0	962.21
Individual farms	30,615	2,586.0	0.08
Urban	12,764	929.0	0.07
Rural	17,851	1,657.0	0.09
Dacha- urban	1,292	69.0	0.05
Total area	33,014	8,247,368.0	249.81

As seen from Table 18, there are over 30,000 individual farms in Mangistau with the average land area of less than one hectare (845m^2). Nearly, half of them are in the areas defined as urban. Thus, they are not farms but individually owned plots of land that may be used for residential and other purposes.

2.2.2 Production by farm type and profitability

(1) Production by farm type

More aggregated data on production by farm type are given in Table 19, where the first five groups of farms are shown as farm enterprises. There exists a wide discrepancy between control over land resources and production. Specifically, individual farms own/control negligible pasture land, but they produce two-thirds of the livestock output.

Table 19 Use of Pastures and Livestock Production by Farm Type (2006)

	Farm enterprises	Peasant farms	Individual farms	Total
Number of farms	128	979	30,615	31,722.0
Pastures (10^3ha)	7,303	942	3	8,247.6
% of land	88.5	11.4	0.0	100.0
Livestock (off-take)				
Ton in 2006	1,528	1,650	6,305	9,484
% of output	16.1	17.4	66.5	100.0

The share of farm enterprises in output (16.1%) is too small in comparison to their dominant share of the land ownership. According to the data, over half of the total pasture land is controlled by 73 incorporated companies with the average land area of 70,000ha. Most of the remaining pastures are controlled by 38 cooperatives with the average land area of 50,000ha.

(2) Profitability

Prices of main livestock products are summarized in Table 20. They are generally at the similar levels as the world prices, and even higher for some items. On the input cost side, prices of grains used as livestock feed together with pasture hay are considerably below reference border prices as of July 2007, as expected for Kazakhstan as a major grain exporter. Overall, investments in livestock production in Mangistau would be highly profitable with average levels of technical efficiency.

Table 20 Prices Received by Farmers, July 2007

(Unit: KZT)

	Mangistau	Beineu	Av. oblast price
Eggs (10 pieces)	158		158
Milk Shubat (1ℓ)	151	100	126
Sheep (carcass)	20kg/11,000	18kg/10,512	
Lamb (head)	10,425	8,850	9,638
Sheep (head)	14,550	14,925	14,738
Sheep – Astrakhan (head)	12,825	10,900	11,863
Cattle (head)	74,750	80,813	77,782
Steer (head)		51,575	51,575
Horse (head)	85,150	85,487	85,319

Source: Hearing by the JICA Study Team

2.2.3 Employment and value added

(1) Rural population and employment

Statistical data indicate that nearly 30% of the population in Mangistau Oblast is rural. In administrative terms, some neighborhoods of the Aktau and the Zhanaozen cities are defined as villages. In functional terms, the Mangistau sub-district and the Tenge village are urban as well as the rayon capitals of Beineu, and Shetpe. The total urban population by this definition is 317,000 in 2006. Thus, the remaining 57,400 (15.3% of the total population) live in rural areas. This rural

population corresponds to a labor force of 17,000 workers if the same labor force coefficient and labor participation ratio as the oblast averages are applied.

The statistics on employment by rayon and by sector show that the total number of workers engaging in agriculture is 1,449 (Table 21). Another statistical Table shows that these are the workers employed by medium and large enterprises (Table 22). They are presumably employed in 128 farm enterprises given in Table 18. This implies an average of 12 workers per farm and 4,800ha of farmland per worker.

Table 21 Employment by Rayon, 2005

Sector/sub-sector	Aktau	Zhanaozen	Beineu	Karakiya	Mangistau	Tupkaragan	Total
Agriculture, hunting & forestry	337	82		438	519	73	1,449
Fishery							0
Mining	15,258	12,723	1,972	383		537	30,873
Manufacturing	2,908	246					3,154
Utilities	5,609	494			119	138	6,360
Construction	7,466	1,527				432	9,425
Trade & repair services	824	146					970
Hotels & restaurants	198	663					861
Transport & communication	8,148	235	1,009				9,392
Financial services	812						812
Real estate & renting	5,251	1,699		409			7,359
Public administration	2,745						2,745
Education	5,851	2,187	1,680	826	1,279	452	12,275
Health & social works	3,582	1,190	420	283	290	196	5,961
Community & social services	772	325			67		1,164
Adjustment	-1	18	0	0	0	-50	-33
Total employment	59,760	21,535	5,081	2,339	2,274	1,778	92,767

Source: Statistical Yearbook of Mangistau Oblast, 2004 & 2006

Table 22 Employment by Sector, 2003-05

Sector/sub-sector	2003	2004	2005
Agriculture, hunting & forestry	1,535	1,544	1,449
Fishery	27		
Mining	23,252	28,683	30,674
Manufacturing	4,764	4,640	3,172
Utilities	6,219	6,307	6,360
Construction	6,482	7,555	9,425
Trade & repair services	611	745	970
Hotels & restaurants	909	649	861
Transport & communication	9,613	7,604	9,392
Financial services	644	648	812
Real estate & renting	7,328	7,279	7,359
Public administration	2,254	2,306	2,745
Education	11,321	11,619	12,275
Health & social works	5,672	5,860	5,961
Community & social services	1,316	1,112	1,164
Adjustment	6,000	510	606
Total employment	81,947	87,061	92,767

Source: ibid.

In addition, there are 979 peasant farmers as shown in Table 19. Assuming an average of 2 persons working on each farm, the agricultural employees would total about 3,400. The individual farms numbering over 30,000 are not considered farms, although their contribution to livestock production is large through their supplemental activities. The estimated total agricultural employment of 3,400 corresponds to 3.7% of the total employment in Mangistau Oblast. In rural areas of Mangistau, those depending dominantly on agriculture account for only 20% of the total employment.

(2) Value added

The value added in agriculture is estimated based on the best available data and descriptive information on livestock management and crop production. First, the gross production value of livestock is estimated based on the estimated production volume of meat and milk of different kinds and unit prices of these products at farm gate. The calculation is shown in Table 23.

Table 23 Estimation of Production Value of Livestock in Mangistau, 2006

	Meat			Milk		
	Production (t)	Unit price (KZT/kg)	Value (KZT)	Production (t)	Unit price (KZT/kg)	Value (KZT)
Sheep/goat	2,648	500	1,324	2,970	100	297
Cattle	232	500	116	-	-	-
Horse	663	700	464	-	-	-
Camel	569	400	228	3,080	120	370
Total	4,112		2,132	6,050		667

As seen from Table 23, the gross production value of livestock is estimated to be KZT 2,799 million, consisting of KZT 2,132 million for meats and KZT 667 million for milk. As the range based livestock production dominant in Mangistau Oblast incurs very limited purchased input, the value added ratio is assumed at 80%. Thus, the value added in livestock production is calculated to be KZT 2,239 million in 2007.

There exists a total of 372ha irrigated agricultural land, consisting of 200ha newly developed in Zhanaozen with water transferred from the Volga river and 172ha in Tupkaragan irrigated by groundwater. Main crops produced are tomato, cucumber, cabbage and melon. The average yield of these crops is assumed to be 20t/ha, and the farm gate price is taken at KZT 40/kg in 2007 based on prices for tomato and cucumber. The gross production value in 372ha is calculated to be KZT 297 million. The production costs are difficult to estimate as the prices of the water transferred from Volga are heavily subsidized, and quantities and prices of other production input such as fuel, seed, pesticides/herbicides and fertilizer are widely varies. Assuming the value added ratio at 40%, the crop value added is calculated to be KZT 119 million.

The value added from rural craft, fishery and forestry is negligibly small and assumed at KZT 100 million. The total agricultural value added is thus calculated to be KZT 2,458 million in 2007. The agricultural employment estimated at 3,400 corresponds to the rural population relying on agriculture at 8,500, if the average size of rural households is assumed at 5.0 and two working adults are assumed in each household. The agricultural value added of KZT 2,458 million corresponds to per capita income of KZT 289,000 or US$2,400. This is considerably higher than the average agricultural income of US$1,845 per capita in Kazakhstan, but much lower than the average income on Mangistau Oblast of US$6,136 per capita.

(3) Implications

As seen from Table 19, two-thirds of livestock output is produced by individuals who have no control over land and whose main activities are not farming. Those who derive some supplemental income from agriculture are not likely to be receptive to adoption of practices that would be needed for improved agricultural practices. These people are likely to respond in a very similar manner as subsistent farmers in developing countries. Commercialization and efficiency improvement may be very difficult for these people.

2.2.4 Production prospects

(1) Livestock production

The productivity in livestock is measured through a number of interdependent parameters: proportion of reproductive animals in the herd, lambing/calving ratio of the productive stock, off-take ratio, average carcass weight and average milk yield. The livestock productivity in Mangistau Oblast is evaluated by using the oblast specific data (details in Annex to this section).

The livestock productivity varies depending on breed, feeding levels, veterinary care and farm practices. In Mangistau, feeding depends almost totally on pastures with the exception of around 10days a year, when the snow might melt and subsequently freeze to make it impossible for livestock to graze on ice-covered grass. Dependence on pastures introduces a strong element of seasonality in production. Meat production tends to concentrate on the period when the most favorable grazing conditions are ending.

Veterinary care in Kazakhstan was traditionally provided by the collectives. New extension services by the Government or private enterprises have not established yet. This, however, does not seem to have created serious problems of disease epidemics.

Common breeds are local, noted to be combined meat and milk breeds. The emphasis is clearly on meat production as sheep and horses are not milked at all, and even the milk production from cattle and camel is limited.

The livestock productivity parameters are determined based on the detailed data given in Annex to this sub-section and shown in Table 24. The conditions represented by the parameters appear very favorable considering the extensive nature of the livestock production in Mangistau.

Table 24 Mangistau Livestock Herd Productivity Parameters, 2006

	Sheep/Goat	Cattle	Camel	Horse
Proportion of reproductive animals (%)	61	50	55	52
Births per 100 head	90	57	36	51
Average live weight at slaughter	31	210	341	211
Dressing Ratio	45	48	48	48
Off-take ratio	27	19	12	18

Source: Annex to this section

The proportion of productive female, the first parameter in Table 24, changes depending on when the herd composition is measured. The proportions seem to be very favorable even considering that the herd composition is more favorable in the middle of winter when most of the off-takes occur. Cattle parameters are relatively less favorable. Cattle are not as adaptive as sheep in utilizing poor pastures and unfavorable water conditions. Consequently, the cattle population is small compared to the sheep herd in Mangistau.

The average live weight and dressing ratios are not as favorable as the herd composition. In case of sheep and goat, the average measured for both sheep and goat together implies a lower weight for sheep than would actually be the case. The more critical determinant, however, is lack of fattening or finishing just before slaughter. At present, livestock is taken off the pasture and directly sent to slaughter. This is a waste of stock that could be fattened.

Fattening has many advantages. It can increase the meat production very rapidly. Instead of waiting a year to get a new lamb or calf, additional meat can be produced in a matter of weeks. The efficiency with which feed resources is converted to live weight, and meat, is greater in fattening than in range-based systems.

The most significant advantage of fattening comes from carcass quality. In fattened heavy animals, the bone-to-meat ratio in carcass can be as low as 17%, while this is likely to be close to 25% under

the present practice. There also is a strong preference among the consumer for the tender, less lean meats, which would be produced through fattening.

(2) Crop production

All crop production in Mangistau is on irrigated land. The average annual rainfall of 150mm or so does not allow rain-fed crop production. At present, only one crop is harvested annually from irrigated plots in Zhanaozen and Tupkaragan under field conditions. Two crops can be easily grown in greenhouses or under cover provided that water is made available.

The crop production under cover is a more intensive form of production. To achieve the yield potentials from this type of production requires the availability of high yield seed, fertilizer, technical guidance and a high degree of specialization among farmers. These conditions are not readily available in Mangistau at present.

2.2.5 Input distribution and marketing

(1) Input distribution

Under the Soviet system of managing the land and livestock through very large units, the farm units provided many functions that are performed by independent suppliers and service providers in market economies. Concentrate feed, medicament, marketing, technical services and in many cases processing functions were performed by the large production units during the Soviet era. In a market-based system, these services need to be performed by independent operators. Family farms would buy their production inputs from these operators and sell their products to them. Lack of these services is one reason why the old large farm units keep their hold on farmers who may desire to break away from the cooperatives, but are locked into the existing farming units.

Productivity is heavily dependent on the quality of these input services. The quality tends to be much higher when the farmers are in direct contact with the producers and suppliers of these inputs. Crop and livestock productivity improvements and the sustainability of individual farm units depend on development of these functions.

(2) Marketing and market regulation

Mangistau Oblast depends on food imports from other regions of Kazakhstan and abroad for most of its food consumption. The main preoccupation of the Agricultural Department of the Oblast, therefore, is to monitor consumer prices rather than be concerned with the producers.

While food production and prices have been mostly freed from the state control, the liberalization in distribution and processing has not kept pace. Food is a major component of consumer budget and their prices present very sensitive political issues. Whenever supply interruptions occur and there are unwarranted price changes, the first impulse is to intervene directly in procurement, distribution and pricing of food items. This represents a deep-rooted culture inherited from the control economy of the past.

What the authorities need to do is to ensure that the market mechanisms work. There are near monopolies in rail transport of carcass meat and meat cuts. The market and cold storage chain to handle imports of fresh produce has not developed. Private investments in these sectors may occur only after a relatively long period of stable policy environment. Nonetheless, investments in selected sub-sectors should be encouraged, including primary production, processing and distribution of livestock and crop products.

(3) Financing

Financing holds another key for agricultural development in Mangistau. There are two sources of finance for small agricultural holdings. A micro credit fund managed by the Oblast provides a minimum of KZT 13,000 and a maximum of KZT 26,000 per burrower. The terms are one year for crop and two years for livestock credits. The Development Fund for Small Enterprises provides credits for agricultural enterprises as well. A specialized bank for agriculture does not exist and presumably large agricultural enterprises borrow from commercial banks.

2.2.6 Agro-industries

(1) Existing agro-industries

There are 20 registered agro-industry enterprises in Mangistau in 2007. They consist mainly of grain milling/bakeries and meat processing. All of the grains for milling are imported from other regions as there is no grain production in the Oblast. A large part of livestock slaughtered in Mangistau is imported from other regions of Kazakhstan. The Oblast imports also substantial quantities of carcasses and meat cuts from other regions. Local livestock production is estimated to provide only one-quarter of the local consumption of meat estimated at around 40kg per capita per annum or the total carcass equivalent of 16,000t per annum.

There are two large dairy plants in Mangistau, but currently they are not operating due to shortages of milk. They have tried to continue operations by re-constituting imported milk powder but found it difficult to stay in operation without a local supply base. Small scale dairy production is undertaken for camel curd, goat cheese and other products in Tauchik in Tupkaragan and elsewhere.

The existing slaughterhouses and meat processing plants are well equipped and work at a fraction of their capacity. Local demand for red meat is met largely by importing meat cuts rather than live animals. The infrastructure of cold chain for transport and storage is developing to handle this pattern of trade.

Other agro-industries include sheep and camel products such as wool blankets produced in Zhanaozen, furs and leathers collected in Shetpe for export to Russia and China, and clothing in Senek supplying an oil company in Zhanaozen together with milk. Confectioneries exist in Aktau, which may be expanded. The production of agro-industry products in Mangistau is summarized in Table 25.

Table 25 Production of Agro Industry Products in Mangistau

(Unit: ton)

	2003	2004	2005
Meat and by-products	90	22	-
Sausage products	7	33	38
Minced meat, intermediate products	79	58	81
Prepared and canned fish	9	9	-
Processed liquid milk and cream	438	311	184
Cheese and cottage cheese	87	57	111
Yogurt and another fermented milk products	3,385	2,296	1,756
Milk ice-cream	4	1	-
Fresh bread	1,166	1,215	1,148
Cakes and confectionery products	95	165	119
Bun products	12	1	-
Chocolate, confectionery products made of chocolate and sugar	59	54	21
Macaroni and noodles, flour products	11	3	10
Beer, thousand (liters)	1,165	1,453	63
Mineral Water with gas, without sugar and not-flavored	1,727	1,637	1,719
Non-alcohol drinks, thousand (liters)	157	219	994

(2) Prospects

The future development of agro-industries will depend on the expansion of raw material base and the growth of local market. Livestock products have good potentials for expansion as examined above, while crop production will be to substitute the supply of fresh produce currently imported from neighboring regions and countries. Some agro-industries may develop based on the local market to expand into the market of neighboring regions and countries.

Annex to Sub-Section 2.2.4: Parameters of herd structure and productivity

Indicators of livestock production:2007

Indicators	Unit	Cattle	Sheep Goat	Pigs	Horses	Camel	Poultry	Total
1	2	3	4	5	6	7	8	9
Herd size beginning of year	Head	8,253	460,774	427	31,160	37,343	11,168	
Of which reproductive females	ditto	4,122	282,930	111	16,155	20,545	9,568	
Proportion (of above)	%	50	61	26	52	55	86	
Births per 100 prod. Females	Head	57	90	380	51	36	250	
Total births	ditto	2,333	254,637	422	8,239	7,396	23,920	
Purchases	ditto	0	0	0	0	0		
Herd size year end	ditto	10,586	715,411	849	39,399	44,739	35,088	
Off-take	ditto	2,024	191,230	204	6,984	5,446	15,603	
Death	ditto	162	32,721	215	995	653	6,585	
% death	%	1,5	4,6	25,3	2,5	1,5	18,8	
Losses	Head	0	0	0	0	0	0	
Slaughter for Astragan	ditto		26,000					
Total off take	ditto	2,186	249,951	419	7,979	6,099	22,188	
Herd size- year end	ditto	8,400	465,460	430	31,420	38,640	12,900	
Of which reproductive	ditto	4,130	283,080	112	16,160	20,570	9,900	
Herd size increase	%	101,8	101,0	100,7	100,8	103,5	115,5	
Of which reproductive	%	100,2	100,1	100,9	100,0	100,1	103,5	
Meat Production in 2007								
Off- take	Head	2,024	191,230	204	6,984	5,446	15,603	
Average Live weight/head	Kg	210	31	60	211	341	1	
Proction in Live weight	Thousand ton	0,424	5,833	0,012	1,471	1,854	0,014	9,608
Dressing ratio	%	47,90	44,60	66,00	48,00	48,00	59,05	
Meat Production in Thou.tons	Thousand ton	0,203	2,601	0,008	0,706	0,890	0,008	4,417
Milk Production in 2007								
Number of milking cows and cam	Thousand head	4,2				7,4		
Average milk yield	Kg	722				415		
Output of milk	Thousand ton	3,000						3,000
Other milk	ditto					3,090		3,090
Total milk	ditto	3,000				3,090		6,090
Egg Production in 2007								
Number of laying hens	Thousand head						9,5	
Average egg prod.	Piece						70	
Egg production	Million piece						665,0	
Wool Production in 2007								
	Thousand head		460,7			37		
Actually sheered	ditto		317,2					
Average per sheep	Kg		1,5			3		
Average per sheer	ditto		2,1					
Production	Ton		691					691
Other wool	ditto					110		110
Total wool	ditto		691			110		801
Hides and skins	Thousand unit	1,6	169,0	0,0	4,9	5,0		181

Part of sheep not sheered due to decline in world market price of wool

2.3 Industry

2.3.1 Industrial production structure

As seen already, industry contributed 68.2% of the GRDP in 2006. The sub-sector breakdown is not available, but estimated to be 95% mining, 1.9% manufacturing, and 2.8% utilities as shown above. Utilities constitute a critical component of industry in Mangistau. Desalinization of the Caspian Seawater is a major economic activity in the Oblast, and thermal power generation and central hot water distribution are undertaken in Aktau as well as water supply.

The productivity in industry is the highest of the three broad sectors (Table 15). The average salaries are the highest in mining, and relatively high in manufacturing as well, following the averages in transport and communications and construction (Table 16).

2.3.2 Mining

Mining in Mangistau is almost all due to the oil and gas industries, while the non-oil activities of quarrying for construction materials account for less than 1% of the total production value in industry. The very high share of mining reflects partly the structure of the sub-sector. It is reported that about 10% of the mining value added is attributed to inclusion of some services undertaken by large oil companies within their vertically integrated structure of operations.

(1) Production structure

There are very few small and medium sized enterprises in Mangistau, and this applies to mining as well. There were 69 firms in mining in 2006, consisting of 13 large ones employing more than 251 workers, 19 medium ones employing more than 51 workers, and 37small ones (Table 26).

The 13 large firms produced 88% of the total output of KZT 765 billion in 2006. The large firms have a similar dominance in employment as well, employing 40,700 out of the 49,900 people working in industry in 2005. The lack of small and medium enterprises in Mangistau is a major issue in the industry sector of the Oblast, adversely affecting employment creation and efficiency of large enterprises as well.

Table 26 Size Distribution of Mining Enterprises in Mangistau, 2005

Type of enterprise	No. of enterprises	Output (US$10^6)	Share in output (%)
Small	37	367	6.0
Medium	19	369	6.0
Large	13	5,394	88.0
Total mining	69	6,130	100.0

Source: Statistical Yearbook of Mangistau, 2006

(2) Procurement pattern

The mining investment in Mangistau Oblast amounts to about 15% of the sector output. In addition, substantial material and service procurement accrue to the maintenance of oil fields. These two items amount to around US$1.0 billion per annum. Almost all of this is spent on imported commodities and services.

Two reasons seem accountable for the lack of local procurement. The first is the government requirement that all the procurements must be made through open competitive bidding. The second reason is the large size of operations in mining relative to the size of local firms that cannot supply the required volumes. Lack of standardization in oil equipment also creates difficulties as parts are unique to each drilling technology imported from a diverse range of countries.

The first factor is due to the system of revenue sharing between the Government and oil companies. The government revenues are calculated on the basis of operating profits of companies. The Government, therefore, imposes strict procurement rules to control costs. Basing the natural resource charges on companies' profits has the perverse impact of undermining the incentives for the companies to reduce costs and increasing efficiency.

Related to the second factor, local and national firms are not large enough to be able to supply large volumes that are procured through these bids. This size constraint applies to parts supply and maintenance services as well. The local firms are not equipped with even the simple equipment for bulky repair works, which are now undertaken by shipping parts to the supplying countries for repair. There are no government programs to promote the establishment or growth of such small and medium businesses.

The link between the oil companies in parts and services delivery does not seem to work well. In contrast, the labor transfer to the oil sector is reported to work well. Local technical colleges train a sufficient number of graduates with acceptable skill levels. Large oil companies, particularly those in the public sector, provide on-the-job training for the new recruits. Private companies are reported to provide short-term training to unemployed youth with the support of government program, to enable them to take skilled jobs in the oil and gas industries.

(3) Spatial distribution of activities

The employment statistics by rayon indicate that 84.0% of the mining and construction activities is reported to be in the Aktau city and Zhanaozen (Table 27). Interviews with oil companies indicate that only 20% of the total labor force in mining actually works in the same locations as the headquarters in Aktau and Zhanaozen. Most of the mining sector employees work outside these cities and oil fields. These mining workers made up around 40,000 out of the 45,000 population living in rural areas in 2006. Typically, they live in dormitories provided by the companies for two-week shifts and get an equal time off to be spent with their families in the two cities.

Table 27 Employed Population by Sectors and by Location, 2005

(Unit: 1000)

Rayon	Agriculture	Industry & construction	Services	Total
Mangistau Oblast	5.8	67.4	97.1	170.3
Aktau city administration	-	34.4	59.4	93.8
Zhanaosen city admin.	-	22.6	17.4	40.0
Beineu Rayon	-	1.7	9.7	11.4
Karakiya Rayon	3.1	3.3	1.8	8.2
Mangistau Rayon	2.3	2.1	6.1	10.5
Tupkaragan Rayon	0.4	3.2	2.7	6.3
Total	5.8	67.3	97.1	170.2

These mining workers commute, sometimes distance of over 200km. This pattern of commuting may have some rationality for staff involved in oil exploration. Most of the employees of the large oil companies are involved not in exploration but in the maintenance of the oil fields and oil transport. It is reported that only 10% of oil company employees are oil exploration staff.

The maintenance of the oil fields provides permanent employment. There probably is a strong demand from this staff for permanent residences in convenient locations with required social facilities for their families. Such locations may be determined, taking account of the availability of required physical and social infrastructure and the service requirements of other economic/livelihood activities.

2.3.3 Manufacturing

Although manufacturing contributes a small portion of the industrial output, certain diversity is

observed in its structure. The degree of specialization in certain sub-sector industries in a region is analyzed by the location quotient defined as the ratio between the sub-sector share of value added in the region and the same at the national level. Data on value added by sub-sector are not available, and therefore the location quotient is defined here based on the production value. This is equivalent to assuming the same value added ratio for any sector at the regional and the national levels.

The sub-sector structure of manufacturing in Kazakhstan and Mangistau Oblast is summarized and the location quotient (LQ) calculated in Table 28. The sub-sectors having the value of location quotient larger than 1.0 in Mangistau Oblast are: 1) rubber and plastic products (LQ=6.31), 2) machinery and equipment (3.24), 3) other non-metallic products (3.17), 4) leather products and footwear (2.70), and 5) coke, refined petroleum products and nuclear materials (1.36).

Three sub-sectors of rubber and plastic products, machinery and equipment, and coke, refined petroleum products and nuclear materials are all related to the oil and gas industries. The machinery and equipment industry has large import to support the oil and gas industries, but there exist local firms producing small machinery and equipment for household and other uses as well based on import materials. The rubber and plastic products industry includes manufacturer of glass-fiber and plastic pipes. The other two sub-sectors are local resource processing industries.

Table 28 Manufacturing Sub-sector Structure in Kazakhstan and Mangistau and Location Quotient for Mangistau, 2005

Sub-sector	Kazakhstan		Mangistau		LQ
	Output ($KZT\ 10^6$)	Share (%)	Output ($KZT\ 10^6$)	Share (%)	
Food, beverage & tobacco	463,098	25	3,173	20.3	0.81
Textile & sewing	39,759	2.1	196	1.3	0.62
Leather products& footwear	1,786	0.1	43	0.27	2.7
Wood products	5,899	0.32	30	0.19	0.59
Paper products & printing	46,052	2.5	276	1.8	0.72
Coke, refined petroleum products & nuclear materials	165,881	9	1,902	12.2	1.36
Chemicals	53,912	2.9	287	1.8	0.62
Rubber & plastic products	29,037	1.6	1,577	10.1	6.31
Other non-metallic products	109,674	5.9	2,934	18.7	3.17
Metallurgy & metal products	733,188	39.6	232	1.5	0.04
Machinery & equipment	179,491	9.7	4,921	31.4	3.24
Other industries	23,787	1.3	78	0.5	0.38

2.3.4 Utilities

The production value of utilities in Mangistau accounted only for 2.1% of the industrial production value in 2005, but still slightly larger than the manufacturing production. This is mostly due to the large heat-power complex of an open company MAEK Kazatomprom in the Aktau city, accounting for 84% of the total utilities production value in the Oblast. This complex supplies 70% of fresh water used in Mangistau, including distilled water and hot water supply to the surroundings of the city as well.

The power supply by MAEK Kazatomprom is with three thermal plants with the combined effective generating capacity of 892MW. The maximum power load in Mangistau Oblast was 427MW in 2005, and the annual power generation was 2,896GWh to make the load factor 77.4%. The Aktau city and its surroundings had the peak power demand of 180MW and the annual power generation of 1,587GWh for the load factor of 64.2%, including the power use by MAEK itself. Excluding the power use by MAEK, the peak load was 82MW and the annual energy was 718GWh to make the load factor 50.3%.

The power generating capacity of MAEK is expected to increase to 922MW by 2010 and further to 1,097MW by 2015 through the rehabilitation of existing facilities. In addition, new gas turbine plants are expected to be introduced at Kalamkas with 90MW by 2010 and also in new oil fields with

120-260MW during 2015-20. Additional major power generating capacity should be installed by 2020, and a nuclear option has been discussed. Considering the lead time, the decision should be made in a few years.

2.4 Services

The oil and gas industries and the people employed by them create demand for services and goods consumed by the industries and the people, and a host of business services as well. Another sub-sector that creates large employment is the public administrative services, which would affect the local service industries in a manner similar to that of the oil and gas companies. Together with services in health and education, the public sector probably employs as many people as the oil and gas sector.

Of the major business services, transport and communications seem to be well developed. Trade is very small. Specialized business services in insurance, finance and marketing are developed associated mainly with the oil and gas industries but not reported as a separate sub-sector.

Construction is the largest component of services providing around 10% of both the GRDP and the employment. Most construction activities are probably mining related, though information is not available at this stage. The increase in personal income has led to a boom in housing construction. This is evident in volume of construction activities and manufacturing of construction materials. A similar trend is observed for construction of office buildings. The new Aktau city is expected to capitalize on this trend and planned to supply commercial spaces in a large scale as well as housing.

Another major source of employment is personal services to the population. As yet, services in hotels, restaurants, personnel hygiene and similar activities have not developed fully. Two critical constraints are the lack of the required regulatory environment, including a fully developed commercial code, and the lack of commercial spaces. One reflection of this is the lack of a central business district (CBD) in the Aktau city.

An extreme concentration of all service enterprises is observed in the Aktau city. Nearly all the banks, insurance, trade and transport companies are located in the Aktau city (Table 29). The exception to this pattern of distribution is found for health and education facilities, which are distributed more or less throughout the Oblast.

Table 29 Distribution of Service Facilities in Mangistau Oblast

	Health	Trade	Education	Hotels/rest.	Constr.	Insurance	Bank	Total
Aktau	97	1,820	133	107	1,276	26	19	3,478
Tupkaragan	5	17	6	7	24	0	0	59
Zhanaozen	16	80	45	11	217	1	1	371
Beineu	11	22	29	0	24	0	1	87
Mangistau	16	27	34	2	67	1	0	147
Karakian	7	15	24	0	21	0	0	67
Munailin	3	10	2	0	9			24
Total	155	1,991	273	127	1,638	28	21	4,233

2.5 Tourism

2.5.1 Overview

Mangistau Oblast is expected as one of the areas with highest potential for tourism development in the Country, as 30% of the tourist destinations are concentrated in the Oblast. This expectation is further enhanced by the recent rapid economic growth of the region, together with expected improvement of accessibility by planned large scale transport infrastructure projects. The efforts for tourism development in Mangistau Oblast, however, are in the initial stage. There is no public agency or

separate department dedicated to tourism development yet. Likewise related data for tourism sector are not sufficiently available. Currently the Department of Industry and Entrepreneurship is responsible for the tourism sector.

2.5.2 Major tourist destinations in Mangistau Oblast

Tourist destinations in Mangistau Oblast can be divided into four categories; i) Caspian coastal resorts, ii) natural landscape of desert and steppe fields, iii) historical heritage sites, and iv) religious monument sites. Major tourism sites are listed in Table 30. Their locations are depicted in Figure 2. Among them, the Caspian coastal resort has been the most internationally recognized destination. The Kenderli recreation zone, 2-hour drive from Aktau via Zhanaozen city, enjoys the best water quality and thus is expected to be a major international resort complex. Religious sites are also significant. Beket-Ata is a very highly graded holly place among muslims and constantly attracts Kazakh pilgrims. The tour routes to Beket-Ata usually include Shopan-Ata on the way. Both sites are accessible only by dirt roads, but stable tour operation is available. Access to most of the nature sites is through dirt roads.

Figure 2 Location of Major Tourist Destinations in Mangistau Oblast

Table 30 List of Major Tourist Destinations in Mangistau Oblast

Type	Name	Location
Caspian coastal resorts	Sagundok deserted coast	Tupkaragan
	Aktau beach resorts	Aktau
	Stigle recreation zone	Aktau
	Kenderli recreation zone	Karakiya
Natural landscape	Tamashalu oasis	Tupkaragan
	Sultan-Epe necropolis	Tupkaragan
	Saura oasis	Tupkaragan
	Samal canyon	Mangistau
	Karatau mountains	Mangistau
	Karakiya depression	Karakiya
	Ustyurt natural reserve	Karakiya
Historical heritage sites	Fort-Shevchenko	Tupkaragan
	Bautino	Tupkaragan
	Shertala fortress	Mangistau
Religious monument sites	Beket-Ata	Karakiya
	Shopan-Ata	Karakiya
	Shakpak-Ata underground mosque & necropolis	Tupkaragan

2.5.3 Visitor arrivals

Having several domestic access routes, the number of visitor arrivals to Mangistau is not fully grasped. The number of foreign visitors, mostly arrived by international direct flights, has steadily increased for 2005-2007 by 1,200 persons as shown in Table 31. The number of users of tour company services has dramatically increased between 2005 and 2006, implying significant number of tour companies' establishment in this period. The number of domestic visitors to Mangistau shows even faster growth. According to the Department of Industry and Entrepreneurship, the overall sales turnover of tour companies was estimated at KZT 102.1 million in 2005. Assuming the same services and prices, the sales turnover may reach KZT 427.4 million in 2007.

Table 31 Number of Travelers to/from Mangistau Oblast

(Unit: 1,000 persons)

	2005	2006	2007
Number of serviced foreign visitors to Mangistau Oblast	57.8	58.2	59.0
Annual growth		0.7	1.4
Number of visitors used tour companies	0.3	6.2	8.5
Annual growth		1,966.7	37.1
Number of serviced citizens departed from Mangistau Oblast	198.4	198.7	199.1
Annual growth		0.2	0.2
Number of citizens used tour companies	2.5	3	4.2
Annual growth		20.0	40.0
Number of serviced domestic visitors to Mangistau Oblast	7.2	23.8	29.1
Annual growth		230.6	22.3

Source: Department of Industry and Entrepreneurship

2.5.4 Tourism industry

The number of licensed tour companies increased by 57.9% from 2006 to 2007 as shown in Table 32. Among them, the number of tour agencies has shown faster growth. The number of accommodation sites steadily increased including new establishments of two hotels. According to the Department of Industry and Entrepreneurship, the occupancy rate of 12 hotels in Aktau was around 40% in 2005. The growth in the number of employment was smaller than that of tour companies, implying small size of tour companies. The job creation in this period was around 800.

Table 32 Major Tourism Industry Indices

	2006	2007	Growth (%)
Number of tour companies	19	30	57.9
Tour operators	11	16	45.5
Tourist agencies	8	14	75.0
Number of accommodation facilities/sites	54	58	7.4
Hotels	27	29	7.4
Health improving camps	20	21	5.0
Tourist camps	7	8	14.3
Number of employees	2.1	2.9	38.1
Permanent (1,000)	1.1	1.4	27.3
Seasonal (1,000)	1.0	1.5	50.0

Source: ibid.

2.5.5 Existing tourism development plan

A tourism development master plan study was conducted in year 2007, led by a German consultant team. The plan covers the entire area of Mangistau Oblast, but mostly focused on the development of Kenderli Beach Resort (Figure 3). In the master plan, foreign visitor arrivals to Kazakhstan were projected along with expected activities, based on results of marketing research conducted in the master plan study. These projections are shown in Table 33 and 34. The number of tourist represented by "holiday purpose" is expected to increase by 20 folds from 58,000 in 2004 to 1,200,000 in 2020. The number of domestic tourists was separately projected to reach 10 million in 2020.

Table 33 Projected Number of Foreign Visitor Arrivals to Kazakhstan by "Master-plan for Mangistau Oblast Tourism Development until 2015"

(Unit: 10^3 persons)

	Number of visitors			
Purpose of visit	2004	2010	2015	2020
Business	825	1,020	1,200	1,400
Visiting of friends and relatives	2,190	2,650	3,050	3,900
Holiday	58	380	800	1,200
Total	3,900	5,200	7,490	9,400

Source: Master-plan for Mangistau oblast tourism development until 2015

Table 34 Projected Composition of Tourist Activities by "Master-plan for Mangistau Oblast Tourism Development until 2015"

Type of activities	Projected share (%)
Tours on natural objects	63
Steppe safaris	47
Beach rest on Caspian Sea	47
Tours on a silk way	38
Cultural tours	35
On traces of Genghis Khan	34
Cruises over Caspian Sea	29
Railway tours	26
The pedestrian tourism	20
Trips on cities	20
Visiting Baikonur	19
Overseeing animals/plants	13
Mountain-skiing rest	8
Hunting	2

Source: ibid.

Figure 3 Land Use Plan of Kenderli Beach Resort
by "Master-plan for Mangistau Oblast Tourism Development until 2015"

2.5.6 Other movements

Apart from the activities suggested in the aforementioned master plan, there are several movements in tourism development as follows:

- Joint project of private tour companies to integrate regional tourism, covering the Mangistau, Atyrau, West-Kazakhstan and Aktobe oblasts
- International program to establish a Caspian cruise tour, including the Aktau seaport as one of the calling ports (charter operation already available)

CHAPTER 3 TRANSPORTATION

3.1 Transport Sector Policies and Institutions

3.1.1 Transport sector policies, strategy and institutions

The Government of Kazakhstan promulgated in 1997 the "Kazakhstan 2030" with seven main strategies, one of which is the infrastructure development centering on the transport and communication sector. Based on it, the Ministry of Transport and Communication (MTC) established the "transport strategy up to 2015" with the view to ensuring progressive transport development in line with the economic strategy. In the strategy, the Caspian Sea area is placed as one of the development areas in Kazakhstan.

For the Caspian Sea area, the Government formulated the State Program of Development for the Kazakhstan Sector of the Caspian Sea. The Program aims at the contribution to sustainable economic growth and upgrading of the quality of life for Kazakh citizens through rational and safe use of the Caspian hydrocarbon resources and promotion of related sectors. More specific emphasis is placed on the development of multi-modal hydrocarbon transport system and the development of maritime fleet and seaports.

The road system of Kazakhstan consists of republican roads, oblast roads, and rayon and city roads. Republican roads are authorized by the Government and administered by MTC. Oblast roads are operated and managed by the Motor Road Department of the Oblast Akimat. Rayon and city roads are managed by the Road Construction Section of the rayon and the city akimat, respectively.

MCT is in charge of implementing policies for the railway sector. The Kazakhstan Railways or Kazakhstan Temir Zholy (KTZ) is a joint stock company responsible for operating and maintaining the rail infrastructure and providing passenger/freight services.

MTC and KTZ started a reform program in December 2001 to create an efficient and competitive system to attract private investments. By the program for restructuring of railway transport of Kazakhstan for 2004-06, KTZ has been divided into several joint stock companies (JSCs). Main companies are: 1) JSC Kezzhedortran for freight transportation, 2) JSC Passenger Transportation, 3) JSC Kedebtransservice for freight yard services, and 4) JSC Kastransservice for container transportation.

The Government plays an active role in airport ownership, air rout licensing, a fairly restrictive international aviation regime with subsidies, and investment in airport infrastructure. It formulated the policy for the development of air transport in Kazakhstan 2006-10. The policy has established the following:

1) Requirement of middle or small size fleets of aircrafts to meet the international demand growth and the replacement of Soviet aircrafts on the domestic routes
2) Concentration of international air services at the hub airports of Astana, Almaty and Atyrau, and the connection of domestic services to/from regional centers
3) Increase in the involvement of local authorities for the development of regional airports and the acceleration of their modernization
4) Development of regional cargo airports using external sources of fund
5) Introduction of more commercial management structure of air services

The maritime transport in Kazakhstan is administered by the Water Transport Department of MCT. There are three sub-divisions in the Department: the Domestic Waterways for control of inland waterway transport, Sea Ports in charge of port facilities, and Sea Navigation administering the

maritime transportation. Kazmortransflot is a company limited for maritime transport services under the Department. The "transport strategy up to 2015" has established the following for the sea transport: 1) development of sea transport infrastructure including seaport rehabilitation and improvement of inland waterways, 2) removal of barriers to the transport corridors to utilize traffic potentials, and 3) technological innovation and streamlining of training programs.

3.1.2 Transport strategy, programs and institutions in Mangistau Oblast

Mangistau Oblast has several development programs related to the transport sector, centering on the export of hydrocarbon and mineral resources. The integrated "Land-Sea-Air" program, managed by the Economic Department of Mangistau Oblast Akimat, aims at strengthening the position of Mangistau in general and Aktau in particular as the nodal point of inter-regional and international transport and trade. It contains several projects as listed in Table 35.

Table 35 Projects Contained in the "Land-Sea-Sky" Program

Sector	Project Description
Transport infrastructure development	1. Development of Kuryk seaport and Kuryk working settlement 2. Development of motor roads and railways 3. Reconstruction of the Aktau International Airport
Other industrial development	1. Expansion of "Morport Aktau" SEZ 2. Development of tourism cluster 3. Development of energy 4. Perspective development of New Aktau City 5. Establishment of Caspian Technological University

The medium term socio-economic development plan of Mangistau Oblast 2006-08 has established targets, issues and priorities for economic development up to 2010. In the transport sector, the plan has set the following priorities:

1) Motor road rehabilitation and construction
2) Aktau port expansion and Kuryk port development
3) Aktau international airport rehabilitation

The management of republican roads in Mangistau Oblast is undertaken by the Oblast branch of the Committee for Transport Infrastructure Development (CTID). These roads are designated as part of the Asian Highways No. 63 and No. 70 due to their importance of their port connections and links with industrial and agricultural centers. Some state enterprises are involved in road construction and management in Mangistau. Kazakhavtodor provides the maintenance services for all the republican roads and periodic maintenance as well. Kazdornii provides consulting and advisory services for CTID.

KTZ is divided into 12 local departments. The railway sections (798km in total) within Mangistau Oblast were managed by the Atyrau department, but as of August 1, 2007, the Mangistau department has been separated from the Atyrau department. In addition, Kaskortransservice, an open joint stock company, provides logistic and operation services, owning the railway section (18km) between the Aktau port and the Mangishrak station as the terminal of Aktau.

There exist 22 airports in Kazakhstan, classified into six categories according to their runway length as established during the Soviet era. The Aktau airport with 2,600m runway is classifies as class B, the second most important class.

3.2 Existing Transport Conditions in Mangistau Oblast

3.2.1 Transport modal split

In Kazakhstan, motor roads carried 78.4% of the freight volume in 2005, while railways accounted for 11.6%. In terms of freight turnover, however, railways played the main role with 57.8% in 2005 as compared to 15.8% for motor roads. In Mangistau Oblast, the role of railways is much smaller. In 2005, roads carried 114.4 million ton of freight in the Oblast, while only 8.6 million ton of freight is recorded in the Atyrau branch of KTZ covering Mangistau and Atyrau.

The road freight transport volume has not increased much in Mangistau in recent years, although its turnover increased at the average annual rate of 8.1% during 2002-05, slightly higher than the average in Kazakhstan as a whole (Table 36). As for passenger transport, both passenger volume and turnover increased at rates higher than the national averages during 2002-05 (Table 37). The increase in freight and passenger transport by railways is also at high rates in Mangistau and Atyrau than the respective national averages (Table 38).

Table 36 Freight Transport Volume and Turnover

Volume					(Unit: 10^6t)
	2002	2003	2004	2005	Av. annual growth rate (02-05)
Mangistau Oblast	108.0	118.7	125.8	114.5	1.019
Kazakhstan	1219.3	1318.2	1444.8	1511.1	1.074
Turnover					(Unit: 10^6t km)
	2002	2003	2004	2005	Av. annual growth rate (02-05)
Mangistau Oblast	1,969.5	2,148.5	2,252.2	2,485.6	1.081
Kazakhstan	37,600.0	40,200.0	43,900.0	47,100.0	1.078

Source: Regions of Kazakhstan 2006, State Statistics Department

Table 37 Bus Passenger Transport Volume and Turnover

Volume					(Unit: 10^6 passengers)
	2002	2003	2004	2005	Av. annual growth rate (02-05)
Mangistau Oblast	25.3	25.5	28.8	27.7	1.09
Kazakhstan	8,879.1	8,722.2	9,235.2	9,775.7	1.074
Turnover					(Unit: 10^6 passenger km)
	2002	2003	2004	2005	Av. annual growth rate (02-05)
Mangistau Oblast	1,169.8	1,183.2	1,480.2	1,589.9	1.108
Kazakhstan	79,429.0	80,825.0	85,240.0	91,651.0	1.078

Source: ibid.

Table 38 Railway Transport Volume and Turnover

(Volume)					(Unit: 10^6t)
	2002	2003	2004	2005	Av. annual growth rate (02-05)
Atyrau Department	5.6	5.6	7.0	8.6	1.154
Kazakhstan	163.3	185.3	193.6	198.4	1.067
(Volume)					(Unit: 10^6 passengers)
	2002	2003	2004	2005	Av. annual growth rate (02-05)
Atyrau Department	1.3	1.3	1.3	1.4	1.025
Kazakhstan	14.9	13.9	14.3	14.3	0.986

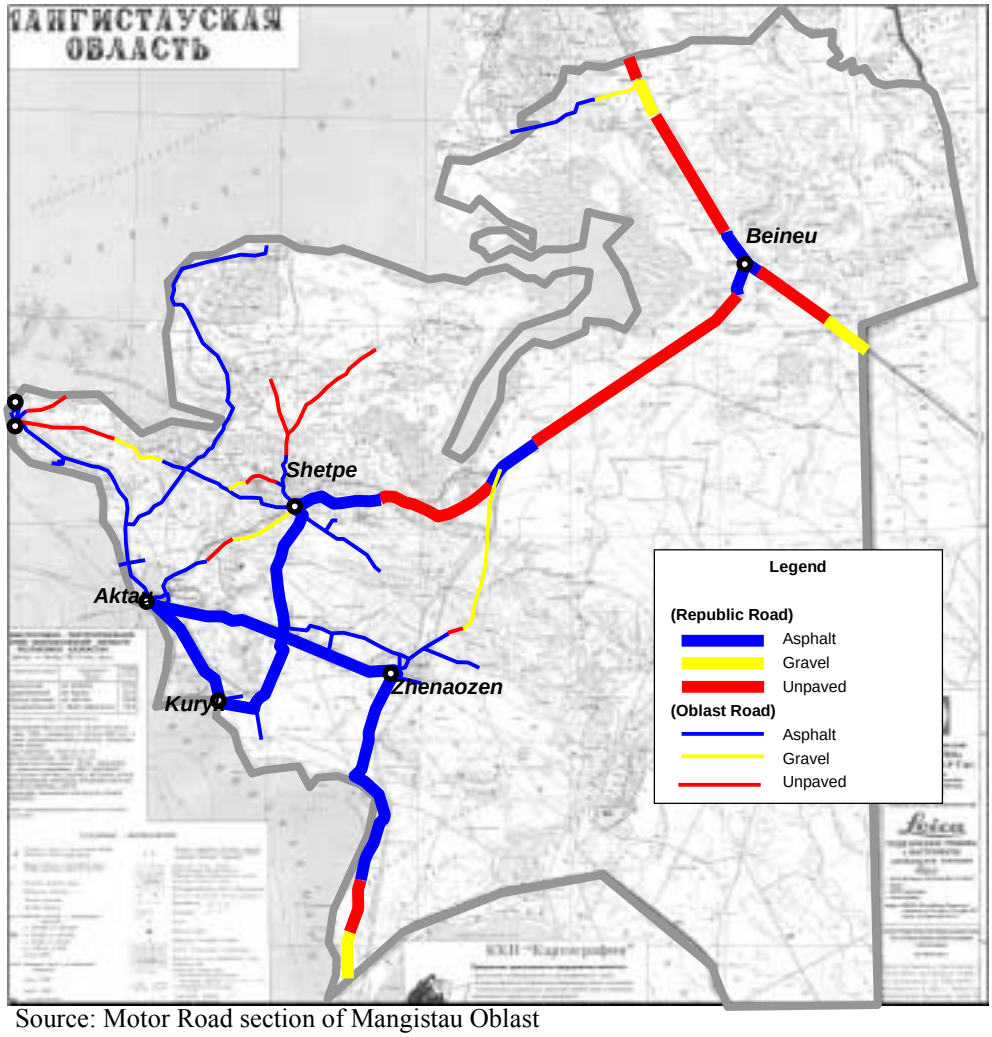
Source: ibid.

3.2.2 Road network

The main road network in Mangistau with republican and oblast roads is shown in Figure 4. The total road length is 2,651km consisting of republican, oblast and rayon roads. The republican road sections within the Oblast total 1,033km as shown in Table 39. The road density is 13.3km/1,000km

in Mangistau, lower than neighboring Oblasts of Aktube (17.2), Atyrau (18.6) and West Kazakhstan (30.3). All the roads are classified into six classes based on the traffic volume and significance. The road length by road class and rayon is summarized in Table 40.

The road length by surface conditions and rayon is summarized in Table 41. Of the republican road length, 41.1% is unpaved, while in Kazakhstan as a whole, 37.6% is gravel or unpaved. Asphalt paved road length accounts for 58.7% of the republic road length in Mangistau, while in Kazakhstan, only 16.1% is asphalt paved and additional 46.3% black gravel paved.



Source: Motor Road section of Mangistau Oblast

Figure 4 Motor Road Network in Mangistau Oblast

Table 39 Republican Road Sections in Mangistau Oblast

Route	Length (km)	Note
1. Dossor-Kulsary-Beineu-Sai-Utes -Shetpe-Zhetybai-Aktau	589	Asian Highway route 63 and 70; Dossor-Beineu, Category 3; another Category 2
2. Beineu-Akzhigit-Uzbekistan Border	84	Asian Highway route 70 Category 4 (may need to be changed to Category 2)
3. Zhetybai-Zhanauzen-Fetisovo -Turkmenistan border	237	Asian Highway route 63, Category 3
4. Aktau-Kuryk	59	In 2007, newly authorized, Category 3
5. Kuryk-Zhetybai	64	In 2007, newly authorized, Category 3
Total	1,033	

Source: CTID Mangistau Branch

Table 40 Motor Road Length by Classification in Mangistau Oblast

Road	Length by Category (km)					Total
	I	II	III	IV	V	
Republican	0	450	599	84	0	1,033
Local total	0	0	764	800	54	1,618
Oblast road	0	0	521	394	0	915
Rayon road	0	0	243	406	54	703
Aktau	0	0	241	4	0	241
Zhanaozen	0	0	0	32	0	32
Karakiya	0	0	2	80	0	82
Tupkaragan	0	0	0	72	0	72
Mangistau	0	0	0	217	54	271
Beineu	0	0	0	5	0	5

Source: Mangistau Branch of CTID, Motor Road section of Mangistau Oblast, Aktau city Akimat

Table 41 Motor Road Length by Road Surface in Mangistau Oblast

Road	Length by road condition (km)				Total length	Paved road (%)
	Paved		Unpaved			
	Asphalt	Black gravel	Gravel	Soil		
Republican	606	-	393	34	1,033	58.7
Local	606					
Oblast road	529	296	90	148	915	74.0
Rayon road	77	425	182	19	703	71.4
Aktau	-	240.6	0.3	-	241	
Zhanaozen	1	26	5	-	32	
Karakiya	40	42	-	-	82	
Tupkaragan	22	7	36	7	72	
Mangistau	11	109	139	12	271	
Beineu	3	-	2	-	5	

Source: ibid.

3.2.3 Vehicle registration and ownership

The number of vehicles registered in Mangistau increased at the average annual rate of 18.3% during 2002-05, much higher than the average of 8.7% in Kazakhstan (Table 42). The passenger vehicle ownership ratio is quite high in Mangistau reaching 169 vehicles per 1,000 population in 2005, much higher than the national average of 115 vehicles in the same year. This is a reflection of the higher per capita income in Mangistau as seen in Figure 5.

Table 42 Vehicle Registration in Mangistau Oblast and Kazakhstan (2002-2005)

(Unit: 1000 vehicles)

Zone	Mode	2002	2003	2004	2005	Av. annual growth rate (02-05)
Mangistau Oblast	Passenger vehicle	26.2	31.0	37.2	47.7	1.221
	Truck	9.5	10.6	11.4	12.2	1.087
	Bus	2.4	2.8	2.8	3.2	1.101
	Total	38.1	44.4	51.4	63.1	1.183
Kazakhstan	Total	1,365	1,471	1,532	1,752	1.087

Source: Transport Statistics of Mangistau 2006

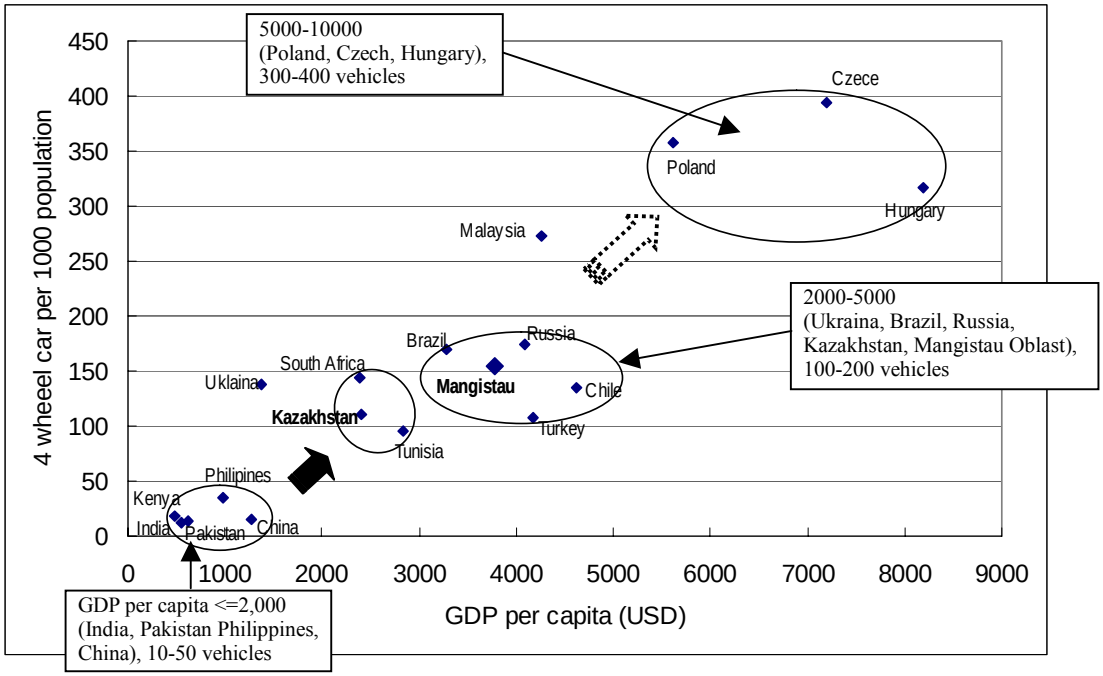


Figure 5 Vehicle Ownership in Major Countries

3.2.4 Road transport facilities

The inter-city bus terminal is located in the 28th micro district in the north of Aktau to provide bus links from Aktau to Zhanaozen, Zhetybay, Shetpe and Kuryk. Its capacity is already inadequate to meet the present demand. Therefore, the Oblast Akimat has a plan to establish a new bus terminal on a concession base for operation in 2011. The new bus terminal can handle 1,200 passengers per day with 3-floor building with market, restaurant and hotel on 10ha land lot.

The transport law regulates the distance between gas stations and technical maintenance stations based on traffic volume by road section. On republic roads, the distance of 30-50km in both directions are recommended.

The Mangistau branch of CTID plans to rehabilitate road sections according to the "transport strategy up to 2015" and the road sector development program of the Republic of Kazakhstan for 2006-12. They are summarized in Table 43 for republican roads and Table 44 for local roads.

Table 43 Road Projects on Republican Road Network Development

Road section	Length (km)	Type of construction	Construction year	Cost (KZT 10^6)	Remark
1. Beineu-Shetpe -Aktau	298	Pavement	2006-2009	9,720	
2. Beineu-Akzhgit -Uzbekistan border	84	Pavement	2009-2010	-	
3. Zhetybai-Zhanaozen -Trukmenistan border	237	Pavement	2010-2012	-	
4. Opornoe-Beineu (210-332.6km)	122.6	Rehabilitation (pavement)	2006-2008	7,670	Rehabilitation already underway by Turkish company

Table 44 Road Projects on Local Road Network Development

Road section	Length (km)	Type of construction	Construction year	Cost (KZT 10^6)
1. Aktau-Fort Shevchenko-Bautino	140	Rehabilitation	-	-
2. Aktau-Kuryk	59	Rehabilitation	2009-2010	-
3. Zhetybai-Kuryk	64	Rehabilitation	2010-2012	-
4. Kuryk-Kenderli	95	-	-	-

3.2.5 Railway transport

The railway network in Mangistau Oblast consists of the KTZ sections for Uzbekistan border - Beineu (125km), Beineu - Akzhigit (90km), Beineu - Mangistau (404km), Mangistau - Zhanaozen (178km), and the section between the Aktau port and the Mangishrak station (18km) operated by Kaskortransservice. All the railway sections in Mangistau are of single track and non-electrified. In all the sections within the Oblast, an automatic signaling and telecommunication system has been installed. The possible train length is 57 wagons and about 680m.

There are 11 stations handling passenger and freight transport but no station able to handle containers. A freight transport yard exists near the Mangistau station for loading/unloading and transferring. Services available at each station are summarized in Table 45. In total 45 train services are available per day, and the main inter-regional destinations are Atyrau, Almaty, Aktuavinsky, Karaganda, Astrahan and Moscow.

Table 45 Main Station/Terminal in the Mangistau Oblast (Beineu-Uzen)

No	Station	Available services
1	Beineu	Freight/passenger
2	Ustyurt	Passenger
3	Say-Utes	Passenger
4	Shetpe	Freight/passenger
5	Mangishlak	Freight including container/passenger
6	Aktau port	Freight including container
7	Eralievo	Passenger
8	Zhetybay	Passenger
9	Uzen	Freight/passenger including small container

Source: KTZ Homepage

The railway operation in Mangistau is based on 30 locomotives, consisting of eight used for passenger transport and 22 for freight transport, of which one is on periodical repair. The maximum train speed is regulated by KTZ as 90km/hour for passenger trains and 80km/hour for freight trains. The average speed in Kazakhstan was 64km/hour for freight and 78km/hour for passenger in 2003. In Mangistau, the average speed was 64km/hour for freight and 65km/hour for passenger trains.

Two new railway lines are planned to link the three ports in Mangistau. They are summarized in Table 46, and their routes shown in Figure 6. Another new rail link is planned from Beineu to Shalkar and further to Aktobe Oblast. This link will dissolve one of the missing links of the TRACECA Kazakhstan route. The rail length from Beineu to Shalker is 440km and the investment cost is estimated at KZT 84 billion.

Table 46 Railway Construction Projects with Concession Base in Mangistau Oblast

Project name	Length (km)	Purpose	Period (years)	Freight vol./yr (10^6t)	Cost (KZT 10^9)
1. Yeralievo station to Kuryk	14.4	Transportation of transit cargo to Kuryk port	2.5	5.5	7.4
2. Aktau (Mangishrak) to Bautino	135.1	Development of offshore oil field base	12	7.3	22.9

Project name	Length (km)	Purpose	Period (years)	Freight vol./yr (10^6t)	Cost (KZT 10^9)
3. Beineu to Shalker	440	Improvement of TRACECA route	NA	NA	84.0

Source: Economic Department of Mangistau Oblast.

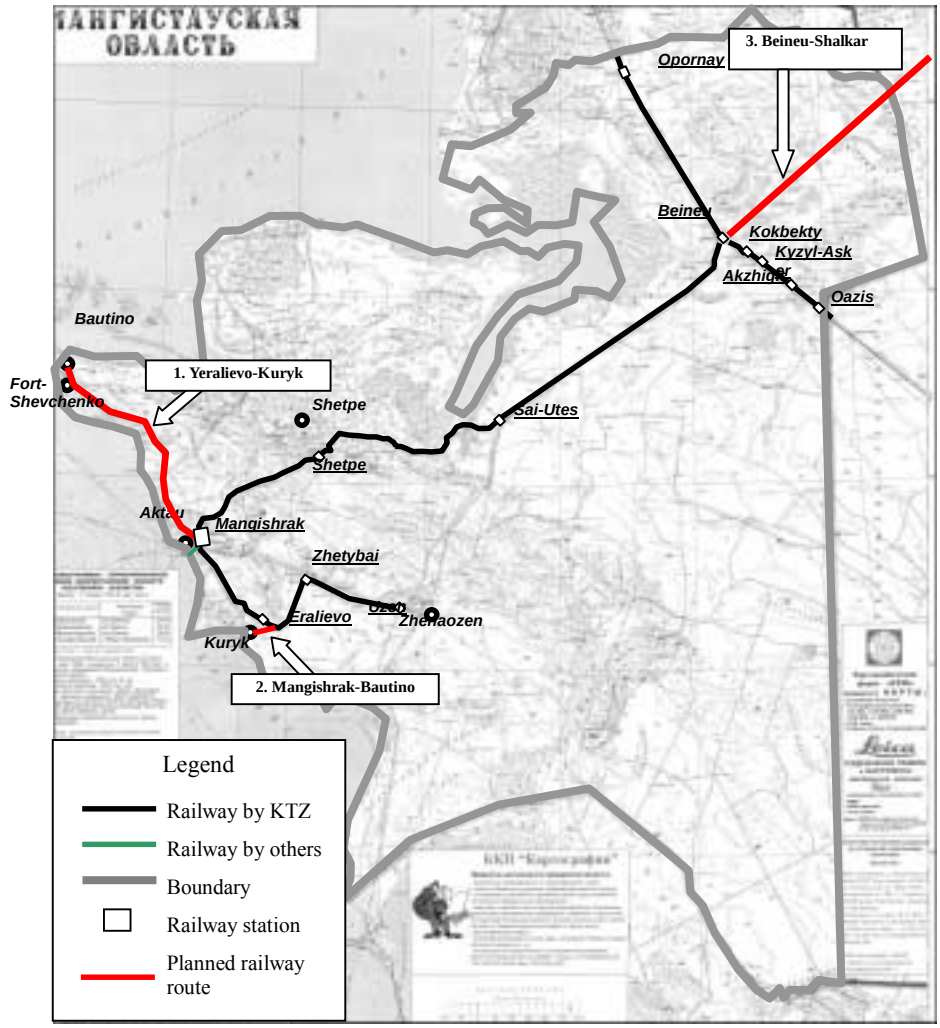


Figure 6 New Railway Project in Mangistau Oblast

3.2.6 Air transport

The Aktau airport is located 10km north of the Aktau city with 345ha. No physical constraint exists obstructing the aviation operation and control. The access from the city, however, is limited to taxis as no public transportation serves the airport.

The Aktau airport is owned by the Akimat of Mangistau Oblast, represented by its financial department. Its operation, however, is undertaken by a joint stock company "the Aktau International Airport". A new terminal building and runway are planned for privatization by concession. The main facilities of the airport are summarized in Table 47. The number of passengers at the Aktau airport increased from 142,000 in 2004 to 176,000 in 2005, representing an annual increase at 23.8%. The freight transport is dominated by import at 24,122t in 2005.

Two projects are planned as summarized below to increase the passenger capacity and accommodate larger airplanes on the basis of 30 years concession. The construction of the new terminal by concession is expected to start within 2007 to complete in 2008 for operation in 2009. Rehabilitation of the existing runway is also planned.

Project	Expected capacity	Investment cost (US$10^6)
Reconstruction of main runway	To accommodate Boeing 747 class jet takeoffs	160
Construction of new passenger terminal	350 passengers/hour capacity 200 passengers for international flight and 150 for domestic flight	41

Table 47 Major Facilities of Aktau International Airport

Facility	Description
Main runway	The runway length of the Aktau Airport is 2,650 m to serve the class aircraft and the width of the runway expanded from 42m to 45m. The shoulder widths are with one of non-paved runways beside the main runway. The runway strip differs considerably from the ICAO standards.
(Pavement)	Main runway is covered with the asphalt concrete. PCN 30/F/C/Y/T, which is determined by Kaz aero project organization
Taxiway	The pavement condition is the same with runway. Taxiway system is simple. Two exiting taxiways connect the main loading apron with the runway. Another taxiway may be provided to connect another apron, or maintenance centre.
Apron	Aircraft type to be handled are: An-124-100, Tu-154-M, b-737-800, A-310, Il-76
Passenger terminal	The capacity of the passenger terminal is 350 passengers/hour (200 passengers of international and 150 passengers of domestics.)
Equipment	Light Equipment-Low intensity Lights VOR-DME: Freq-113.3, AKT 43 51 30, E 51 06 06 NDB ILS Air Navigation Services are provided by 100% state owned enterprise of Kazaernavigatsia. However, effective involvement of airlines in the Air Navigation Services business planning via transparent consultation processes is desirable as the airlines bear costs and often relatively expert customers.

3.2.7 Sea transportation

There exist two main ports of Aktau and Bautino and another planned at Kuryk for oil export. Their locations are shown in Figure 7.

(1) Aktau port

The Aktau port is located in the south of the city center as the only international port of Kazakhstan, handling crude oil and dry cargoes. The port, built in 1963, handled mainly oil export (at some 7 million ton annually at the beginning of the 1980's), and dry cargoes never exceeded 300,000t during the Soviet era. After the decline of transport volume following the disintegration of the Soviet Union, the transport volume started to increase in 1995 with the export of Kazakh metals and oils by Tenbizshevroyl (TSHO), and was expected to increase further as the TRACECA passed the region. AISCP was established in 1996, and the Government implemented the rehabilitation and development of the port in 1997-99, supported by the European Bank of the Reconstruction and Development (EBRD).

Dominant wind directions at the port are east, northeast and southeast during winter, and north during summer. The average wind velocity is 4.6m/sec. Foggy days are experienced during April to June at 8-12 days per month.

The management, operation, development and rehabilitation of port facilities are undertaken by the Aktau International Sea Commercial Port (AISCP), under the seaport sub-division of the Water Transport Department. AISCP has currently 550 staff members (as of July 2007).

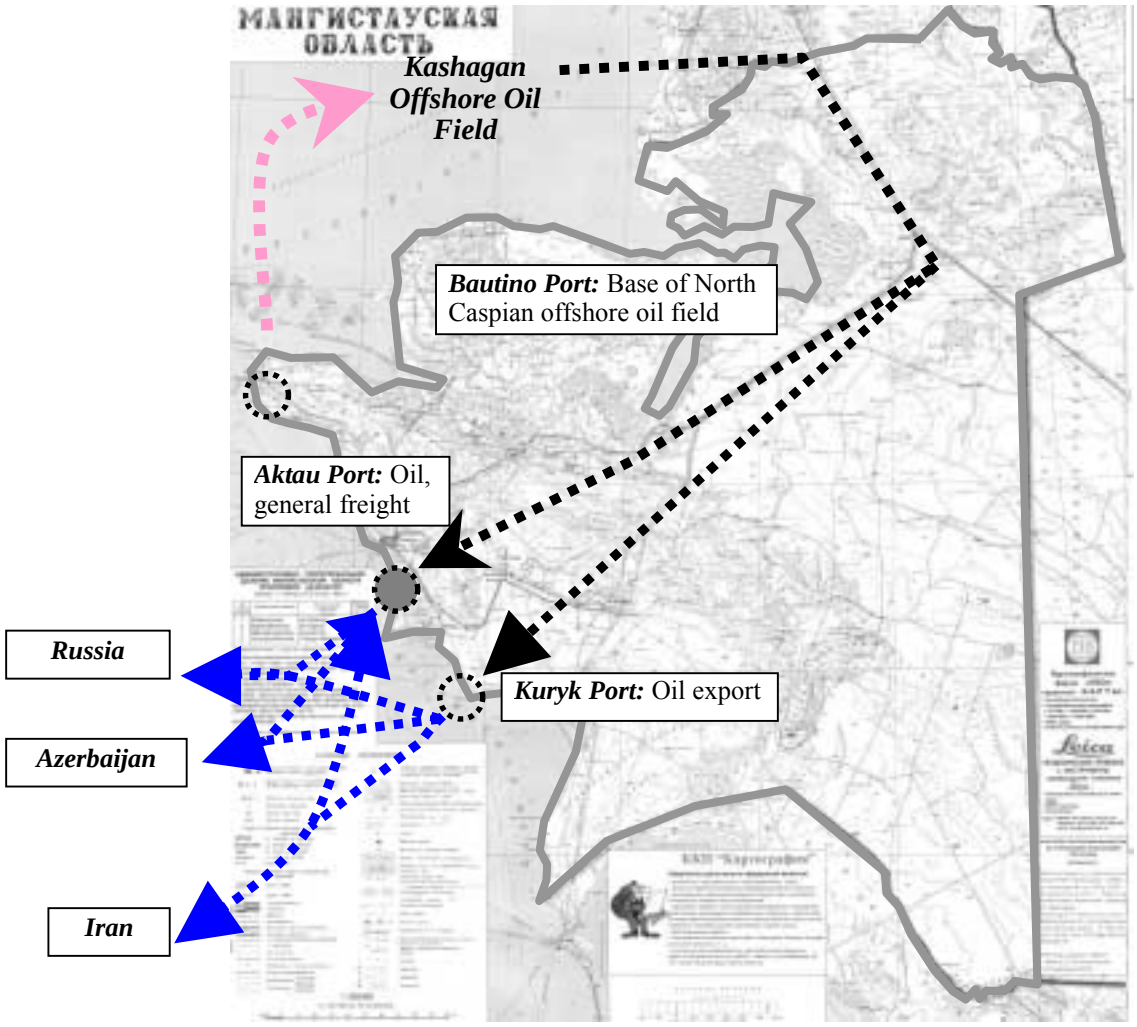


Figure 7 Location of Main Seaports in Mangistau Oblast

The general layout of the port is shown in Figure 8. The port has 12 berths, including three for general cargoes, four for oil and one for ferry vessels. Details are given in Table 48. There are also free open space of 75,000m² and roofed transit warehouse of 6,000m².

Table 48 Berth Facilities of Aktau Port

No.	Items	Berth length (m)	Admissible draft (m)	Note
1	General bulk/container	150	4.6	
2	General bulk/container	150	4.6	
3	General bulk/iron material/products	100	4.6	
4	Oil berth	192	7.0	
5	Oil berth	192	7.0	
6	Grain berth	150	4.6	Processing capacity: 600,000t Storing capacity: 24,000t
7	Fleet of port	70	4.0	For internal use
8	Ferry berth	140	5.3	
9	Oil berth	150	5.3	
10	Oil berth	150	7.0	
11	Oil berth for reserve	120		
12	Small ship berth	80	4.0	

Source: ASCIP

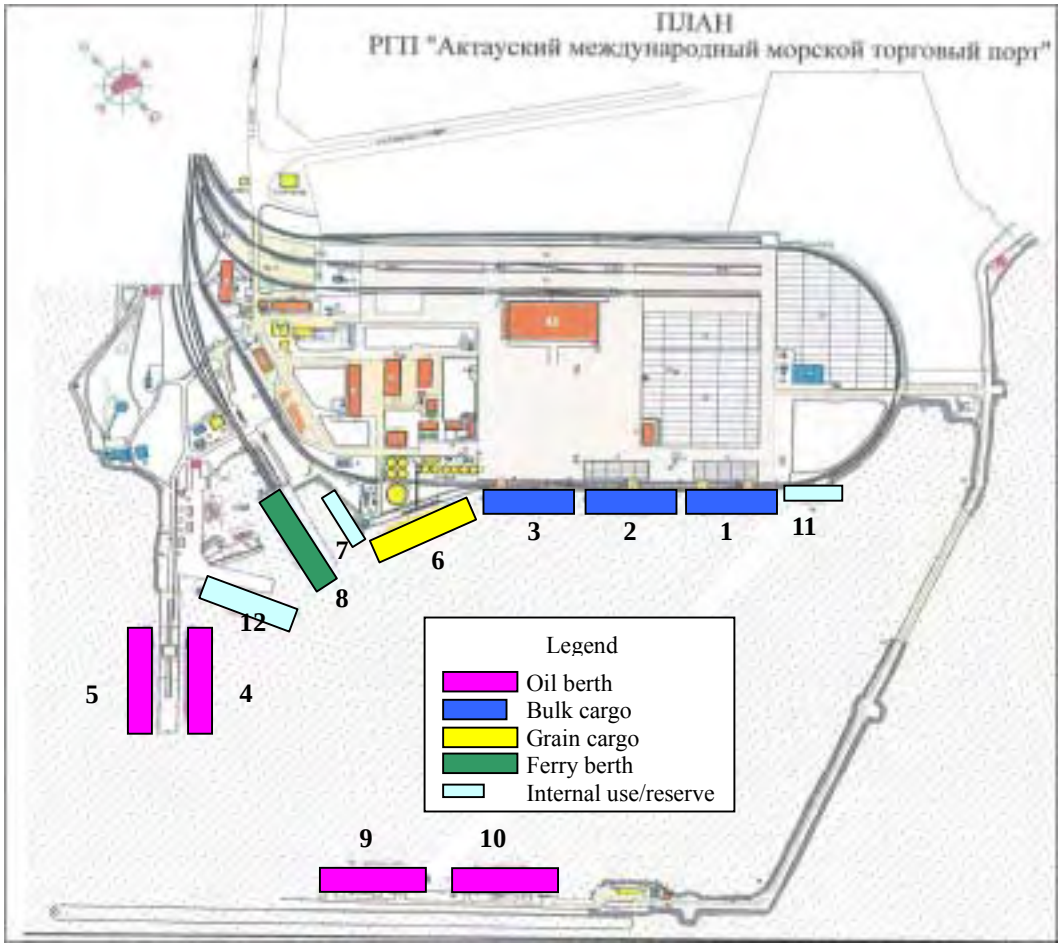


Figure 8 Major Berths of Aktau Port

While tankers of up to 12,000DWT with length 145m are accommodated at the port, both tankers and dry cargo vessel of 3,000-7,000DWT, considered the Caspian standard size vessels, are regularly called at the port. The shiploads for oil have been increasing at about 5% per year. The growth of ship sizes is likely to accelerate for both oil and dry cargo, as there is pressure from the oil companies to use large-scaled ships, which give economies of size and also spend less time in port, and several companies are ordering 12,000DWT ships. The ship sizes for dry cargo are also likely to increase.

The cargo handling volume at the port is summarized in Table 49. As shown, oils are dominant cargoes with almost 10 million ton handled, followed by metals with over 1.0 million ton. The oil export from Aktau is directed to Russia (34.7% of the total export in 2006), Azerbaijan (22.1%), and Iran (43.2%). As for the container freight, the total volume at present is only 1000 TEU per year, which is very low by international standards, but the volume and number of container cargo are increasing rapidly, by about 46% per year and 16% per year respectively (Table 50). Most container freight comes from Iran by general cargo vessels operated by Khazar Shipping. These containers carry building products, oil industry equipment and consumer goods.

Major oil producers such as Kazmunaigas and Mangistaumunaugas bring oils from inland oil fields by railways for export from the Aktau port. New offshore oil fields are now under development, and the large amount of oils is planned to be shipped out through new facilities to be provided at Kuryk. The Aktau port is also prepared to handle the increased amount of oils by expanding its facilities.

Of the general cargoes, steel products are major commodities handled at the Aktau port, accounting for 70% of the total general cargo. Most of the general cargoes are shipped to Iran. Major part of steel products shipped from Aktau is supplied by Mittal Steel Temirtau, a Kazakh company. Recently, some Russian products are also shipped from Aktau as transit cargoes. Grains (wheat and barley) are

another major export commodity of Kazakhstan, and 3-5 million ton of grains are exported annually. As for grains, all the volume was shipped to Iran in 2006, and Iran is the premier destination for container cargoes as well.

Table 49 Cargo Handling Volume at Aktau Port in Recent Six Years

(Unit: 1, 000t)

Items	2001	2002	2003	2004	2005	2006	2007 (est.)
Oils	5,035.4	5,552.4	6,970.7	8,289.2	8,912.8	9,960.4	9,500.0
Metals	1,060.1	571.2	835.5	1,011.5	1,025.2	1,028.7	1,050.0
Grain	84.1	209.2	5.4	13	33.3	116.7	100.0
Others	22.8	22.9	22.6	33.6	71.3	56.0	105.0
Ferry cargos	199.2	592.6	245.5	4.6	350.1	310.1	300.0
Total	6,401.6	6,948.3	8,079.7	9,691.9	10,392.7	11,471.8	11,055.0

Source: ASCIP

Table 50 Container Handling Volume at Aktau Port in Recent Three Years

(Unit: TEU)

Items	2004	2005	2006	Growth rate (%, 04-06)
Import	326	407	716	48.2
Export	147	268	290	40.5
Total	473	675	1006	45.8

Source: AISCP

The Aktau port is planned to be expanded with the creation of a new basin to the north of the existing port to provide four new oil berths of 9.0m depth, four berths for general cargoes of 6.0m depth and containers, and three support berths for smaller ships. The total cost is estimated at KZT 32.7 billion for five phases to be implemented over the period up to 2020. This expansion will give the port an additional 10-11 million ton handling capacity for oil export and 1.5 million ton for general cargoes.

Further expansion of the port in the southwestern part of the existing facilities is at a preliminary planning stage. The plan includes five oil berths for 12 million ton annual handling capacity, and five general cargo berths for 2 million ton.

(2) Kuryk port

During the Soviet era, the Kuryk port played a minor role of storing the freight from Makhachkala in Russia temporarily before shipping to the Aktau port. Although currently not used, a ferry mooring facility still remains. At present, no port facilities are operational near the Kuryk village located some 75km south of Aktau.

The Kuryk port area has 8m depth, naturally suitable for port development. Mangistau Oblast proposed to the Government to develop major port facilities at Kuryk in the area of 6.5ha. The Kuryk port development plan was approved by the Presidential Decree of July 2004.

Based on the State Program of Development of the Kazakhstan Sector of the Caspian Sea, the program of complex development of the Kuryk sea port and the Kuryk village of Karakiya rayon of Mangistau Oblast 2007-10 was prepared. According to the program, the Kuryk port is defined as a reloading point for oil transportation to Azerbaijan to connect to the Baku-Tbilisi-Ceyhan oil pipeline.

The basic components of the program are: 1) development of corresponding industrial infrastructure, 2) development of economic and social infrastructure and 3) creating the conditions for effective functioning of the Kuryk port. Specific infrastructure projects are listed in Table 51. The total investment is estimated to be US$1,316.2 million. The investment cost is expected to be covered by private enterprises, concession and republic's budget. The transport infrastructure necessary for the port development is also planned as summarized in Table 52.

Table 51 Expected Industrial Infrastructure to be installed according to the program

Facility name	Estimated investment cost (US$10^6)
1. Supporting base of sea oil operations	26.5
2. Ersai Caspian Shipyard	101.0
3. Kuryk oil terminal	433.9
4. Shipyard for repairing/building	86.0
5. Installation of complex preparation of oil & gas (UKPNG)	287.7
6. Terminal of Liquid gas	70.0
7. Fleet base of Kazmortransflot	19.4
8. Emergency base	45.0
9. Ecological mooring	5.0
Total infrastructure	1,010.1

Source: The Program of Complex Development of Seaport Kuryk and Kuryk Village of Karakia Rayon of Mangistau Oblast for 2007-2010; Dept. of Enterprise, Mangistau Oblast Akimat

Table 52 Transport Infrastructure According to the Program

Facility name	Outline of facility (km)	Estimated investment cost (US$10^6)
1. Railway (Yeralievo station to Kuryk)	14.4	26.5
2. Motorroad of Aktau-Kuryk	60.0	101.0
3. Motorroad of Yeralievo station to Kuryk	14.0	433.9
4. Motorroad of Zhetybai-Kuryk	65.0	86.0
5. Coastal road	9.0	-
6. Village road	64.0	287.7
Total		935.1

(3) Bautino port

The Bautino port is a small port located in the northwest of Mangistau Oblast. It is managed by the Bautino port section of AISCP. The port used to be a fishery port, but now is a base port for offshore oil exploration. It has the mooring area about 150m long and 50m wide. The port is equipped with two gantry cranes of 5t and 32t capacity as well as four cranes of 3-5t capacity.

3.3 Maintenance of Transport Infrastructure

3.3.1 Maintenance needs

Lack of periodic and routine maintenance of roads results in higher safety risks, reduced travel comfort, higher vehicle operation cost and increase in life cycle cost. In Kazakhstan, damages due to poor maintenance tend to be larger because of severe weather conditions in winter and large gap between winter and summer conditions. The road maintenance in Kazakhstan consists of surface cleaning, repair of pavement, winter season maintenance and others, but no specific guidelines exist for other road facilities such as bridge and other structures and signboards. Even for roads, details and frequencies of each type of maintenance have not been specified.

The data on road conditions are supposed to be stored based on the periodic inspection every two years, but the quality of data is poor. The database contains width and conditions of carriageway and shoulders, vertical slope and visibility, a curvilinear radius, circle radius, roughness and other road surface conditions and others. Based on these data, the priority of maintenance is determined.

The periodic and routine maintenance in reality, however, is constrained by the shortages of fund as well as the lack of recognition on the importance of the maintenance. According to the report by ADB, the budget for Republic road maintenance is short of requirement by 30% (Table 53).

Table 53 Estimated Shortfall in Road Maintenance Expenditure

Required (US$10^6)	Actual (US$10^6)	Shortfall (US$10^6)
230	163	67

Source: Reassessment of the Regional Transport Sector Strategy, ADB, 2001

3.3.2 Road finance

The road budget for Republican and local roads in recent years are summarized in Table 53. The budget for Republican roads was 42.8 billion in 2004, while that for local roads was 8.9 billion. The unit cost was KZT 1.75 million/km for a republican road and KZT 0.13 million for a local road. The unit cost for a republican road is on the high side by international standards. The reasons for this are pointed out as follows:

1) Proper road maintenance had not been carried out due to shortages of budget especially during the 1990's.
2) The guidelines for maintenance have been outdated.
3) Only a few private firms are qualified to carry out the road construction
4) No stable source of road finance is available after the special purpose tax for road development was abolished.

The fund sources changed after 1996, and now consist of road user turnover tax (0.5%), petroleum tax (KZT 3.0/ℓ), passenger tax for foreign vehicles, and tax for heavy vehicles. The road tax changed its content in 1998 into 5% of all companies' sales taxes. These are not based on the principle of beneficiaries pay.

3.3.3 Problems with maintenance and management

The following problems are noted related to the maintenance of transport infrastructure, particularly roads.

1) The importance and necessity of road maintenance works are not well recognized. There is no organization or personnel in charge exclusively of maintenance in any infrastructure administration.
2) Large scale rehabilitation takes up large share of road infrastructure cost due to poor maintenance while periodic and routine maintenance has small share.
3) No effective manual exists to specify maintenance items, measures and procedure of maintenance works. Basic data to plan for maintenance are inadequate.
4) No systematic evaluation of priority for maintenance is established to allow economic evaluation and long-term planning.
5) Use of the private sector is confined largely to subcontracting maintenance and management of port and airport facilities.

These problems are particularly serious for road infrastructure. While the port and airport facilities are closed only to excusive users, roads are generally open to any users. Also, no user charges have been imposed on road uses. Moreover, even if road surface has small damages, users are not motivated to refrain from using the facilities unlike the case of damages in port or airport facilities. All these conditions make it reasonable for the government to take responsibility for the maintenance and management of road facilities.

3.4 Issues on Transport Development in Mangistau Oblast

3.4.1 Artery road network

The artery road network within Mangistau Oblast and linking with the neighboring oblasts and countries is not well established. Some republican and oblast road sections have poor surface

conditions, and there exist missing links in the network. Several paved road sections have deteriorated surface conditions such as the Aktau-Beineu, Aktau-Turkmenistan, Beineu-Atyrau, and Beineu-Uzbekistan sections. Stage-wise improvement of the artery road network needs to be planned in line with the expected economic development in different areas of the Oblast.

3.4.2 Rail and sea transport, and rail and motor road links

The railway system is the major mode of freight transportation in Mangistau Oblast, accounting for some 60% of the total freight turnover in recent years. In view of the foreseen function of the Oblast as the trade and distribution center in a broader regional context, the rail and sea transport links should be improved for long-haul cargo transport, and the rail and motor road transport links should be improved both for long-haul cargo transport and door-to door services. This would involve the strengthening of port facilities and functions, improvement of rail/road links to serve the ports, and establishment of clear functional division of the three seaports of Aktau, Bautino and future Kuryk.

3.4.3 Enhancement of transport capacity for oil

The increase in the oil production in the western Kazakhstan is the national strategy. To increase the oil export, the capacity of pipelines and international seaports needs to be enhanced. The expansion of oil handling capacity is indispensable. Also, the early development of the Kuryk port is important together with the rail links as well as pipelines.

3.4.4 Aktau international airport

The Aktau international airport is the main gateway for visitors to Mangistau Oblast. Their facilities are largely degraded, and improvement projects have been planned and already partly started. These projects should be completed promptly as a prerequisite to the regional development of Mangistau Oblast. Further upgrading of the airport should be planned to support the more diversified economic activities expected in the coming decades. These activities would increase passengers for domestic and international tourism including conference tourism, import of high value goods, and export of increasing variety and amount of high value products to be produced in Mangistau.

3.4.5 Access to rural areas

While Mangistau Oblast benefits from the production and export of hydrocarbon resources, rural areas tend to be largely left behind except areas closer to oil and gas fields. The improvement of access roads to rural areas should be undertaken to integrate the rural economy into the Oblast economy and improve the social service delivery. In view of the vast rural territory, access roads should be improved selectively to areas of higher development potentials, while more concentrated patterns of settlements should be encouraged through the planned provision of other facilities.

3.4.6 Urban road system

Except in the Aktau city, urban roads are not well developed. Some settlements do not have paved road to connect to the main access road nor within the settlements. Some settlements officially categorized as rural should be developed into urban centers serving respective rural hinterlands such as Shetpe, Beineu and Kuryk. Establishment of urban road systems would be instrumental for such development. The two major cities of Aktau and Zhanaozen should offer high-grade amenity for residents and visitors. Their urban road systems should be improved with emphasis on pedestrian roads and facilities. Also, main roads should be upgraded with pedestrian facilities as part of city beautification respectively.

CHAPTER 4 WATER SUPPLY AND SEWERAGE

4.1 Water-related Policies and Institutions

4.1.1 Water related organizations

The water resources in Kazakhstan are managed by the Water-Economic Board of the Committee on Water Resources, the Ministry of Agriculture, which establishes policies for water resources development, management, conservation and other related matters. The responsibilities for water supply belong to the Management of Energy and Municipal Services at the national level.

At the regional and local levels, various public entities established in each rayon are responsible under the respective Oblast. An open company named MAEK-Kazatomprom is responsible for water production at the sources, and other public entities are in charge of water transfer and wastewater treatment. A joint stock company of the Mangistau Oil Pipeline Management (MNU) Western Branch (WB) Kaztransoil transfers the Volga river water from Astrakhan in Russia to Mangistau through a pipeline. In Aktau, a state municipal enterprise named TVS&S undertakes thermal water supply and treatment.

4.1.2 Water related policies and programs

The "Kazakhstan 2030" promulgated by the Government in 1997 set the policy directions for water resources management. In line with the policy directions, more specific programs have been formulated at the national, regional and local levels. At the national level, the law on water supply and usage of 2003 has clarified the possibility and options for improving water infrastructure and operation and maintenance of water supply systems. The "program for drinking water 2002-04" was formulated to improve water supply facilities in rural areas.

Based on the "plan for water supply 2002-10" and the "execution plan for water operation in Kazakhstan 2002-04", the "plan for water supply in Mangistau Oblast 2003-09" was prepared. Its execution program has set the following policies:

1) Provision of low cost water supply to all the Oblast people
2) Technological development
3) Environmental preservation of surface water and groundwater
4) Organizational strengthening for addressing drinking water supply issues based on environmental culture

The main projects contained in the plan and their progress are as follows:

i) Out of six plants planned, a desalinization plant at Bautino has been completed with 20,000m^3/day capacity.
ii) Water supply systems are planned for 11 settlements (two in Beineu, four in Karakiya, three in Mangistau and two in Tupkaragan) for the total pipe length of 278km), of which 31km pipe length or 11% of the planned length have been completed.
iii) Water reservoirs are planned with 550m^3 combined storage capacity in three settlements, of which 200m^3 or 36% have been completed.

The "environmental program of Mangistau Oblast 2005-07" has the following components related to water resources:

1) Shutdown of unused wells of water contaminated by high contents of particular minerals (40 hydro-geological wells closed in 2005)
2) Construction of wastewater treatment plants in large settlements and oil/gas producing areas

3) Monitoring of seawater (air, water, bottom sediments, micro organisms, flora and fauna monitored at 46 offshore and 78 inland points).

The "social and economic development medium plan of Mangistau Oblast 2006-08" has a water related component aiming at normal operation of water, heat and power supply facilities. Several projects have been implemented based on the "list of priority investment projects in rural areas", "development plan in rural areas 2004-06", and "development plan in small towns of Mangistau Oblast 2003". The following projects are contained in the plan:

i) Water supply network in Fort Shevchenko (2004-06)
ii) Water supply main between Ketik and Fort Shevchenko (2004-06)
iii) Water supply networks in Aksium and Gizan of Mangistau rayon (2004)
iv) Water supply facilities in Zkanaozen (2004)
v) Water supply network for new detached and complex housing in Aktau (2004)

The "regional plan for drinking water 2010" is for repair of existing water supply facilities, procurement of materials and technology, and construction of new water supply and filtration facilities and reservoir in rural areas. The following are contained in the plan:

1) Major repairs of water supply facilities (2004)
2) Improvement of physical and technical base of water supply facilities (2004)
3) Construction of water supply facilities in rural areas (2004)
4) Construction of water supply network in Kuryk (2004)
5) Construction of water supply facilities in other areas (2005)
6) Construction of water supply network in Zhetybay (2005)

The "development plan of Aktau city" has a project to improve dilapidated water and sewerage pipelines continually. The "development plan of Zhanaozen city" contains a project to construct a new wastewater treatment plant.

4.1.3 Water and sewerage tariffs

The state municipal enterprise TVS&S collects water and sewerage tariffs from water consumers, except public taps such as religious facilities and public fountains. The enterprise is expected to manage and operate their water supply and sewerage services based on the collected tariffs, but they have no right to determine the tariff levels. The tariffs are set by the Government at low levels for political reasons. Consequently, the collected tariffs are not sufficient for adequate management and operation of water supply and sewerage services.

Current tariff schedule is summarized in Table 54. The tariffs for water and sewerage are collected together. The politically determined tariffs as shown differ between rayons reflecting the income levels or ability to pay in different rayons.

Table 54 Current Water and Sewerage Tariff Schedule in Mangistau Oblast

(Unit: KZT/m^3)

	Aktau	Zhanaozen	Beineu	Karakiya	Mangistau	Tupkaragan
Potable water	162.06	77.08	36.60	41.27	92.00	22.34
Technical water	50.99	-	-	-	-	-
Hot water	115.20	220.29	-	48.32	-	-
Sewage	25.41	19.25	24.00	-	24.00	67.89

Source: Strategy for Mangistau Oblast up to 2015

4.1.4 Water supply management

MAEK-Kazatmprom supplies water to residents, legal entities, city organizations, enterprises, near-by settlements and organizations in the industrial zone as agreed by contracts based on respective

applications. Any consumer has a right to change the volume of water to be supplied by making an application following the established procedure. A legal procedure is followed for illegal use of water. Water charges are determined by water meter reading.

Along the pipeline for the transfer of Volga water, water meters are installed and sealed up in boxes respectively to prevent mechanical disturbances. The pipeline and water meters are periodically checked to prevent illegal connections and water thefts.

4.2 Existing Conditions of Water Supply and Sewerage

4.2.1 Water sources and production

Mangistau Oblast has three sources of water. They are: 1) water from the Caspian Sea: filtered water for technical use such as cooling power generating facilities and industrial plants, and distilled water for drinking; 2) groundwater for drinking and technical purposes; and 3) water transferred from the Volga river. Quantity of water produced from each source is analyzed based on readily available data and information.

(1) Caspian Seawater

The open company MAEK-Kazatomprom extracted the Caspian Seawater at 801.38 million m^3 and the groundwater from the Kuyulus aquifer at 7.40 million m^3 in 2006 in Figure 9. Of these amounts, 755.39 million m^3 seawater and 1.91 million m^3 groundwater was processed by MAEK-Kazatomprom. Of the former, 13.68 million m^3 distilled water was produced for distribution and the rest consumed in the process. Also, the groundwater of 0.39 was made available for distribution as drinking quality water and 6.10 million m^3 as technical water, while 0.91 million m^3 water is consumed. Of the seawater produced at 45.99 million m^3 (801.38 minus 755.39 million m^3), 44.37 million m^3 was distributed to the surrounding area, while the rest wasted at 1.62 million m^3.

The total amount of the drinking quality water was 21.08 million m^3 (13.68+7.40 million m^3) in 2006. The production is supported by the two desalinization plants existing in Aktau producing 35,000m^3/day and 40,000m^3/day of distilled water. The desalinization at the plants involves a stabilization process on carbonate sand filters, removal of organic substances on filters of birch activated carbon (BAC), demineralization, and fluorination and disinfection for portable water as required by the sanitation standard of Kazakhstan.

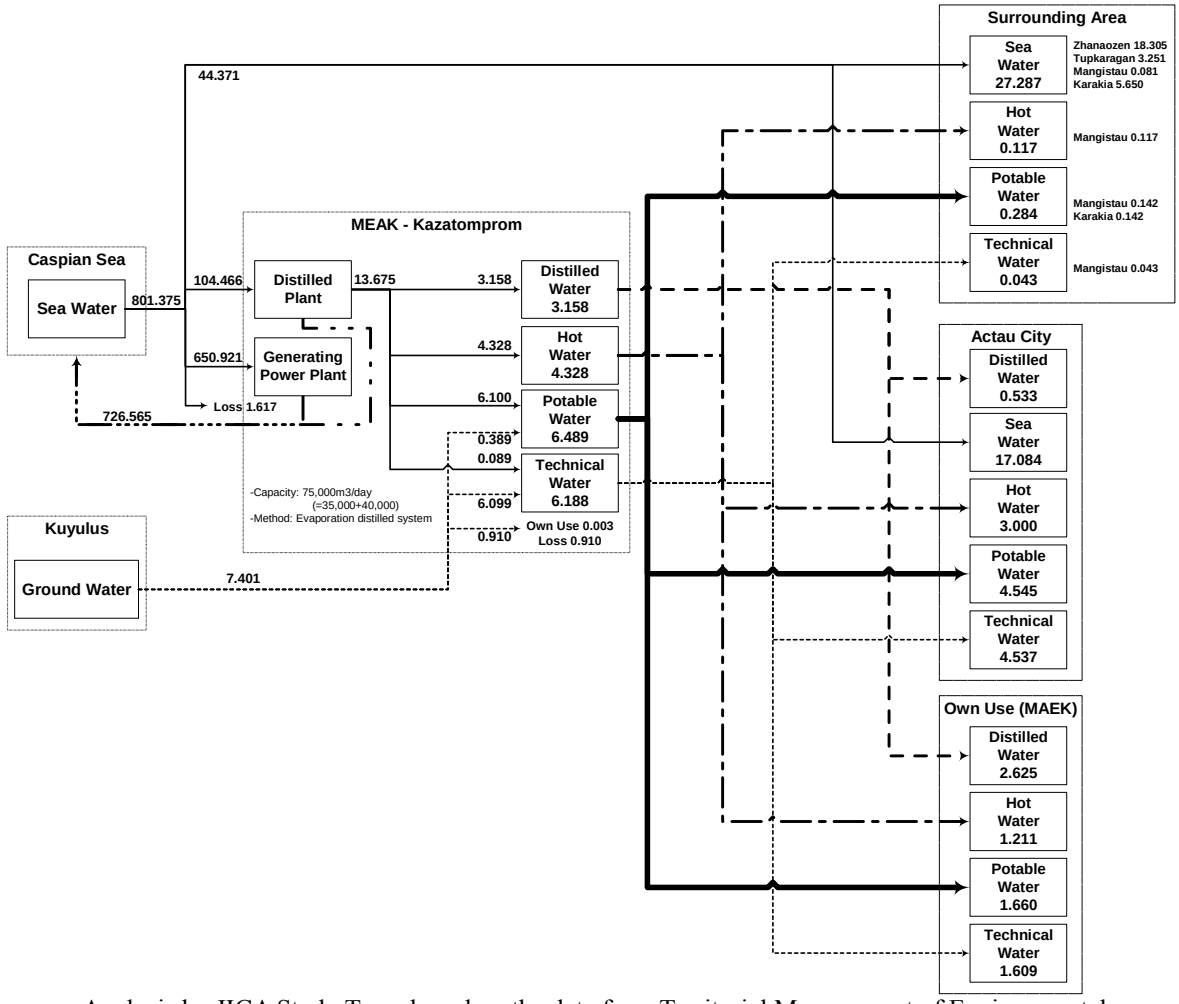
Of the seawater at 17.08 million m^3, the distilled water at 0.53 million m^3, the hot water at 3.00 million m^3, the potable water at 4.55 million m^3 and the technical water at 4.54 million m^3 are consumed by MAEK-Kazatomprom for its own use. The breakdown of this consumption is shown in Table 55.

Table 55 Breakdown of Own Water Use by MAEK-Kazatomprom in 2006

(Unit: $10^6 m^3$/year)

	Loss in TVS&V	Loss in MAEK	Technical need	Domestic need	Total
Distilled water	-	0.611	1.942	0.072	2.625
Potable water	0.865	0.617	-	0.178	1.660
Technical water	1.063	0.473	-	0.072	1.608
Hot water	0.686	0.484	-	0.041	1.211
Total	2.614	2.185	1.942	0.363	7.104

Note: Excluding the consumption of seawater
Source: Analysis by JICA Study Team based on the data from MAEK-Kazatomprom



Source: Analysis by JICA Study Team based on the data from Territorial Management of Environmental Protection and MAEK-Kazatomprom

Figure 9 Water Supply Diagram in Aktau System in 2006

(2) Groundwater

According to the study carried out in the 1980's, there existed 960 wells of less than 150m depth, 250 hydro-geological wells of 200-1,200m depth, and 50 springs in Mangistau Oblast. Hydro-geological wells were developed by either oil companies or collective farms. Groundwater of some hydro-geological wells has been contaminated by oil wastes such as waste mud and cutting wastes, and forced to be shut down. About one-third of the hydro-geological wells have been shut down due to bad water quality.

At present, groundwater is used for portable water in Mangistau Oblast. The total amount of groundwater extracted in the Oblast was 11.74 million m^3 in 2006, consisting of 7.40 million m^3 in Aktau, 3.99 million m^3 in Zhanaozen, 260,000m^3 in Mangistau rayon and 90,000m^3 in Tupkaragan. Details are given in Table 56.

The Territorial Management of Environmental Protection studied the groundwater reserves in Mangistau Oblast. According to the study, fresh drinking quality groundwater (less than 1.5g/dm^3 salinity) is confirmed at 12 locations for the total amount of 66,400m^3/day, and additional 14 sites are found with estimated 24,250m^3/day. Other reserves found are classified as weakly brackish (2.0-3.0g/dm^3), gentry brackish (3.0-5.0g/dm^3), brackish (5.0-10.0g/dm^3), and strongly brackish (10.0-20.0g/dm^3).

Table 56 Consumption of Groundwater of Drinking Quality in Mangistau

(Unit: $10^6 m^3$/year)

Rayon/city	Water fields	Volume
Aktau	Kuyulus	7.40
Zhanaozen	Sauskan and Tuyesu	3.99
Mangistau rayon	Kiyakty	0.23
Mangistau rayon	Unknown	0.03
Tupkaragan rayon	Kiyakty	0
Fort Shevchenko	Ketyk	0.04
Oblast total		11.74

Source: Territorial Management of Environmental Protection

(3) Volga river water

The water of the Volga river is transported from Astrahan through a pipeline to Mangistau Oblast and used mainly for drinking water. The total amount supplied in 2006 was 8.74 million m^3, consisting of 3.45 million m^3 in Zhanaozen, 3.28 million m^3 in Tupkaragan, 990,000m^3 in Mangistau rayon, 380,000m^3 in Karakiya, 370,000m^3 in Beineu and 260,000m^3 in Aktau. Recently, concern has been raised on the contamination of the river water and water rights.

4.2.2 Water supply systems

The water supply situation by rayon in urban areas of Mangistau Oblast is summarized in Table 57. In the table, the per capita water consumption is calculated based on the gross quantity of water supply, including municipal and industrial water uses and the population of the demand centers. It is seen that the unit water consumption is large in rayons with many industrial activities and oil/gas production and exploration, and small in rural rayons. The unit water consumption is relatively small in the oil producing center of Zhanaozen as the seawater transported from Aktau at 18.3 million m^3 is used for sub-surface pressure maintenance at oilrigs.

In rural areas of Mangistau Oblast, 22 large settlements have centralized water supply systems. Those settlements not covered by the urban water supply systems, which are summarized in Table 57, rely exclusively on local groundwater sources.

Table 57 Water Supply Situation by Rayon in Urban Areas, 2006

Rayon	Water consumption by source (10^6 m^3/year)				Urban population (1,000)	Per capita consumption (ℓ/capita/day)
	Volga river	Ground-water	Distilled water	Total		
Aktau	0.26	7.40	13.68	21.34	142.1	411
Zhanaozen	3.45	3.99	-	7.44	75.1	271
Beineu	0.37	-	-	0.37	23.4	43
Karakiya	0.38	-	-	0.38	13. 7	76
Mangistau	0.99	0.26	-	1.25	10.9	314
Tupkaragan	3.28	0.09	-	3.37	8.1	1,140
Oblast	8.74	11.74	13.68	34.15	273.3	342

Note: Population of Beineu village in Beineu rayon and Shetpe village in Mangistau rayon
Source: Analysis by JICA Study Team based on the data from Territorial Management of Environmental Protection

The Territorial Management of Environmental Protection estimated the water supplied to the Aktau city was 7.52 million m^3 in 2006. If this quantity is divided by the urban population of the city, the unit water consumption is calculated to be 145ℓ/day. This appears likely for domestic water consumption, not including industrial water uses.

The total amount of water supplied to the city by MAEK-Kazatomprom was 13.06 million m^3 in 2006 as shown in Table 58. Of this total, 7.97 million m^3 water was supplied for domestic, 4.89 million m^3

for industrial and 0.20 million m^3 for irrigation. Additional 0.44 million m^3 water was distributed to nearby settlements.

Table 58 Water Consumption in Aktau System in 2006

(Unit: $10^6 m^3$/year)

	Area	Domestic	Industrial	Irrigation	Total
Distilled water	Aktau City	-	0.533	-	0.533
	Surrounding Area	-	-	-	-
	Sub Total	-	0.533	-	0.533
Potable water	Aktau City	1.980	2.565	-	4.545
	Surrounding Area	0.284	-	-	0.284
	Sub Total	2.264	2.565	-	4.829
Technical water	Aktau City	3.304	1.233	-	4.537
	Surrounding Area	0.043	-	-	0.043
	Sub Total	3.347	1.233	-	4.580
Hot water	Aktau City	2.238	0.562	0.200	3.000
	Surrounding Area	0.117	-	-	0.117
	Sub Total	2.238	0.562	0.200	3.117
Total	Aktau City	7.522	4.893	0.200	12.615
	Surrounding Area	0.444	-	-	0.444
	Sub Total	7.522	5.220	0.200	13.059

Note: Excluding the consumption of seawater
Source: Analysis by JICA Study Team based on the data from MAEK-Kazatomprom

The combined population of the demand centers as shown in Table 57 is 273,300, corresponding to 70.1% of the total Oblast population. Including other settlements in rural areas having centralized water supply systems, the population coverage by water supply services is higher than this. The Management of Energy and Municipal Services estimated the population covered by the water supply services at 330,500, which corresponds to 88.3% of the Oblast population.

In addition to drinking, hot and technical water, seawater is supplied for cooling of the MAEK-Kazatomprom facilities and industrial plants, and also for sub-surface pressure maintenance at oilrigs. Consumption of seawater by rayon is summarized in Table 59.

Table 59 Consumption of Seawater in Mangistau Oblast

(Unit: $10^6 m^3$/year)

Rayon/city	Volume	Note
Aktau	803.52	Total extraction from Caspian Sea; 25.57 million m^3 used for industrial purposes
Zhanaozen	18.30	Mostly for oil fields
Beineu	3.25	
Tupkaragan	0.22	Consumption at Bautino desalinization plant included
Mangistau	0.08	
Oblast total	825.37	

Source: Territorial Management of Environmental Protection

4.2.3 Sewerage

There are seven wastewater treatment plants in Mangistau Oblast, consisting of four plants operated by private enterprises and three by state enterprises. The treatment method commonly adopted is by biofilm reactors. Cities of Aktau, Zhanaozen and Fort Shevchenko, and the Beineu village are served by sewer systems covering housing and industries. The wastewater treatment plants at Zhanaozen and Beineu are in critical conditions.

The wastewater treatment plant in Aktau has the treatment capacity of 72,000m^3/day. This capacity is sufficient to treat all the wastewater generated from the drinking quality water supplied at 27.45

million m^3/year or 75,000m^3/day as confirmed above. However, surplus sewage flows into the plant from oil factories, sometimes several times larger than city sewage. Removal of mineral and oil contents by mechanical methods poses problems at other treatment facilities as well.

To improve the situation as described above, several projects are planned and partly implemented. In particular, the "environmental protection program of Kazakhstan 2008-10" contains the construction of Aktau wastewater treatment plant no.2, reconstruction and modernization of Zhanaozen wastewater treatment plant and reconstruction and expansion of Beineu wastewater treatment plant.

In the process of water production by MAEK-Kazatomprom, the large amount of processed water, 726.56 million m^3 in 2006, is discharged into the Caspian Sea. In addition, Mangistaumunaigas discharges 1.83 million m^3 water into the Caspian Sea. Wastewater from treatment plants are disposed of by evaporation, infiltration into ground or discharge into a depression as summarized in Table 60.

Table 60 Wastewater Discharge in Mangistau

(Unit: 1,000m^3/year)

Discharge entity	Total volume	Use volume	Discharge volume	Discharge method
Buzachi Operating Company	42.16	20.86	21.75	Evaporation pool
TVS&V State Enterprise	10,439.80		10,439.80	Koshkar-ata
LLC Kazakhturkmunai	8.04		8.04	Underground infiltration
Kalamkasmunaigas	239.62		239.62	Underground infiltration
SC Karazhanbasmunai	143.69		143.69	Evaporation fields
Ozeninvest State Enterprise	1,796.40		1,796.40	Evaporation fields
BZKU State Enterprise	69.66		69.66	Evaporation fields
LLC Temirzholsu-Mangistau	13.60		13.60	Evaporation fields
LLC Karakudukmunai	8.05		8.05	Evaporation fields
Oblast total	12,761.46	20.86	12,740.60	

Source: Territorial Management of Environmental Protection

4.2.4 Water quality control

MAEK-Kazatomprom produces potable water according to the water quality requirements for "potable water: hygiene requirements and quality control" and "sanitary-epidemiological requirements for quality of water of centralized systems of drinking water supply". Quality certification and control of potable and technical water at source are undertaken by certified laboratories of ZPDiPTVS and HEiRk. The state sanitary and epidemiological control department (DGSEN) is in charge of quality control of potable and technical water at delivery.

Oil companies use approximately 100 million ton of water annually to excavate oil, which tends to increase as oil production increases. The wastewater from oil production is either discharged into desert or pond for evaporation or injected into underground as shown in Table 60.

It is estimated that 170 wells, which used to produce oil, are located along the Caspian coast, and subject to submersion as the water levels of the Caspian Sea rise, causing oil spill to the sea. There are 23 wells in the area subject to the flooding: 11 in Karajanbas, nine in Armand and three in Kalamkas. Five wells were shut down in 2002-05 by the republican budget.

As the oil production increases significantly after the production from the Kashgan oil fields starts in 2010, the risk of oil spill will increase such as accidents, washing of oil tanks of tankers and outflow of oil floods. The offshore oil production in the Caspian Sea is considered particularly of high risk due to complex geological formation, high oil pressure and shallow water depth of the sea. The Government has established strict principles to minimize the risk to encourage preventive measures to be incorporated into the oil companies' operation. A submerged Russian tanker and a drilling rig near Fort Shevchenko are also a matter of concern for possible oil spill. The zoning for the Caspian water resources protection has been carried out for the 284km along the coastline encompassing the

four cities of Aktau, Fort Shevchenko, Kuryk and Kenderli.

4.3 Issues on Water Supply and Sewerage in Mangistau Oblast

The key issue on water supply and sewerage in Mangistau Oblast is how to ensure sufficient water supply for growing economic activities and increasing population. Water quantity and quality considerations are naturally integrated in this issue as the reuse of treated sewage is an option for water supply expansion and how to treat the wastewater from oil operations is another important consideration. Also, increased oil production especially in the Caspian offshore may affect the desalinization by increasing the risk of oil spills.

4.3.1 Alternative water sources

In planning for water supply expansion, it is important to ensure alternative sources of supply for safety. Although the water supply for Aktau will have to continue relying mainly on desalinization of seawater, the alternative method of reverse osmosis should better be introduced in combination with the existing distill plant. Reverse osmosis is better suited to desalinization of the Caspian Seawater that has lower salinity than the world seawater.

The Volga river water should be more effectively utilized as an important source of drinking water, while there exist uncertainties in continued availability of water right and degrading water quality. Especially in Zhanaozen located in the plateau area, recycling of wastewater should be undertaken by alternative methods. An easy method is to apply the secondary treated sewage to irrigated agriculture directly or through infiltration. Introduction of tertiary treatment and use of treated sewage for industrial purposes is an expensive option that may be justified only if high value-added economic activities are conceived.

Wastewater from oil operations will be treated increasingly through infiltration into the ground, which will inevitably affect the groundwater regime. Monitoring activities need to be strengthened to ensure the injection of wastewater would not adversely affect the groundwater quality. Another option is to treat the wastewater for discharge into a natural depression to treat it further through infiltration and evaporation. This option, while more expensive, could improve the groundwater regime.

Use of local groundwater for rural water supply may be increased significantly if some of the wells neglected after the disintegration of the Soviet regime are rehabilitated. For more extensive use of groundwater resources, further exploration of groundwater reserves would be necessary. Based on the existing data obtained from early explorations, more systematic exploration should be undertaken focusing on more promising aquifers. In the Kuyulus field currently developed and its vicinities, some 80,000m^3/day of fresh to weakly brackish groundwater (up to 3.0g/dm^3 salinity) has been reported. If confirmed, this could be a major alternative for water supply to the Aktau city.

4.3.2 Demand side management

The demand side management of water is increasingly important to realize the water security. Despite the lack of sizeable local water resources, the per capita water use appears to be high in Mangistau even for domestic uses. The per capita water consumption for domestic use is estimated at 145litre/day in the Aktau city, corresponding to middle income households in other areas. The tariff variation currently applied to different rayons in Mangistau depending on income levels reflects a sensible policy, but the tariff levels may be slightly raised to suppress the demand. Also, the tariff variation should be effectively utilized to guide the location of economic activities to areas of high development potentials.

CHAPTER 5 SETTLEMENT DISTRIBUTION AND LAND USE

5.1 Spatial Distribution of Settlement Populations

The spatial distribution of existing population dwelled in cities and rural settlements are shown in Figure 10. It is clearly seen that population is highly concentrated in two rayon level cities and their neighboring settlements. Population is unevenly distributed by forming two areas; one in the Caspian coast and the Mangistau hill areas, and another in the north-east corner of the Oblast area, centering at Beineu. The vast southeast area is very scarcely populated. There are several settlements other than the capital of rayons, which have remarkable size of population, such as Oporny in Beineu, and Zhetibai in Karakya.

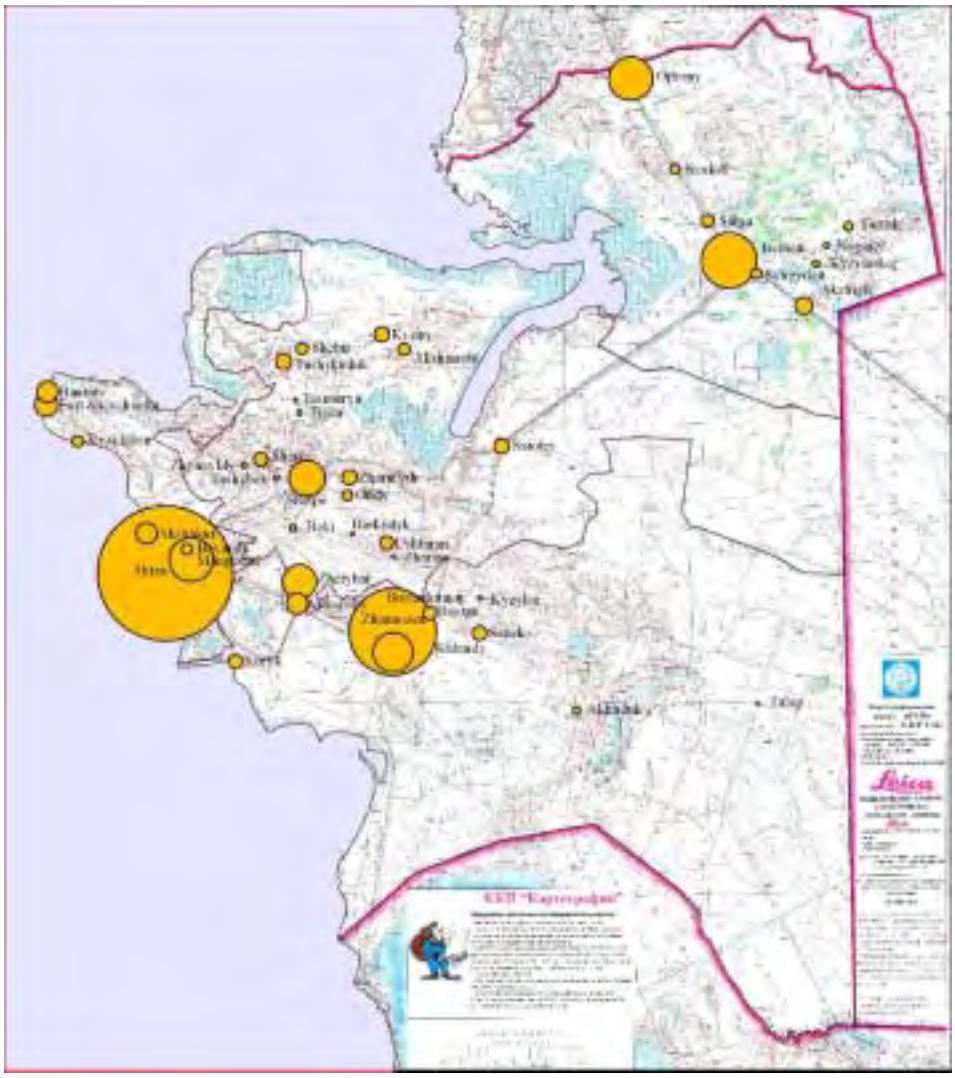


Figure 10 Settlement Distribution in Mangistau Oblast

5.2 Land Use

The current landuse of Mangistau Oblast is summarized in Table 61. Among the four larger rayons, the largest agricultural area is situated in the Karakiya followed by Mangistay. Beineu has significantly smaller agricultural area, while having large settlement area next to Karakiya, reflecting the higher level of urbanization in Beineu and Oporny. At the same time, Beineu has the lowest share of infrastructure, implying closely situated rather compact pattern of settlements. Also, it is

characteristic that Beineu has the largest area of forestland. Karakiya has the lowest share of settlement land, while largest share of agricultural and protected areas. The share of infrastructure land is low in Karakya similar to the Mangistau rayon. The Mangistau rayon has slightly smaller size of agricultural land than Karakya, but has larger land area for settlements. Existence of forestland in the Mangistau rayon implies better availability of water resources. Tupkaragan is very unique among the four rayons, having large land share for infrastructure. This well implies the urbanization trend spilled from the Aktau city to the direction toward Fort-Shevchenko.

Comparing the two rayon-class cities in Mangistau Oblast, Zhanaozen is more urban oriented represented by 88.7% of settlement land area. Aktau has much larger agricultural area but still has 23.6% of infrastructure and industry land areas, showing significantly larger accumulation of industries and urban functions.

Table 61 Land Use by Rayon in Mangistau Oblast, 2006

(Unit: Km2)

Category	Mangistau Oblast	%	Beineu	%	Karakiya	%	Mangistau	%	Tupkaragan	%	Aktau	%	Zhanaozen	%
Agriculture	8,438.1	50.9	276,039.0	6.8	3,819,091.6	60.3	3,447,163.2	72.0	891,996.9	70.8	3,438.0	4.3	330.9	0.6
Settlements	825.9	5.0	230,939.9	5.7	240,740.8	3.8	190,411.9	4.0	64,624.8	5.1	53,534.0	66.4	45,717.9	88.7
Infrastructures	174.8	1.1	10,546.9	0.3	50,620.0	0.8	38,612.2	0.8	50,548.4	4.0	18,993.0	23.6	5,500.2	10.7
Protected areas	223.6	1.4		0.0	223,342.0	3.5		0.0		0.0	256.0	0.3		0.0
Forest	242.4	1.5	225,736.0	5.6		0.0	16,624.0	0.3		0.0		0.0		0.0
Total	16,562.1	100.0	4,051,932.9	100.0	6,329,261.5	100.0	4,789,122.0	100.0	1,259,596.2	100.0	80,629.0	100.0	51,549.0	100.0
Share in Oblast (%)				24.5		38.2		28.9		7.6		0.5		0.3

Source: Report on land availability and allocation, January 2006, Land Administration, Mangistau Oblast

5.3 Hierarchical Distribution of Settlements

The existing distribution pattern of rural and urban settlements was examined, mostly using the data in Village Monitoring 2006 issued by Mangistau Oblast. There were no data available in the village monitoring for settlements of Aktau, Zhanaozen, Bautino, Fort Shevchenko, Zhetybai, and Munaishy as they are classified to be cities. As it is considered that these cities have higher functions, they are classified into higher tiers in the hierarchy of settlements: Aktau as the regional center, and the other five as second rank cities. No data was available for Tenge settlement also, because it was recently separated from Zhanaozen.

(1) Indices adopted for evaluation

The following indices were adopted to evaluate the current level of social and economic activities in the settlements, as well as to grasp the future potential/capacity for development (Table 62).

Table 62 Selected Indices and Scoring Criteria

Selected Indices	Measurement
1) Size-oriented indices	
• Population	≤3,000=2, ≤6,000=4, ≤9,000=6, ≤12,000=8, >12,000=10
• Economically active population	≤1,500=1, ≤3,000=2, ≤5,000=3, ≤10,000=4, >10,000=5
• Area of entire territory (ha)	≤100,000=1, ≤200,000=2, ≤300,000=3, ≤40,000=4, >40,000=5
• Number of sheep heads	0-10,000=1, 10,001-20,000=2, 20,001-30,000=3, 30,001-40,000=4, 40,001-50,000=5
• Number of service entities	0-25=1, 26-50=2, 51-75=3, 76-100=4, 101 <=5
2) Economic activity level indices	
• Average household size (persons/family)	≥7.0=1, 6.0-6.9=2, 5.0-5.9=3, 4.0-4.9=4, <4.0=5
• Average number of sheep per resident	0.0-2.0=1, 2.1-4.0=2, 4.1-6.0=3, 6.1-8.0=4, 8.1 <=5
• Rate of service employment per economically active population (%)	0.00-2.00=1, 2.01-4.00=2, 4.01-6.00=3, 6.01-8.00=4, >8.00=5

Selected Indices	Measurement
• Average number of registered telephone per resident	0-2=1, 3-4=2, 5-6=3, 7-8=4, >8=5
3) Public services level indices • Rate of locally enrolled number of children (%) • Number of locally available medical staff per 1000 residents	 0-20=1, 21-40=2, 41-60=3, 61-80=4, >80=5 0.00-5.00=1, 5.01-10.00=2, 10.01-15.00=3, 15.01-20.00=4, >20.00=5
4) Infrastructure/utilities level indices • Rate of population served by centralized water system (%) • Length of power line per resident (m)	 0-20=1, 21-40=2, 41-60=3, 61-80=4, >80=5 0-10=1, 11-20=2, 21-30=3, 31-40=4, >40=5

(2) Result of settlement hierarchy analysis

Based on the results of the analysis, settlements were ranked by score as shown in Table 63, and then classified into five categories as shown in Table 64. The results of the classification for the existing settlements are depicted in Figure 11.

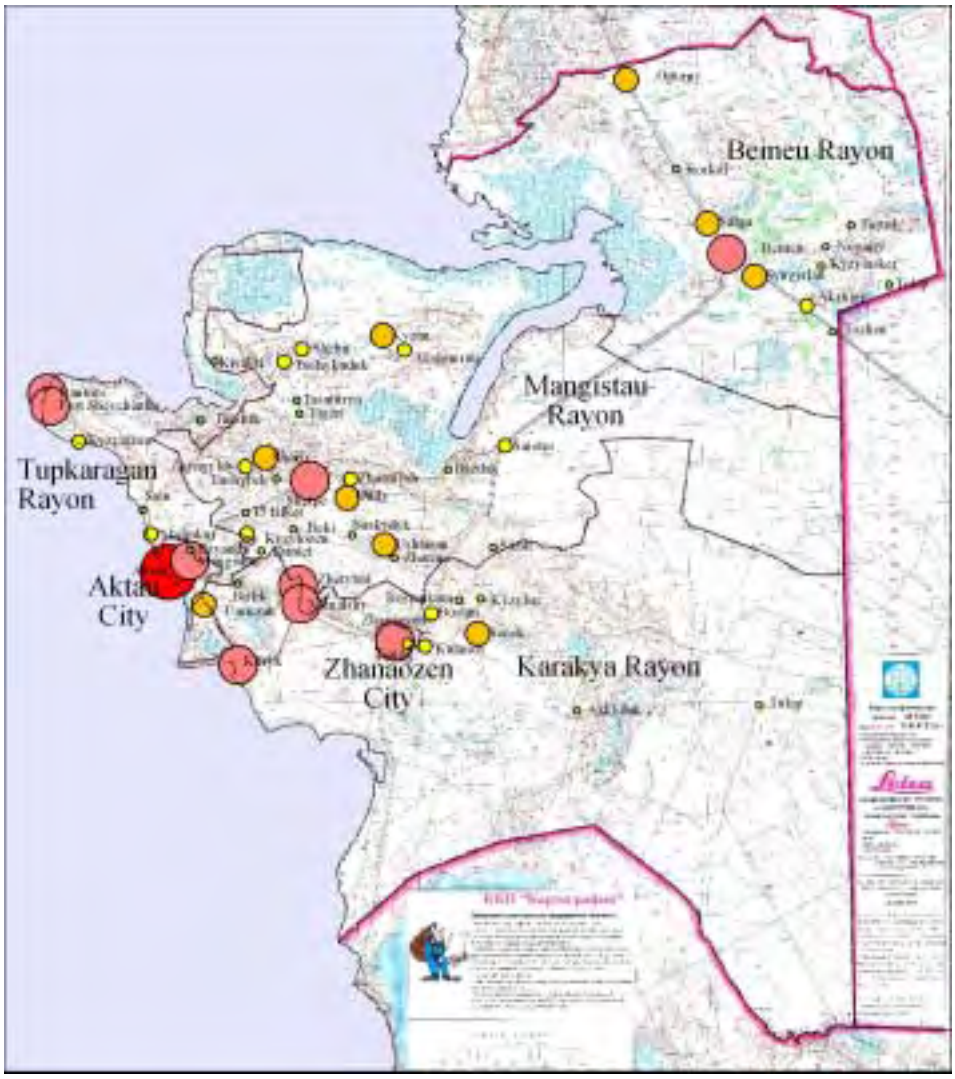


Figure 11 Current Distribution of Settlements by Five Classes

Table 63 Results of Settlement Analysis by Score

Settlement name	village/rural district name	Rayon name	Total score	Classification
Beineu	Beineu	Beineu	45	2
Shetpe	Shetpe	Mangistau	43	2
Kurik	Kurik	Karakiya	39	2
Mangistau	Mangistau	Aktau	38	2
Ushtagan	Aktobe	Mangistau	37	3
Senek	Senek	Karakiya	36	3
Borankul (st.Opornaya)	Borankul	Beineu	36	3
Kizan	Kizan	Mangistau	35	3
Singirlau	Singirlau	Beineu	34	3
Sarga	Sarga	Beineu	34	3
Umirzak	Umirzak	Aktau	34	3
Ondy	Ondy	Mangistau	33	3
Shair	Shair	Mangistau	33	3
Kulandy	Kulandy	Karakiya	32	4
Bostan	Bostan	Karakiya	32	4
Zhingildy	Zhingildy	Mangistau	32	4
Akzhigit	Akzhigit	Beineu	32	4
Akshimirau	Akshimirau	Mangistau	31	4
Zharmish	Zharmish	Mangistau	31	4
Tushikudik	Tushikudik	Mangistau	31	4
Saiotes	Saiotes	Mangistau	31	4
Kizilozen	Kizilozen	Tupkaragan	29	4
Kiziltobe	Kiziltobe	Aktau	29	4
Tolep	Kulandy	Karakiya	27	4
Akshukur	Akshukur	Tupkaragan	27	4
Shebir	Shebir	Mangistau	26	4
Tolep (crossing point 4-)	Tolep	Beineu	26	4
Tasmurin	Shair	Mangistau	25	5
Taushik	Taushik	Tupkaragan	25	5
Station 15	Zhingildy	Mangistau	24	5
Zharma	Aktobe	Mangistau	24	5
Baskuduk	Ondy	Mangistau	24	5
Turish	Turish	Beineu	24	5
Kzil-Asker	Sam	Beineu	24	5
Sayin	Akshukur	Tupkaragan	24	5
Bayandy	Bayandy	Aktau	24	5
Kizilsai	Kizilsai	Zhanauzen	24	5
Sazdy	Aktobe	Mangistau	23	5
Beki	Ondi	Mangistau	23	5
Korkol (Eset)	Eset	Beineu	22	5
Kizilsu	Bostan	Karakiya	21	5
Kiyakty	Tushikudik	Mangistau	21	5
Akkudik	Senek	Karakiya	21	5
Bostankum	Bostan	Karakiya	20	5
Nogaity	Nogaity	Beineu	20	5
Tushibek	Zhingildy	Mangistau	20	5
Daulet	Kiziltobe	Aktau	20	5
Birlik	Kiziltobe	Aktau	20	5
Tigen	Shair	Mangistau	19	5
Bozdak	Saiotes	Mangistau	18	5
Tazhen	Akzhigit	Beineu	16	5

Table 64 Criteria for Classification of Existing Settlements

Tier	No. of settlements	Description	Note
Rank A	(1)	Regional center	Aktau city
Rank B	(9)	Candidates for upper regional sub-centers	Score≥38 including Zhanaozen, Fort-Shevchenko & 3 urban-type settlements
Rank C	(9)	Candidates for secondary centers	Scored 33 to 37
Rank D	(14)	Candidates for rural service centers	Scored 26 to 32
Rank E	(24)	Candidates for ordinary settlements	Scored 25 and below

CHAPTER 6 ENVIRONMENTAL CONDITIONS

6.1 Environmental Policy, Institutions and Programs

6.1.1 Policy and institutions for environmental management

The environmental management in Mangistau Oblast is conducted mainly by the Ministry of Environmental Protection (MOEP) of the Government and the Department of Natural Resources and Wildlife Management of the Oblast Akimat. MOEP formulates environmental policies and provides overall environmental administration, while the Akimat department executes the policies at the oblast level. Other government agencies are involved in different aspects of the environmental management.

(1) Ministry of Environmental Protection (MOEP)

MOEP is the principal agency responsible for environmental management at the Government level. Main duties include the development of policy guidelines for environmental management, issuing of licenses and permits for natural resource use, monitoring of environmental conditions, and administration of environmental impact assessment (EIA). MOEP of Mangistau Oblast has eight departments with about 45 staff members. Licensing and permit issuing are administered by the department of nature management and the EIA by the department of ecological expertise.

(2) Akimat Department of Natural Resources and Wildlife Management

The Department is responsible for administering environmental programs of the Oblast and management of minor natural resources such as sand, shell stones, gravels, water etc. Major natural resources including oil, gas and minerals are managed by the Ministry of Energy Resources. The Department has 15 staff members in four sections: 1) ecological expertise section, 2) nature use section, #9 environmental protection project section, and 4) administration section. The ecological expertise section gives permits for small development projects such as construction of houses and schools, while the natural usage section controls minor natural resources and gives permits for their extraction. The environmental protection project section carries out tenders and selects contractors for environmental protection projects.

(3) Kazakhstan Hydro-Meteorological Services (KAZHYDROMET)

KAZHYDROMET is an independent agency responsible for monitoring environmental quality throughout the Country, covering soil, air and water.

(4) Ministry of Emergency Response (MOER)

Satellite offices of the Marine Inspection Services and the State Inspection and Supervision of Safety for Offshore Oil Operation under MOER are in Mangistau Oblast. Oil companies operating in the Caspian Sea are required to have their own oil spill contingency plan approved by the Marine Inspection Services. MOER itself does not have any equipment for emergency operation for oil spills.

(5) Ministry of Energy (MOE)

MOE is responsible for issuing permits for oil and gas exploration and production operation.

(6) Ministry of Ecology and Natural Resources (MENR)

MENR administers biodiversity management issues through the Forestry, Fishing and Hunting Committee (FFHC).

(7) Rural Caspian Water Basin Center

To sink hydro-geological wells, the permission needs to be obtained from the Rural Caspian Water Basin Center in Atyrau or ZAPKAZNIEDA in Aktube.

6.1.2 Environmental plans and programs

(1) Concept of transition to sustainable development and its action plan in 2007-2024

The concept of transition to sustainable development constitutes the background of both Kazakhstan's strategy of sustainable development 2030 and the strategy to join the World's 50 most competitive countries. It specifies the principle, goals, objectives and key mechanism for achieving sustainable development. The concept divides the periods into four phases for the transition: 1) preparation phase (2007-2009) to integrate the principle into all public and political activities for diversification of economy and technological breakthrough; 2) first phase (2010-2012), joining the world's 50 most competitive countries; 3) second phase, (2013-2018) to ensure the Kazakhstan's position in the world development; and 4) third phase (2018-2024) to achieve international standard of sustainable development. The main principles of the concept include: 1) enhancing the resource use efficiency, 2) raising life expectancy with sufficient birth rates, 3) increasing environmental sustainability by ecosystem conservation, clean production with available technologies, and clean-up historical pollutions, and 3) ensuring successful implementation of the policy.

(2) National Action Program on Enhancement of the Environment of the Caspian Sea (2003-2012)

MOEP has formulated the National Action Program on Enhancement of the Environment of the Caspian Sea (2003-2012) within the framework of Caspian Sea Environment Program. The program strategically aims at: 1) complex planning and management of the coastal zone, and 2) control and regulation of pollution and conservation of biological and landscape diversity in the Caspian Sea and the costal zone. The activities to eliminate the historical industrial pollution in the program includes: 1) conservation and elimination of the flooded oil wells, 2) cleaning of the soil by eliminating oil contents, 3) utilization of associated gas from the oil fields, and 4) treatment of hazardous toxic substances at the Koshkar Ata tailing pit.

(3) Environmental program of Mangistau Oblast 2005-07

The main objective of the program is to create ecological equilibrium and favorable environment for the residents in Mangistau Oblast. The program has been carried out by MOEP and the Department of Natural Resource of the Oblast together with other related organizations. The budget for the program is KZT 1.3 billion for the three years. The activities realized in these years are summarized in Table 65.

Table 65 Activities Undertaken by Environmental Program of Mangistau Oblast 2005-07

Categories	Activities realized
Air pollution	Stabilization of water level of Koshkar Ata tailing Monitoring air pollution (radioactive level, toxic waste and dust) near Koshkar Ata tailing
Water resource protection	Shutting down of contaminated water wells with high amounts of minerals (40 hydro wells in 2005) Seawater monitoring (Air, water, sediments at the bottom of sea, micro-organism, flora and fauna are monitored for 46 and 78 points in offshore and inlands, respectively.)

Categories	Activities realized
Waste management	Construction of landfills for large settlements Construction of waste facility for slaughtered animals Restoration of disturbed open pits used for waste disposal Utilization of waste
Flora and fauna protection	Study of impacts of oil and gas industry on flora/fauna Pilots projects for stabilization of sand movement Green zone development for large settlements Management for two protected areas Establishment of new protected areas at oblast level Development of inventories rare plant species
Radioactive safety	Monitoring for radioactive substances Construction of disposal sites for radioactive waste Rehabilitation of nuclear testing sites Checking radioactivity level of companies which recycle and/or carry radioactive waste Construction of disposal sites for radioactive waste (liquid and solid) from the BN-350 nuclear plant
Health care	Heath care for workers under harsh working conditions, evaluation for labor conditions
Environmental education	Environmental education at schools Concur of nature related program Holding scientific conferences

6.1.3 Environmental permit system

In Kazakhstan, industrial wastes are controlled by the permit system. Industrial enterprises are required to have an annually issued "nature use permit" for their activities to produce pollution. The industrial nature use permit specifies the emission limit value (ELV) to atmosphere, maximum permissible discharge (MPD) for liquid effluent discharge and solid waste disposal for industries. The ELV is developed by enterprises or licensed consultants and negotiated with the Oblast office of MOEP. The ELV includes not only discharge and emission from factories, but also emission from all the activities of the companies (e.g. fleet of vehicles, dust).

The fees for nature use permit are collected by the Oblast and the fines are collected by MOEP. The fines imposed on discharge or emission exceeding the standard specified by the permit is ten times higher than the fee rates under the permit. The fees collected by the Oblast will be spent for environmental rehabilitation defined by three-year environmental programs of the Oblast. It is pointed out that this permitting system in Kazakhstan is very expensive due to the complexity of obtaining the permit annually.

6.1.4 Environmental impact assessment

Kazakhstan has ratified the international convention of Environmental Impact Assessment (EIA). The procedures for conducting EIA were promulgated by the Government in 1993 and 1996, and amended by the Ecological Code in 2007. According to the Ecological Code, all the economic and other activities (projects) that may affect the environment and health of the population either directly or indirectly are subject to EIA.

The design and environmental protection measures in the proposed projects are evaluated based on regulatory requirements such as sanitary-hygienic and environmental standards. The projects are classified into five types based on the sanitary-hygienic and environmental standards (Table 66). EIA is carried out by licensed physical or legal persons financed by persons or enterprises which implement the projects. The procedure of EIA is summarized in Table 67.

The elements to be covered by EIA include: 1) atmospheric air; 2) superficial and underground waters; 3) a surface of a bottom of reservoirs; 4) landscapes; 5) ground resources and a soil cover; 6) flora; 7) fauna; 8) a condition of ecological systems; 9) a state of health of the population; 10) social conditions (employment of the population, formation, transport infrastructure).

Table 66 Project Types and Agencies in Charge of EIA in Kazakhstan

Category	Project type	Implementing agency	Example
1	Projects with danger Class 1 and 2; Investigation and extraction of minerals; project with more than US$50 million budget	MOEP at Central office (Preliminary analysis by MOEP at Aktau)	Class 1 (e.g., Oil and Gas mining, power station, chemical plants); Class 2 (e.g., asphalt, pipe/metal plants)
2	Projects of danger Class 3	MOEP in Aktau	Open pit
3	Projects of danger Class 4	MOEP in Aktau	Transportation project
4	Projects of danger Class 5; all activities have impact on fauna except for amateur fishery and hunting.	Dept. of natural resource, Akimat	City/house construction
5	Project considered to have no impact on environment	No EIA	Sewage system, power line construction, water, gas construction.

Source: Ministry of Environmental Protection, Mangistau Oblast.

Table 67 Procedure of EIA Study

Step 1	Review of land conditions where the project is planned.
Step 2	Tentative assessment of impacts on environment in feasibility report.
Step 3	Full analysis of impact on environment with alternative plans for the projects.
Step 4	Technical decision to prevent negative impacts on environment.
Step 5	Assessment carried out in year after the beginning of the operation.

Source: Ecological Code, 2007.

The results of EIA are evaluated by MOEP or the Oblast Department of Natural Resources, depending on the categories. The public consultation of the project needs to be carried out with announcement on newspaper 20 days prior to the meeting. For large projects, the results are presented to ecological societies for further comments. The project may be stopped or modified based on the judgment of MOEP and the ecological societies.

6.1.5 Land expropriation and compensation mechanism for land development

Since large lands are available in Mangistau Oblast, land development is in general undertaken in open space on state lands. The permission for land development is issued by the government in order to use the land for development. In case of development on private lands, alternative lands can be allocated and funds for rebuilding structures are provided for compensation. The price for the compensation is determined based on the agreement of the land owners/users, but if land users do not agree with the price provided by the government, they can bring the case to the court.

According to the Land Code Clause 84, land alienation for the state needs is compulsory for land users with equivalent compensation for the property under the decision of court when no other possible way is available. These cases include:

1) international obligation,
2) for the needs of the defense, especially protected natural territories, improving, recreational and historical and cultural purpose, creation and functioning of special economic zones,
3) mining of minerals,
4) construction of roads, transmission lines, communication lines, the main pipelines, engineering-communication networks of settlements, and other objects with the public benefit,
5) emergency due to old habitation threatening to collapse, and
6) execution of general plans of settlements regarding construction, established by the present clause, and also constructions stipulated by the state and regional programs, and the investment projects with the state interests or for socially significant purposes.

After January 1, 2006, according to the Land Code Clause 94, the Kazakh government can make a

judicial order to land users of compulsory alienation from the land, if the land is not used for the particular purpose for more than two years (Clause 92), or the land is illegally used against the legislation of Republic Kazakhstan (Clause 93) (e.g. agricultural land is used for another purpose). This regulation may not be applied to the agricultural lands in Mangistau Oblast since most areas are pasturelands (the lands are considered to be used when waiting for pasture growth.).

6.1.6 Policies for rural development

In order to improve the living conditions of rural settlements whose main activities are agriculture, the Government launched the National Rural Development Program 2004-2010. The program is implemented in two phases: the first for 2003-2006 and the second for 2007-2010. The main objective of the program is to establish normal conditions of living in rural areas on the basis of optimization of rural settlements. In order to achieve the main objective the activities of the program are as follows:

1) Analysis of the existing conditions of rural settlements with regard to the main factors of social economic development
2) Classification of rural settlements based on social and economic criteria
3) Development of priority measures to invest in construction, repairs and reconstruction of social and engineering infrastructure
4) Monitoring of social and economic development in rural settlements, environmental safety of rural areas, assessment of land resources, and development of norms and standards for social and engineering infrastructure services
5) Development and implementation of programs to encourage relocation of rural population
6) Development of optimal rural settlement models, including ones with unsafe environmental conditions

6.2 Existing Natural Conditions

6.2.1 Location and land use

Mangistau Oblast is located in the southwestern corner of Kazakhstan, occupying 165,600km^2 or 6.1% of the national land area. It is bordered on Atyrau Oblast to the north, Aktobe Oblast to the northeast, Uzbekistan to the east, Turkmenistan to the south, and the Caspian Sea to the west. The land is largely covered with deserts. Of the total land area, 127,002km^2 or 76.7% is categorized as agricultural land, which is practically all pastures.

6.2.2 Climatic conditions

According to the Köppen climate classification, Mangistau Oblast belongs to the desert climate. The climate of Mangistau Oblast is characterized by hot and dry summer and cold winter with short transitive seasons, very small amount of rains with low humidity, and strong wind and high solar radiation. The coastal areas, approximately up to 30-40km from the Caspian Sea, have warmer winter and cooler summer due to moderation effects of the sea but higher humidity.

According to the data from KAZHYDROMET, the annual average temperatures range from 10.70°C in the northeast (Opornaya in Beineu rayon) and 13.3°C in Aktau. The average temperatures are the highest in July and August and the lowest in January. In Akutau, the average temperature ranges from –0.30°C in January to 26.80°C in August. The highest temperature is found in the southern inland area (29-300°C in Akkuduk) and the lowest temperature is found in Beineu area (–5-60°C). The absolute maximum temperatures reach beyond 400°C for three to five months between May and September. The absolute minimum temperature is lower than –330°C in inlands in January. The wind speeds are approximately 3-5m/sec on average ranging from 3m/sec in Beineu area to 5m/sec in Fort Shevchenko.

The annual precipitations range between 12mm and 190mm, generally lower in the south, higher in the middle and northeastern parts, but extremely low at the western edge of the Oblast (only 12mm/year at Fort Shevchenko and 58mm/year at Kulay islands). The larger precipitation is found near Shetpe, the Buzachi peninsula, and the eastern part of Beineu (170-180mm/year). The distinct dry period is found in August and September in the entire Oblast, and particularly the low precipitation is observed in August.

The annual solar radiation exceeds 125kcal/m^2 in summer. The annual sunshine time is larger than 2,600 hours (7.1 hours/day on average).

6.2.3 Protected areas network

There are five types of specially protected natural territories in Kazakhstan: state reserve, state preserve, state national park, state reserve zone, and state nature monument. At state reserves, no activities except for science, education, culture and tourism are allowed, while state preserves, in addition to the activities allowed in state reserves, grazing is allowed. Reserve zones are special zones established for the specific protection purpose without expropriating lands from land users, where all activities besides the conservation activities are allowed. State level protected areas are managed by FFHC under the Ministry of Agriculture, and a botanical garden is an independent corporation.

There are one state reserve, two state zoological preserves, one state reserve zone and one botanical garden in Mangistau Oblast. Other than the most significant protected area of the Ustyurt state reserve, these areas are not properly managed except occasional visits by FFHC. The Karakolsky state zoological preserve was established for the habitat of birds, created with dumped hot water produced by a desalinization plant.

(1) Ustyurt state reserve (233,000ha)

The reserve was set up in 1984, occupying portions of the Ustyurt plateau in the west of Karakiya rayon. It is a habitat of 261 plants, 27 animals, 111 birds, and 27 reptiles. Rare species include Ustyurt mouflon, long-needled hedgehog, Persian gazelle, Caracal lynx, golden eagle, short-toed eagle, Egyptian vulture, and saker falcon. It is the only habitat for honey-badger and cheetah in Kazakhstan. Due to its remote location with poor accessibility, the reserve is well protected. FFHC has an management office with 40-50 staff in Zhanaozen.

(2) Aktau-Buzachinsky state zoological preserve (170,000ha)

This preserve is located at the north of Mangistau Oblast, at the bottom of the Mangistau bay. It was established for the protection of kulan brought from Turkmenistan for propagation. Eastern part of the reserve is an important habitat for saiga, but not included in the preserve. The preserve has indigenous flora and fauna including Ustyurt mouflon, Persian gazelle, Brandt's hedgehog, caracal, Palls's cat, Caspian Seal, flamingo, whopper swan, eastern white and Dalmatian pelicans.

(3) Karagiye-Karakolsky state zoological preserve (137,500ha)

The preserve has two parts: Karagije located at the southern side of the highway between Aktau and Zhanaozen, and Karakolsky attached to a pond of desalinization plant. It was established for the protection of indigenous flora and fauna (Karagije) and water birds (Karakolsky) including Ustyurt mouflon, Persian gazelle, Brandt's hedgehog, caracal, Palls's cat, Caspian Seal, flamingo, whopper swan, eastern white and Dalmatian pelicans. The preserve has the world second deepest depression Karagije (132 m below sea level).

(4) Kendyrli-Kayasanskoye state reserve zone (1,231,300ha)

The zone, located in the western part of Karakiya rayon near the coast, was established in 2001, supported by the United Arab Emerates, for the protection of falcons for hunting. Lands are specially protected against hunting of falcons and jackals that are illegally traded internationally. Land is privately owned.

(5) Aktau botanical garden (39ha)

The botanical garden in Aktau used to be managed by the Institute of Botany and Bio-industries under the Ministry of Science and Education, but became an independent corporation in 2006. It has a collection of indigenous and exotic species for scientific, educational and cultural activities. The botanical garden purchases plants from Almaty, Uzbekistan and Turkmenistan, and sell them in Aktau. Currently it is expensive to produce plants in Aktau due to the price of water and the poor soil conditions, and it is cheaper to bring them from Almaty because of subsidiary arrangements for free plant acquisition. It has a plan to produce more plants in Aktau.

In addition to the state level protected areas, Akimat establishes protected areas. As Oblast level protected areas, two protected areas are managed by state enterprises.

(6) Sands Sam reserve

The reserve is located at the eastern part of Beineu rayon. In order to improve the pasture quality, 192,000ha of grassland are protected during summer in the Sam area in Beineu. Approximately 3,200 people in 32 farms inhabit in the Sam reserve. Pressure from livestock grazing is very high in this area. A village gas system will be connected by the end of Sept. 2007.

(7) Karaturei salt marsh

The marsh is located between Beineu and Mangistau. In order to protect the existing forest resources, 47,000ha of saxaul forest near salt marsh are protected.

(8) Proposed reserve for eco-tourism development

Mangistau Oblast is located on the crossroads between the European and the Asian continents in the basin of the Caspian Sea. The second deepest depression in the world Kargije, white mountain (or what Aktau means) at Western Karatao near Shetpe, Beket Ata (spiritual site located 100km east of Zhanaozen), rock sunk by the earthquake on the coast may attract tourists. Tourism development is planned to be carried out by establishing an enterprise. Oblast level reserves for tourism route under proposal in these areas include Western Karatao, coastal areas in Buzachi and Tupkaragan peninsulas.

6.2.4 Biodiversity and tree/pasture resources

In spring, a large number of rare birds can be seen at the Caspian Sea coast. 30 species on the Redbook of Kazakhstan inhabit in the northeast Caspian region. These species include white and Damlatian pelicans, squacco, egrets, Eurasian spoonbill, glossy ibis, greater flamingo, whooper swan, Bewick's swan, red-breasted goose, marbled teal, white-headed duck, Siberian white crane, purple gallinule, great black headed gull, osprey and white tailed sea eagle.

Saxaul (Haloxylon ammondendron) is an important tree species found naturally in Mangistau Oblast. The thick bark of the saxaul tree stores water, making it an important source of water in arid regions where it grows. In the Gobi desert, the saxaul is often the only kind of tree found. It used to be the only kind of wood that nomads could use for heating and cooking. A parasitic plant that grows on the roots of the saxaul is prized in Chinese medicine as the 'ginseng of the desert'. Saxaul is planted on

a large scale in the afforestation of arid areas in China. Being highly drought-resistant, it has played an important role in the establishment of shelter belts and the fixation of sand dunes as a counter to desertification.

The pastures in Mangistay Oblast are constituted 80-90% by wormwood (Artemisia absintium). Wormwood is the major pasture species for livestock production. In the eastern part of Oblast, wormwood has been damaged by grasshoppers (Calliptumus italicus) brought by the eastern wind. It started in 2000, and the damage has particularly been severe in Beineu rayon.

6.2.5 Ecosystems of the Caspian Sea Region

A variety of biotopes are found in the Caspian Sea region. The biodiversity of the Caspian Sea is poorer compared with the Black sea and the Barent sea due to the variable salinity; the salinity is too high for fresh water fauna and flora but too low for marine species.

The division of the Caspian Sea from the sea has created the endemic ichthyofauna to the Caspian Sea. In the Caspian Sea, 718 species are found (62 species of protozoa, 397 invertebrates, 79 vertebrates, and 170 parasitic organisms). 44% of the species except for protozoa and parasitic organisms are endemic to the Caspian Sea. The biodiversity of the Caspian Sea has been selected by de-salting and salinization processes. Fish and crustaceous species are the greatest variety found in the Caspian Sea due to the osmoregulation mechanism adjusting to the change of salinity.

Many fish species with commercial values are found in the Caspian Sea. The most common commercial fish include: Beluga (Huso huso), Serlet (Acipenser ruthenus), Zander (Stizostedion), Sazan (Cyprinus carpio) Bream (Abramis) Cat fish (Silurus glanis) and Caspian roach (Rutilus). The most commercially important fish species in the Caspian Sea is sturgeon. Five species of sturgeon are found in the Caspian Sea: Russian and Persian sturgeon (Acipenser persicus), beluga (Huso huso), Sevruga (Acipenser stellatus), Ship (Acipenser nudiventris) and Sterlet (Acipenser ruthenis). The most common sturgeon is Russian sturgeon, beluga and sevruga. The population of Ship has declined, and included in the Red Databook in Azerbaijan and Turkmenistan. Ship is fished only in Kazakhstan. Sterlet is a freshwater fish only found in the Volga river.

The number of salmon species is found in the Caspian Sea. The population of salmon has also declined recently due to poaching. Salmon is included in the Red Databook of Kazakhstan, Turkmenistan and Russia.

Herring is largely fished in the Volga river, Azerbaijan, Turkmenistan and Ira. Particularly Blackback herring (Alosa kessleri kesseleri), Dolginka herring (Alosa brashnikovi brashnikovi), Caspian Herring (Alosa caspia caspia) are the important species.

The only mammal that lives in the Caspian Sea is seal. Seals have been historically hunted by the local residents. The population of seal has declined by 20% between 1986 and 1995. The mass deaths of seals were found in 2006, 2000, and 1997. Poisoning by hydrogen-sulfide (H_2S) from oil wells or infection by bacteria or virus may cause the mass death of seals. The Caspian Seal is considered a vulnerable mammal according to the Red Databook, and hunting is illegal in all countries.

Other mammals found in the coastal area of the Caspian Sea include brown hare (Lepus europaeus), wild rabbit (Oryctolagus cuniculus), coypu (Myocastor coypus), forest dormouse (Dyomys nitedula), wolf (Canis lupus), jackal (Canis aureus), Fox (Vulpes vulpes), Racoon (Procyon lotor), weasel (Mustela nivalis), stone marten (Martes), badger (Meles meles), Eurasian Otter (Lutra lutra), reed cat (Felis chaus), steppe cat (Felis libyca) and djeiran (Gasella subgutturosa). According to the Red Databook, Eurasian Otter (Lutra lutra) is vulnerable species.

In the terrestrial ecosystems of the Caspian region, important species include Ustyurt moufron, kulan (Equus hemionus: Mongolian wildass), saiga antelope (Saiga tartarica), and caracal (Felis caracal:

African lynks). Kulan was once extinct in 1920's from Kazakhstan, but brought from Turkmenistan to create a habitat. Propagation was attempted first in the island of Aral sea, which has later become a peninsula due to the lowered water level, and then it was introduced in the Aktau-Buzachinsky state zoological preserve. It is known that saiga used to migrate from the northern part of Mangistau Oblast to the north of Uzbekistan.

6.2.6 Water quality of the Caspian Sea

According to the data provided by KAZHYDROMET, the water quality of the Caspian Sea has been deteriorating in the last few years. Although most measured parameters were under Maximum Permissible Concentrations (MPC), oil products, synthetic surface-active substance (SSAS), and magnesium exceeded MPCs. At the Aktau seaport, oil products and SSAS exceed (MPC). The concentration of oil products in Aktau has dramatically increased, 60% and 150% in 2007 and 2006, respectively (Table 68). On the northern coast, oil products were not found at Fort-Schevchenko and Kalamkas in 2005, but started to be found in 2006 at all measured locations and exceeded MPC in 2007 at Fort-Schevchenko (Table 69). On the eastern coast, no oil products were found at any stations in 2005, but increasingly found in 2006 and 2007. In 2007, oil products at Peschannyi (50km south of Aktau) and Mangyshalak Chechen (20km south of Aktau) exceeded MPC (Table 70). On the east coast, copper also exceeded MPC at all the locations.

Table 68 Water Quality at Aktau Seaport

(Unit: mg/l)

Item Year:	2005	2006	2007	MPC
pH	8.21	8.11	8.05	
Iron	0.042	0.047	0.040	0.1
Nitrates	0.62	0.54	0.60	9.1
Nitrites	0.0053	0.0060	0.0053	0.02
Nitrogen ammonium	0.087	0.018	0.006	0.5
Suspended solid	4.20	5.11	3.23	
Phosphates	0.117	0.099	0.107	3.5
Phenols	0.000			0.001
Oil products	0.056	0.14	0.093	0.05
Dissolved oxygen	11.9	5.8	6.6	6.0
BOD -5	0.78	0.76	1.63	3.0
Cadmium	Not found	Not found	Not found	0.01
Plum bum	Not found	Not found	Not found	0.01
Zinc	Not found	Not found	Not found	0.05
Mercury	Not found	Not found	Not found	0.0001
Synthetic surface-active substances (SSAS)	0.55	Not found	Not found	0.1
Manganese	0.308	0.087	0.107	0.05
Chrome (Vl)	0.0117	0.0087	0.0100	0.05
Chlorine	0.158	0.033	0.023	250
Copper	Not found	0.0200	0.0093	1.0

Source: Kazhydromet; means of three locations.

Table 69 Water Quality at Northern Coast of Caspian Sea

(Unit: mg/l)

Location:	Karankas			Fetisovo			Fort-Schevchenko		
Item Year:	2005	2006	2007	2005	2006	2007	2005	2006	2007
pH	7.7	7.95	7.41	7.65	7.7	7.44	7.44	7.99	7.78
Iron	0.06	0.04	0.02	0.04	0.012	0.03	0.03	0.027	0.02
Nitrates	0.8	0.5	0.8	0.7	0.6	0.8	0.8	0.62	0.4
Nitrites	0.025	0.006	0.006	0.009	0.006	0.005	0.01	0.003	0.006
Nitrogen ammonium	0.11	0.01	Not found	0.15	Not found	0.01	0.4	0.01	Not found
Suspended solid	7.3	7	7	5.07	4.5	4.5	2.09	3	3
Phosphates	0.09	0.075	0.26	0.07	0.15	0.25	0.06	0.31	0.33

(Unit: mg/l)

Location:	Karankas			Fetisovo			Fort-Schevchenko		
Item Year:	2005	2006	2007	2005	2006	2007	2005	2006	2007
Oil products	Not found	0.0495	0.032	0.04	0.017	0.037	Not found	0.026	0.055
Dissolved oxygen	6.3	5.15	4.5	8.32	5.49	5.77	11.5	5.7	6.58
BOD-5	1.1	1.3	1.4	1.8	0.7	1	2.8	1.2	2.3
SSAS	0.7	Not found	Not found	0.7	Not found	Not found	0.7	Not found	Not found
Manganese	0.3	0.12	0.08	0.1	0.05	0.04	0.3	0.05	0.1
Chrome (Vl)	0.01	0.005	0.006	0.01	0.007	0.006	0.02	0.01	0.006
Chlorine	0.95	0.047	0.01	2.1	0.012	0.02	0.4	0.02	0.02
Copper	Not found	0.02	0.01	Not found	0.02	0.007	Not found	0.01	0.01

Source: ibid.

Table 70 Water Quality in Eastern Coast of Caspian Sea

(Unit: mg/l)

Location:	Kenderli-Divichi			Peschannyi			Mangyshlak-Chechen			MPC
Item Year:	2005	2006	2007	2005	2006	2007	2005	2006	2007	
pH	7.97	8.13	8.08	8.02	7.99	7.75	8.02	8.1	7.64	0.1
Iron	0.07	0.05	0.02	0.06	0.05	0.03	0.13	0.05	0.02	9.1
Nitrates	0.5	0.6	1.3	0.60	0.7	0.7	0.5	0.6	0.5	0.02
Nitrites	0.004	0.005	0.005	0.01	0.004	0.005	0.004	0.004	0.008	0.5
Nitrogen ammonium	0.09	0.02	0.005	0.08	0.005	Not found	0.08	0.01	Not found	
Suspended solid	7.2	3	2.5	8.0	2.8	1.8	8.9	2.4	2.1	3.5
Phosphates	0.05	0.18	0.07	0.1	0.05	0.92	0.09	0.05	0.3	0.001
Oil products	Not found	0.02	0.03	Not found	0.01	0.09	Not found	0.03	0.07	0.05
Dissolved oxygen	11.28	5.94	5.92	12.52	5.08	5.01	10.57	6.24	5.13	6.0
BOD-5	0.6	1.5	1.3	0.5	0.95	1.5	0.6	1.4	1.8	3.0
Manganese	0.2	0.05	0.04	0.7	Not found	0.06	0.2	0.04	0.03	0.05
Chrome (Vl)	0.01	0.005	0.005	0.01	0.005	0.015	0.01	0.004	0.006	0.05
Chlorine	0.23	0.02	0.01	0.22	0.03	0.06	0.14	0.03	0.02	250
Copper	Not found	0.02	0.007	Not found	0.03	0.006	Not found	0.02	0.004	1.0

Source: ibid

6.2.7 Land resources

Mangistau Oblast covers approximately 16 million ha. The three rayons of Beineu, Karakia and Mangistau account for 92% of total area. Approximately one half of the area is used for agriculture (livestock production), 40% for land reserve and 4.5% for others. Of the agricultural area, 83% is pasture as a whole. In Karakia, Mangistau and Tupkaragan 67%, of land is used for livestock production, while only 6.8% of land is used in Beineu. Large land reserve (82 % of total area) is found in Beineu rayon due to the appearance of salt in the soil. As a whole, 40% of land is under land reserve, unoccupied rangelands used for summer pasture. Approximately 20-30% of area is under land reserve in Karakia, Mangistau, and Tupkaragan rayons because of Ustyurt plateau which largely covers the eastern part of the Oblast. Others include industrial area, transport, protected areas, forests and water bodies (Table 71).

Table 71 Land Resources in Mangistau Oblast

	Total		Settlement		Agriculture land						Land reserve					Other	
Rayon	ha	%	ha	%	ha	%	Arable	Hay	Pasture	Other	ha	%	Arable	Hay	Pasture	ha	%
Beineu	4,051,933	24.5	230,940	5.7	276,039	6.8	0	100	268,647	7,292	3,308,671	81.7	4	186	2,344,661	236,283	5.8
Karakiya	6,329,262	38.2	240,741	3.8	3,819,092	60.3	36	0	2,906,921	912,135	1,995,467	31.5	0	0	1,608,979	273,962	4.3
Mangistau	4,789,122	28.9	190,412	4.0	3,447,163	72.0	104	0	3,170,411	276,649	1,096,311	22.9	0	0	434,450	55,236	1.2
Tupkaragan	1,259,596	7.6	33,423	2.7	891,997	70.8	158	0	675,627	216,212	252,426	20.0	0	0	203,289	81,750	6.5
Aktau	80,629	0.5	21,941	27.2	3,438	4.3	113	0	2,454	871	4,408	5.5	0	0	0	50,842	63.1
Zhanaozen	51,549	0.3	9,011	17.5	331	0.6	100	0	13	218	0	0.0	0	0	0	42,207	81.9
Total	16,562,091	100.0	726,468	4.4	8,438,060	50.9	510	100	7,024,072	1,413,377	6,657,283	40.2	4	186	4,591,379	740,280	4.5

Source: Village Monitoring: Mangistau Oblast. 2006.

6.3 Distribution of Ethnic Minorities

The distribution of ethnic groups is presented in Table 72. Kazakh and Russian account for 96% of the oblast population. Minor ethnic groups found in Mangistau Oblast include Azerbaijan(1.1%), Ukrainian(0.9%), Lezhian (0.6%), Tatar (0.6%), Armenian(0.3%), Chechen(0.2%), Korean(0.2%), Belarusian(0.1%), and German (0.1%). The population of minor ethnic groups account for 4% of the oblast population, 98% of which are found in urban areas (Aktau and Zhanaozen cities).

Table 72 Distribution of Populations by Ethnic Group in Mangistau Oblast (Jan. 2006)

Ethnic group/rayon	Aktau	%[1]	Zhanaozen	%[1]	Beineu	Karakia	Mangistau	Tupkaragan	Total	%[2]
Kazakh	131,179	42	77,023	24	36,897	25,747	28,885	15,338	315,069	84.1
Russian	37,769	96	1,248	3	52	2	-	157	39,228	10.5
Azerbaijan	3,829	97	93	2	6	7	1	-	3,936	1.1
Ukrainian	3,384	97	85	2	6	-	-	13	3,488	0.9
Lezghian	2,200	92	160	7	1	20	-	-	2,381	0.6
Tatar	1,931	88	176	8	13	29	-	41	2,190	0.6
Armenian	1,194	98	20	2	-	-	-	-	1,214	0.3
Chechen	691	92	48	6	5	6	1	-	751	0.2
Korean	613	88	73	10	7	-	-	3	696	0.2
Belarusian	454	98	2	0	8	-	-	-	464	0.1
German	415	96	14	3	3	-	-	-	432	0.1
Other	3,940	86	430	9	105	41	10	55	4,581	1.2
Total	187,599	50	79,372	21	37,103	25,852	28,897	15,607	374,430	100.0

[1] % of the populations in Aktau and Zhanaozen for the total number of the ethnic group
[2] % of the total number of the ethnic group for the total population
Source: *Statistical Yearbook of Mangistau Oblast, 2006*.

6.4 Existing Environmental Problems and Measures

6.4.1 Air pollution

The main forms of air pollution in Mangistau Oblast are associated with flare gas emission from oil fields and dust. The amount of dust in the air may sometimes be 7 to 8 times higher than the standards in Zhetybau and Zhanaozen, and twice as high in Aktau. Also, dust is pointed out as a serious problem in rural centers of Shetpe, Kuryk and Beineu.

The program of flare gas utilization started in 2006, and by the middle of 2007, 19 enterprises or 80% of all the oil extracting enterprises in Mangistau have started the program. In 2006, the total emission of polluting substances was reduced by 32%. The countermeasures for flare gas emission taken by the enterprises include underground injection, connection to existing gas pipelines, and utilization of gas for heating or power generation.

The amount of toxic substances discharged in the air consists mainly of carbon oxide accounting for 54% of the total and nitric oxide for 43% in 2005. Other substances are sulphureous anhydride and ammonia. Their emission is summarized in Table 73.

Table 73 Toxic Substances Discharged in Air in Mangistau Oblast

(Unit: 1,000t)

	2003	2004	2005	% share in 2005
Sulphureous anhydride	0.1	0.3	0.5	2.7
Nitric oxide	7.0	7.8	8.1	43.0
Carbon oxide	9.2	8.3	10.2	54.1
Ammonia	0.01	0.01	0.05	0.3

Source: Statistical Abstract of Mangistau Oblast 2006.

6.4.2 Water pollution by oil production

To extract oil, oil companies annually use approximately 100 million ton of water: 107 million m^3 in 2006, 103 million m^3 in 2005 and 97 million m^3 in 2004. Due to the increased oil production, the water consumption has increased in these years.

The wastewater from oil production needs to be carefully treated in order to avoid pollution. Almost all oil companies used to discharge wastewater to desert or evaporation pond without treatment, but the recent survey by the Study on Capacity Development on Pollution Prevention and Control by JICA showed that some firms inject wastewater into underground using abandoned wells.

(1) Contamination of the Caspian Sea by oil production

The Caspian Sea is the largest enclosed water body in the world, covering 371,000km^2 with a volume of 78,200km^3 and a mean depth of about 170 m. The Caspian Sea can be divided into three parts, the northern, middle and southern parts. Fort Shevchenko is located at the southern edge of northern part on the north Caspian shelf, while Aktau is located on the northern edge of the middle part. The northern part covers about 25% of the total surface area, but the water volume in the northern part accounts for a mere 0.5% as the average depths of the northern part is less than 5m. The middle part accounts for 34%, the rest made up by the southern part.

The oil input to the Caspian Sea in 1999 was estimated as 30,000-370,000t/year[2]. Of this total, 65% comes from rivers, of which 90% is due to the Volga and the Ural rivers1 on the northern Caspian Sea. It suggests that at least 27,000t of oil products are annually discharged to the seawater of 390km^3 (0.5% of the total amount of the Caspian Seawater); corresponding on the average to 0.069 mg/l of oil concentration accumulated to the northern Caspian Sea.

According to the Caspian Environmental Program (CEP), oil input as of 1999 to the Caspian Sea from oil production including onshore accounts for only 2.6% of the total oil input[1]. However, it is expected that the oil production in the northern Caspian Sea is significantly increased after the production from Kashagan oil field starts currently planned in 2010. Offshore oil fields in the Caspian Sea is planned to produce 70 million ton/year in 2015 from 2.7 billion ton of oil reserve in the Caspian Sea in Kazakhstan2. The offshore oil production of the northern Caspian Sea is considered to be of high risk because of complex geological formation, high oil pressure and shallowness of water (a few meter depth). Assuming 0.1% of total amount of oil produced is inevitable to go into the seawater, 70,000t/year of oil will go to the sea, suggesting that oil production would produce the amount of oil equivalent to the current discharge from the Volga and the Ural rivers.

It was estimated that 170 oil wells, which produced oil 20-25 years ago, are located on the seacoast and potentially covered by the seawater due to the Caspian Sea level rising. In order to prevent the oil spills to the sea, these abandoned wells need to be cleaned (estimated cost at KZT 10 billion). There are 23 oil wells in the area under flooding: 11 in Karajanbas, nine in Armand and three in Kalamkas. In 2002-2005, five wells were shut down by the republican budget (two in Northern Karajanbas, one in Karamkas and two in Aiyrdgaryl).

Oil spills from oil industry are caused by accidents, washing of tanks of tankers, and outflow of floods of oils. One ton of oil can cover approximately 12km^2 of water surface and pollute up to 1 million ton of seawater. The oil spills to the sea would kill living organisms of the sea cutting biological contact of water to the oxygen. The preventive measures for oil spills for emergency, such as oil fence, skimmer, collection boats, diffusion materials, absorbing materials, security equipment, spare parts, etc. need to be taken. In fact, the Government suspended the development of Kashagan oil field due to the violation against environmental regulations in August 2007.

1 Caspian Environmental Program (CEP). 2000. Oil Contamination of the Caspian Sea. Annual discharges are Volga – 241km^3, Kura – 13km^3, Terek – 8.5km^3, Ural – 8.1km^3 and Sulak 4km^3.
2 Progress report. Study on capacity development on pollution prevention and control in the Petroleum industry, JICA. 2006.

Moreover, a submerged Russian tanker Aksha and a drilling rig near Fort Schevchenko should be lifted in order to avoid oil spill. The zoning for Caspian water resource protection was carried out for 284km of four major cities along the coastal line (Aktau, Fort-Shevchenko, Kuryk, and Kenderli).

(2) Influence on marine resources

The declines of the population of major marine animals were observed. The cause of the population decline is controversial, either caused by contamination by oil production, infection, or overexploitation. The population decline of sardine, sturgeon and seal are well reported.

The population of sardine of the Caspian Sea has declined to one tenth in the recent years. It was pointed out that either jerry fish brought by oil tankers in 1998 or hydrogen-sulfide (H_2S) produced from oil wells had caused the decline of the fish population.

Of the world caviar-producing sturgeon population, 90% lives in the Caspian Sea. The number of sturgeons captured in Kazakhstan has declined significantly since the 1970's from 8,000t to 400t due to the reduction of river flow, the destruction of spawning sites, and overexploitation. The surgeon populations suffer greatly from illegal catches in the sea after disintegration of the states along the Caspian Sea from the former Soviet Union.

The population of the Caspian Seal has declined to one half during the 20th century. The mass deaths of seals were found in 2006, 2000, and 1997. Poisoning by hydrogen-sulfide (H_2S) from oil wells or infection by bacteria or virus may cause the mass death of seals.

(3) Water quality and health problems

In Mangistau Oblast, viral hepatitis is 1.5 times more frequent and 3.0 times higher than the national average. The deterioration of living conditions particularly in rural areas including the lack of drinking water is major problem

6.4.3 Solid wastes

(1) Industrial solid wastes

Mining wastes are characterized by unusual values of pH and electronic conductivity and the presence of pollutants such as heavy metals. Oil industries have historically dumped the wastewater and oily wastes to desert, and oil fields tend to be abandoned without rehabilitation measures once exhausted.

(2) Oil wastes

The total volume of oil wastes in Mangistau Oblast, including drilling wastes and oil slimes, is approximately 2.1 million m^3 (Table 74). Oil wastes in the oil pits, the central collection point of Uzenmunaigas (UMG) and the water-oil lake in Uzen constitute the major problem. These wastes are utilized partly as materials to pave roads in the oil field areas, but the amount is very limited. At the central collection point of UMG, during 1999 and 2006, 229,664t of oil was removed, but the visual level of oil stayed at the same level. The area of oil spills was reduced only by 5.2ha.

Table 74 Amount of Oil Wastes by Location

Location	Amount
Uzen	1,610,895
Zhetybai & Kalamkas	466,650
Karazhanbas	90,755
Total	2,168,300

According to the measurement carried out in 2004, the water-oil lake had area approximately 500ha with 389,000t of oil. The total of 13,700t of oil wastes was utilized from the lake for road development: 1,620t by Kazpolmunai, 1,912t by Tolkinneft, 8,916t by KBM, and 1,252t by KKM, corresponding only to 1% of the oil wastes in the Uzen oil field.

Oil wastes placed at public solid waste disposal also pose problems. As of July 2007, 28,796t of wastes of three danger classes and 84,759t of waste of four danger classes were placed at landfills, and 189,316t of wastes were treated at the Koktemat municipal solid waste facilities.

(3) Solid wastes from medical facilities

Disposal sites for medical solid wastes were installed in Zhanaosen in 2006. Disposal sites for all other rayon centers will be constructed in 2008.

(4) Solid wastes from slaughtered animals

Disposal sites for animal carcass, the first pit in central Asia for this purpose, were constructed at Kuryk and Fort Schevchenko at the cost of KZT 7.0 million/pit. The pits of 8m deep and 3m wide were constructed for dead animals infected with epidemic diseases that are feared to spread out throughout the region. No serious diseases were reported in the region except for Sylvania disease of cattle 30 years ago.

(5) Domestic solid wastes

The amount of domestic solid wastes is estimated as 95,000-110,000t/year in Aktau and 16,000-35,000t/year in Zhanaozen, 6,000ton/year in Kuryk, 7,000t/year in Shetpe, and 12,000t/year in Beineu, and 8,000t/year in Fort Schevchenko. Eleven landfill sites for domestic solid waste were placed in Mangistau Oblast.

Landfill sites in Aktau, Kuryk, Shetpe, and Beineu are planned to be constructed in 2007. Landfill sites in Zetybau and Zhanaozen need to be constructed (KZT 6 and 15 million, respectively). The problems of current domestic waste disposal are suggested as follows:

- Lack of hydro-geological consideration for landfill facilities
- No monitoring of landfill operation
- No registration for the enterprises to transfer garbage
- No sanitary and ecological requirements for the temporal storage
- No efforts to reduce the wastes
- No waste separation at sources
- No use and processing of wastes by enterprises
- No technology applied to the operation at landfills
- Existence of unauthorized dumping at landfill sites
- Unauthorized and uncontrolled dumping sites occupying large area

6.4.4 Radioactive wastes

(1) Koshkar Ata tailing

The tailing of uranium wastes poses the most serious environmental problem in Mangistau Oblast. The Koshkar Ata tailing pit located on a depression without water outflow, 5km away from the Aktau city, 7-8km from the Caspian Sea, was allocated for disposal of radioactive wastes. The hazardous industrial substances (mainly calcium phosphate and sulfide iron) as well as domestic wastes are also deposited in the tailing. Since 1965, approximately 52 million ton of radioactive wastes with 11,000 curies have been disposed in the tailing. The most toxic wastes disposed to the tailing are uranium

238, radium 226 and thorium 230.

Since the hazardous substance on the surface of tailing is blown to air by winds, 17,000-32,000t/day of re-treated sewage and 7,000t/day of non-treated domestic sewage from the Aktau city are discharged to the tailing. Currently, 70% of the surface of the tailing is covered with $CaSO_4$. Other components found in the tailing include iron, sulphur, tin, zinc, cobalt, arsenic, and selenium. Since several substances including uranium are mixed, it is difficult to recover and reuse them.

The rehabilitation and soil improvement project to cover the Koshkar Ata tailing by 30 cm soil was proposed in 2007 with the government fund of KZT 124 million. It is planned to cover the entire tailing in two years.

(2) Nuclear test sites

In Mangistau Oblast, underground nuclear tests were carried out in 1967 and 1970 at three sites in the eastern Mangistau and northern Karakiya near the border of Mangistau rayon, where the maximum of 12m deep and 500m wide subsided. There is no radioactivity up to three-meter distance from the point of the bomb blasts. The radioactivity levels are 400-500 curies at a surface point and increase up to 1,000 curies at one meter in depth. These areas were covered with concrete materials in order to avoid the access by animals.

(3) Nuclear power station

The only nuclear power station of the Country was built not far from the Aktau city center with a distilling installation. The spent uranium and radioactive wastes were sealed by the support of IAEA (International Atomic Energy Association).

(4) Radioactive waste from Uranium processing plant

In Kazakhstan, uranium is enriched at the three different levels: primary, secondary and third processing. In Mangistau Oblast, a primary processing plant was constructed in Aktau and operated from 1964 to the 1990's. After shutting down the plant, approximately 5,000t of metals were brought to outside the plant. The metals were not sold due to the high level of radioactivity, and thus brought back to Mangistau and dumped in the desert at 6-7 plots near Aktau. These metals were already collected and replaced in the processing plant.

A disposal site for low and medium level radioactive wastes are planned to be constructed at the area 43km from Aktau. A landfill site 300m deep will be constructed on a deep clay layer of soil at the cost of KZT 1 billion.

6.4.5 Desertification

In Kazakhstan, two third of the land is currently subject to different degrees of desertification. The Convention on Struggle against Desertification was ratified by Kazakhstan in 1997. Mangistau Oblast is considered to be one of the most vulnerable areas for desertification in the Country having already strong degree of desertification.

MOEP has developed a program against desertification for 2005-2015. The program is divided into three phases: the first stage (2005-2007) for inventory and estimation of degraded ground and the development of a pilot project; second phase (2008-2010) for the development and introduction of actual policy and economic measures for steady land tenure; third phase (2011-2015) for integration of measures with economic and social developments.

In Mangistau Oblast, a problem of desertification is characterized by the expansion of desert to rural settlements by sand movement. Some houses were already buried at some settlements due to the

expansion of desert from the east. The causes for the sand movement are considered as 1) the decline of water table; 2) the reduction of vegetation cover by plants use for cooking energy; and 3) overgrazing near the settlements. It is known that the groundwater table declined by 2-10m in Zhanaozen. After the collapse of the Soviet Union, animal grazing has become more concentrated near the settlements since transhuman grazing system became infeasible due to smaller farm size.

A pilot project against sand movement was started in Senek in 2003 with a budget of KZT 60 million. At the eastern and southern side of the settlement, local plants including Saxaul (*Haloxylon ammodendron*), Zhuzgun (*Calligonum leucocladum*), Teresken (*Ceratoides spp.*) covering 70% of the land with 8-10 lines were planted in 700ha of newly denuded sandy area. The plantation was successfully established and the sand movement was stopped in 2004. Saxaul trees were cut down by local people for firewood. One to two years later when the vegetation is sufficiently covered, sheep can be grazed at the planting sites. The same activities will start in Ushtagan in 2007. A state enterprise is proposed to be established to carry out the activities against desertification in Ushtagan and Senek.

In order to prevent sand movement, it is necessary to create 400-500m protected zone at the northern and western side of settlements. The regulation for the protected zone should be to prohibit activities to destruct vegetation such as animal grazing and fuel wood collection, and minimize transport movement in the zone.

6.4.6 Environmental monitoring

The framework for environmental monitoring in Kazakhstan is given by the law of environmental protection. The natural resource users conduct self-monitoring by hiring qualified inspectors, and report the results to government agencies. The state agencies monitor the environmental conditions and natural resources (Table 75). Air pollution is calculated by CO, SO_2, NO_2, NH_3, and other indices, while water pollution by BOD, DO, and other indices. The maximum permissible concentrations (MPC's) of these substances are given in Table 76. In addition to the MPC's by individual indices, an integrated air and water pollution index is also used.

Table 75 Monitoring Responsibilities by Related Organizations

Organization	Responsibilities
KAZHYDROMET	- Inspection of air, water, soil pollution sources. - Monitoring of air/water quality, radiation, hydrological and meteorological conditions - Maintenance of monitoring data
Regional Oblast and cities executive bodies (Akimat)	- Inspection and monitoring at local level - Report on violation to responsible bodies - Environmental monitoring
Ministry of Health	- Setting maximum permissible concentrations (MPC's) - Establishment of buffer zones around the industrial plants on the basis of heath and sanitary considerations. - Assessment of emission sources and their physical hazardous effects
Ministry of Agriculture	- Monitoring of water used for irrigation - Preparation of cadastres for soil and water resources
Ministry of Interior	- Monitoring of vehicle emission gas - Management of traffic police activities
Enterprises	- Monitoring of emissions produced by the enterprises based on measurements and mass balance calculations - Report on the monitoring records on quarterly and yearly basis to authorities

Source: Environmental Performance Review of Kazakhstan (2000), UNECE.

Table 76 Maximum Permissible Concentrations of Pollution Substances

(1) Major air quality parameters

Parameter	MPC's (mg/m^3)	
	20 minutes	24 hours
Carbon monoxide	5.00	3.00
Sulphur dioxide	0.50	0.05
Nitrogen dioxide	0.085	0.04
Particulate matters	-	0.05
Lead	-	0.0003

(2) Major water quality parameters

Parameter	Unit	MPC's	
		Fishery purposes	Drinking purposes
pH	-	7-8	7-9
Dissolved oxygen	MgO_2/l	>6.0	>6.0
Chlorides	Cl mg/l	300	250
Salinity	mg/l	1,000	1,000
Copper	Cu mg/l	0.001	1.0
Zinc	Zn mg/l	0.01	3.0
Nickel	Ni mg/l	0.01	0.1
Cadmium	Cd mg/l	0.005	0.001
Mercury	Hg mg/l	0.0005	0.0005
Chromium	Cr (IV) mg/l	0.001	0.05
Arsenic	As mg/l	0.05	0.05
Iron	Fe mg/l	0.05	0.3
Lead	Pb mg/l	0.03	0.03
Ammonium	mg N/l	0.4	2.0
Nitrites	mg N /l	0.02	0.913
Nitrates	mg N /l	9.0	10.16
Phosphates	mg P/l	0.35	3.5
COD	mg/l	15.0	30.0
BOD	mg/l	3.0	3.0
Oil Product	mg/l	0.05	0.1
Phenols	mg/l	0.001	0.001
Cyanides	mg/l	0.05	0.05

Source: Environmental Performance Review of Kazakhstan (2000), UNECE.

Monitoring of water quality by the Government is carried out in three ways. KAZHYDROMET monitors at the Aktau sea port, beaches and settlements for mineral oil, phenols, nitrites, nitrates, nitrogen ammonia, iron, phosphates, BOD, DO, temperature, calcium, magnesium, carbonates, hydro carbonate, anion, cat ion, pH, etc. The quality of potable water is monitored by the Department of the State Sanitary and Epidemiological Supervision, and the quality of groundwater is monitored by the oil and gas enterprises.

Kazhydromet monitors water quality of the Caspian Sea. Along the coast of Aktau, water quality is monitored at six to eight points per day, and near the oil field, seawater quality is monthly monitored jointly with MOE and FFHC. The water quality at offshore oil fields is monitored by oil companies through qualified inspectors and reported to MOEP. However, large-scale state monitoring for seawater has never been carried out, which would cost KZT 10 billion as estimated. MOEP does not have boats to monitor water quality in the sea.

6.4.7 Environmental education and awareness program

As activities for awareness of environmental protection, Mangistau Oblast organizes competitions of nature harmony activities by schools and scientific conferences, establishes a science technical union for ecological education, and publishes environment related magazines.

A competition of mass madia for nature related programs such as video or article of newspapers, and a

seminor of science conference with other oblasts of western Kazakhstan (West Kazakhstan, Aktube, Atylau, Mangistau, and Kizilorda oblasts) were held by the initiative of Mangistau Oblast. The lectures and meetings for environmental education at schools, providing educational materials for schools were carried out and social involvement in environmental issues are promoted.

6.5 Issues on Environmental Management in Mangistau Oblast

The environmental management in Mangistau Oblast is a matter of survival demanding urgent attention and effective measures against both imminent and long-lasting problems. While the negative environmental heritage from the Soviet era such as the radioactive wastes in the Koshkar-Ata tailing pit and at former nuclear test sites, power plant and uranium processing plant has stared to be managed, there remain inherent environmental problems due primarily to natural conditions of the Oblast aggravated by the economic development and the population growth.

The main issues are as follows:

1) Proper treatments of radioactive and toxic substances produced during the Soviet era
2) Protection of the water quality of the Caspian Sea to ensure safe and reliable water supply to coastal settlements
3) Provision of adequate water supply for inland settlements
4) Enhancement of land productivity of vast rural areas
5) Reduction of air pollution
6) Prevention of desertification
7) Proper management of solid wastes
8) Biodiversity conservation and protected area management
9) Environmental education and awareness

Each issue is discussed. Strategy to deal with them is elaborated in Chapter 5.

6.5.1 Treatment for radioactive and toxic substance

The Koshkar Ata tailing pit with radioactive wastes from a uranium processing plant, as well as oil wastes from oil excavation sites constitutes the remaining problems for human health. It needs special attention due to the construction of new Aktau city on the northern side of the existing Aktau city. The proper treatment for the pit is an urgent issue. The rehabilitation and soil improvement project to cover Koshkar Ata tailing by 30cm soil would be started with the government fund of KZT 124 million in 2007. It is planned to cover the entire tailing in two years. Project implementation as well as environmental risk by hazardous substances for Koshkar Ata tailing pit needs to be monitored.

6.5.2 Protection of water quality of the Caspian Sea

The oil production in the northern Caspian Sea is expected to increase significantly after the Kashagan oil field becomes operational. The total production including other offshore fields could reach 100 million ton/year. If 0.1% of total oil produced leaks from the excavation sites, the amount of oil that gets into the northern Caspian Sea may thus be as much as 100,000t/year. To obtain the seawater satisfying the MPC of oil or 0.1ppm for drinking purposes with this amount of oil, the seawater of 1,000 billion ton would be required. This amount corresponds to 1,250 times the current annual intake of the seawater at Aktau.

The offshore oil production of the northern Caspian Sea is considered to be of high risk because of complex geological formation, high oil pressure and shallow water. Therefore, the extraction needs to be undertaken with utmost care. Oil spills from offshore oil production derives from washing of tankers, outflow of floods of oil, and accidents. Preventive measures for accidents such as oil fence, skimmer, collection boats, diffusion materials, absorbing materials, security equipment and spare parts need to be applied to offshore operations. In addition, abandoned wells on the coast and sunken ships

should be properly treated.

6.5.3 Water supply for inland settlements

The majority of people in rural areas of Mangistau Oblast rely on groundwater. After the collapse of the Soviet Union, however, many water supply systems based on groundwater have been neglected due to lack of management. Many of them need to be restored to improve the quality of water for rural people and to support economic activities. Participation of local stakeholders and their organizing would hold a key for restoration and sustainable management of the water supply systems.

6.5.4 Enhancement of land productivity

Land productivity in rural areas is constrained not only by water shortages but also by wind erosion. To enhance the land productivity, tree planting and management of grazing land and pastures may be undertaken. The initiative of the Oblast government is indispensable as no immediate benefits are expected from these measures.

6.5.5 Reduction of air pollution

The amount of dust observed in Aktau,, Zhetibai and Zhanaozen exceeds the environmental standards. The air pollution by dust is also a serious problem in rural centers of Shetpe, Kuryk and Beineu. A possible counter-measure is to establish a buffer zone by tree planting around the settlements and excavation sites, taking account of dominant wind directions.

The flare gas utilization program initiated in 2006 to reduce the gas emission seems successful. As the counter-measures taken by enterprises are varies, it is important to share the experiences so that more effective measures can be taken at different oil fields.

6.5.6 Prevention of desertification

The desertification problem in Mangistau Oblast takes a form of the expansion of desert area to rural settlements by sand movement. The causes of the sand movement are considered to be: 1) decline of groundwater tables, 2) reduction of vegetation cover by the use of plants for cooking, and 3) overgrazing near the settlements. The pilot tree plantation experimented for the Cenek settlement showed successful results. The selection of tree species is critical for the success, and saxaul is considered worth trying in Mangistau Oblast.

6.5.7 Solid waste management

Oil wastes at oil pits, the central collection point of Uzenmunaigas and the water-oil lake in Uzen are the major problems. The use of oil wastes for road pavement and other purposes is still very limited. The large amount of oil wastes accumulated at public solid disposal sites poses major threat to environment.

The management system for domestic solid wastes has not been well established in Mangistau Oblast. The current problems include: 1) lack of planning for landfill sites, 2) lack of management of landfill operation, 3) no regulations for enterprises' garbage transfer, temporary storage and dumping, 4) no control of unauthorized dumping at landfill sites, and 5) unauthorized dumping outside the landfill sites. Waste separation at sources and recycling have not been undertaken in the Oblast. At the bottom of these problems are the lack of awareness for the solid waste management by enterprises and people.

6.5.8 Biodiversity conservation and protected area management

The management of protected areas in Mangistau Oblast is constrained by remote locations of most areas, while the remoteness has helped to preserve these areas. Most reserves other than the Ustyurt state reserve are not managed except occasional visits by FFHC staff. As tourism activities are promoted in these areas, biodiversity conservation and protected area management would become important considerations. The opportunity for integrated management and use for tourism may be presented by the Karakolsky zoological reserve near the Aktau city, where wetland for migratory birds have been created by the hot water drainage from a desalinization plant.

6.5.9 Environmental education and awareness

Environmental education plays an important role for environmental management in the long run. The Akimat of Mangistau Oblast has been organizing competitions of natural harmony activities among schools and scientific conferences, and publishes environment related magazines. Currently, lectures related to environmental education are taught at schools only on ad hoc basis. A variety of environmental problems existing in Mangistau Oblast as described above present opportunities for environmental education and awareness such as water saving, waste separation and recycling, tree planting, and oil wastes cleaning.

CHAPTER 7 CAPACITY DEVELOPMENT

7.1 Objective and Methodology

The present study shares the definition of "capacity development" presented by UNDP (United Nations Development Program) as follows.

"Capacity" is defined as "the ability of individuals, institutions and societies to perform functions, solve problems, and set and achieve objectives in a sustainable manner". "Capacity Development" is thereby the process through which the abilities to do so are obtained, strengthened, adapted and maintained over time.

Capacity development holds the key for a balanced development of Mangistau Oblast. The need for capacity development will be assessed within the context of the following regional development objectives for Mangistau Oblast.

a. To promote economic development in a diversified manner: capitalizing on energy sector development and dispersing its effects to non-energy sector activities
b. To distribute the fruits of economic development to all segments of Mangistau Oblast, socially and geographically
c. To ensure sustainable development with due consideration to environmental management

Capacity development in the present study is analyzed at two levels, Mangistau Akimat level and Mangistau Oblast level, focusing on the following aspects.

Mangistau Akimat level

- Capacity of Mangistau Akimat officials
- Organizational and institutional capacity of Mangistau Akimat

Mangistau Oblast level

- Investment and business climate
- Cooperation mechanism between public and private sectors

7.2 Existing Conditions and Problems

7.2.1 Individual, organizational and institutional capability of Mangistau Oblast Akimat

Interview surveys were conducted in October 2007 by the JICA Study Team with directors and deputy directors of the following 14 departments and management units of Mangistau Oblast Akimat office in order to clarify the views of directors on the need for capacity development.

- Territorial Management of Environmental Protection (republican)
- Health Department
- Management Unit of Physical Training and Sports
- Management Unit of Construction
- Management Unit of Passenger Transport and Motor Road
- Management Unit of Natural Resources and Nature Utilization Regulation
- Management Unit of Energy and Municipal Services
- Department of Education
- Management Unit of Agriculture
- Management Unit of Architecture and Town Building

- Department of Economy and Budget Planning
- Department of Entrepreneurship and Trade
- Management Unit of Land Relations Administration
- Department of Statistics (republican)

A set of questions were asked about the following aspects.

- Evaluation of directors and deputy directors on the capability level of their staff
- Their views on the need for capacity development
- Problems faced by them with regard to human resources management
- Solutions

The following part presents the major findings on these aspects.

(1) The directors view the capability level of their staff generally highly. Out of 14 directors, those evaluating the capability of staff as "very well" numbered 5, whereas those judging "fair" was 6. The remaining 3 evaluated it as somewhere between "very well" and "fair".

(2) Concerning the kind of capability that requires upgrading, there was not big difference among them. It can be summarized all kinds of capability need upgrading, because new issues like laws and new methods always come up. The numbers below are those of directors indicating the need for upgrading for respective type of capabilities.

Area of capacity development need for upgrading	No. of directors recognizing
Information collection capability:	5
Analytical capability:	6
Solution identification capability:	7
Planning capability:	7
Presentation capability:	7
Coordination capability:	5
Financial management capability:	6
Technical capability:	5
Schedule management capability:	6
Monitoring capability:	6
Adjustment capability:	5

(3) Shortage of skilled and qualified experts was mentioned by many directors. This opinion was observed more in the management units concerning infrastructure rather than mainstream sections such as those responsible for economy and entrepreneurship and the sections responsible for welfare such as health and education which have long history of high level services from the USSR time. For example, the number of doctors per 1,000 population in Kazakhstan is 2.0 and 7.3 in rural area and Almaty respectively, whereas those in Japan and USA are 2.0 and 2.3. Traditionally important sections, thus, seem to be budgeted and manned sufficiently compared with infrastructure related sections.

(4) The main reason for the shortage of qualified experts is brain drain by job hopping. According to them, there are many cases in which young staff who joined the department or management unit quit after working for some years and move to private companies. In one section, there were 50 cases in three years in which the staff joined the section but later quit to move to private companies. This happens because of a big difference in salary level. It was indicated that while the salary level of the akimat departments and management units are somewhere between US$100-200/month, that offered by private companies is US$600 or even as high as US$3,000/month.

(5) Solutions to this problem would be to raise salary by 30-40% or by double according to them. This kind of simplistic view, however, should be well examined before implementation in consideration of other related factors.

(6) Mangistau Akimat Office departments and management units have access to the programs for training their staff which are provided by central government and oblast akimat. The following organizations provide training programs.

- Eurasian Training Center of Government Employees of the Public Service Affairs Agency in the Republic of Kazakhstan
- Academy of Public Administration under the President of the Republic of Kazakhstan
- Regional Center of Professional Development of Government Employees

The subjects offered by the third regional center based in Aktau include budget processing, legislation of state organizations, local and general management, personnel management, political technology, standard of state services and simplification of bureaucratic system.

Views toward the training programs offered by these organizations vary from director to director and depending on the area of responsibility of the section. While there are positive views admitting their usefulness, other opinions point to the lack of subjects relevant to their section or insufficient level of training. Since technical subjects are not offered by these programs, they sometimes do not satisfy government employees with responsibility in technical matters.

(7) There were a number of opinions indicating shortfalls in organizational and institutional aspects such as follows.

- The present tender system sometimes creates problems in technical aspect because of too heavy emphasis placed on "low cost principle". Contract sometimes goes to companies with low technical capability just because of the lowest bid offered by them, resulting in substandard construction work.
- There is no section in Mangistau Oblast akimat responsible for transportation planning. Management Unit of Passenger Transport and Motor Road is responsible only for maintenance of roads and coordination of passenger transport activities. The Ministry of Transport and Communication is the responsible organization. Lack of planning at local level sometimes has been creating mismatches between demand for repair work and actual budgeting.
- Communication between central and oblast organizations for environmental management seems insufficient. The environmental sections at oblast level and city level have to carry out their activities on their own without good knowledge about national policies and strategies for environmental management due to lack of proper guidance by the central organization. Besides, monitoring of the Caspian Sea is undertaken by Management Unit of Natural Resources and Nature Utilization Regulation of the Mangistau Akimat Office, only on the basis of local assembly's decision, a kind of informal arrangement. Environmental management of the Caspian Sea is a more global issue not limited to Mangistau Oblast, requiring more positive engagement of the central ministry.

(8) Although there is positive recognition on the part of the Mangistau Oblast Akimat office on the importance of promoting private business activities, it still remains at a conceptual level and has not developed sufficiently into operational level. There is a gap between Akimat officers and private businessmen about the evaluation of business and investment climate in Mangistau Oblast. Investment climate in the oblast is not as satisfactory as the akimat officers perceive to the eyes of private people.

7.2.2 Investment and business climate

(1) General

Investment and business climate is an important factor for economic development. Its improvement can be regarded as capacity development at organizational and institutional levels of Mangistau Oblast, especially with regard to economic development. Investment and business climate is characterized by a number of elements such as legal framework for investment and business promotion, conditions of infrastructure, quality of human resources and support measures by government.

(2) Investment and Business Climate in Kazakhstan

Investment and business climate in Kazakhstan can be featured as rapid improvement in recent years, showing better performance than many neighboring countries, but still embracing a number of shortfalls to the eyes of investors and business. The following is the result of the survey conducted by the World Bank every year regarding investment and business climate of the countries in the world, titled "Doing Business 2008 How to Reform".

Kazakhstan was ranked 71st in 178 countries for April 2006-June 2007 (reported in *Doing Business 2008*) in terms of overall ease of doing business as shown in the table below.

Ranking of Kazakhstan on the Ease of Doing Business in 178 Countries

Item	2008	2007	2006	2005
Doing business (overall)	71	71	63	82
Starting a business	57	48	40	37
Dealing with licenses	173	173	119	121
Employing workers	22	23	22	21
Registering property	72	71	76	81
Getting credit	48	45	48	117
Protecting investors	51	49	46	43
Paying taxes	44	44	66	63
Trading across borders	178	177	172	171
Enforcing contracts	28	28	27	27
Closing a business	100	103	100	102

Source: Economy Rankings, "Doing Business" website
http://www.doingbusiness.org/EconomyRankings/

The position of Kazakhstan was relatively good compared to the neighboring Eurasian countries as shown below. It was only Georgia (18), Armenia (39) and Turkey (57) that exceeded Kazakhstan.

Country	Rank
Georgia	18
Armenia	39
Turkey	57
Kazakhstan	71
China	83
Kyrgyz Rep.	94

Country	Rank
Azerbaijan	96
Russia	106
Uzbekistan	138
Ukraine	139
Tajikistan	153

Source: ibid.

The position improved from 82nd in 2005 to 71st in 2008, mainly due to improvement in "getting credit" from 117th to 48th and "paying taxes" from 63rd to 44th. The problematic factors defined as those lower than 71 were "dealing with licenses (173)", "registering property (72)", "trading across borders (178) " and "closing a business (100)".

Kazakhstan is compared with Singapore, the first ranking country in overall easiness in doing business, in the most problematic two factors of Kazakhstan, "dealing with licenses" and "trading across borders" as follows.

The indicators for "dealing with business" record all the procedures officially required for an entrepreneur in the construction industry to build a warehouse, as the representative indicator for licenses. Cost includes all the fees incurred on every procedure of license acquisition. Cost for trading across the borders include all the fees associated with completing the procedures such as cost of documents, administrative fees for customs clearance and technical control, terminal handling charges and inland transport.

Competitiveness in investment climate of Kazkahstan, especially in the institutional aspect, will be significantly improved, once conditions in license issuance and international trade procedures are revamped. High cost for trading across borders indicates the need for upgrading of transportation infrastructure to reduce the cost of inland transportation.

Despite the relatively favorable investment and business climate in Kazakhstan, there are a number of factors pointed out as shortfalls or constraints by private companies such as follows, which largely support the World Bank evaluation above.

- Regulatory environment based on a "presumption of guilt" toward business
- Excessive control by official bodies regarding customs, tax inspection, sanitary control, advertising regulations and many others
- Outdated regulations
- Contradictions in regulatory norms between Kazakhstan and western countries
- Ambiguity of laws and arbitrary interpretation by officials
- Resultant high operational cost to ensure regulatory compliance

It is anticipated that the planned accession to WTO would solve these problems in a mutually beneficial manner, decreasing the workload both for regulatory bodies and private companies.

(3) Investment and Business Climate in Mangistau Oblast

1) Investment Potential Survey (IPS)

Outline of IPS

"Investment Potential Survey (IPS)" was undertaken by a company called BRiF, a Kazakhstan consulting firm based in Almaty, between September and December 2007. An outline of IPS is summarized as follows.

Objective

The objective of IPS is to collect information from foreign and domestic investors operating in Kazakhstan on the level of their interest in making new investment in Mangistau Oblast and major factors they consider essential for making such an investment decision.

Methodology

Interview surveys were conducted utilizing questionnaire forms developed by the Study Team and translated into Russian by BRiF.

Survey location

IPS was conducted in Almaty, Atyrau and Aktau.

Sample size

The total number of samples collected was 50.

2) Final Results of IPS

Volume 4 "Survey Report" presents the final results of IPS based on the information collected from 50 companies in Aktau, Almaty and Atyrau. A summary of the final results follows.

Mangistau Oblast

a) There were 15 questions asked about investment and business climate in Mangistau Obalst for 15 factors. The answers were chosen from "Excellent", "Good", "Fair", "Bad" and "No idea". "Excellent" and "Good" are regarded as positive answers, whereas "Fair" and "Bad" are viewed as negative answers. "Fair" is interpreted as "not bad, but not good either" indicating existence of some problems. The results show as below that there were 2 positively judged, 9 negatively judged and 4 split answers.

(Positively judged factors)
- Availability of qualified labor
- Access to foreign market

(Negatively judged factors)
- Incentive measures
- Easiness in acquiring raw materials
- Easiness in procuring spare parts
- Simplicity in procedures
- Clearness and consistency of laws and regulations
- Provision of information by government on investment climate
- Access to financial assistance by government
- Overall support by government
- Cleanliness of government

(Split judgment)
- Infrastructure
- Wage level of labor
- Quality of labor
- Access to domestic market

b) Overall investment and business climate in Mangistau Oblast was evaluated positively with positive answers accounting for 70%. This fact may look contradictory to the result above. It could be the case that companies' view toward business chance in Mangistau Oblast is positive enough to surpass negative aspects.

c) The questions focusing on human resources aspect revealed that the interviewed companies are split, one group having no problem, while the other group facing problems. The companies indicated a number of measurers they expect to be provided by the government such as strengthening of skill development in Mangistau Oblast and other part of Kazakhstan, provision of financial assistance for skill training by companies and strengthening of basic education.

d) Kind of skill development needed included technical skill, financial management skill and personnel management skill.

Almaty

A set of questions were asked to 30 companies operating in Almaty with regard to their view about possibility of investment in Mangistau Oblast and investment/business climate in Mangistau Oblast.

a) Reflecting the fact that many companies interviewed are not actually operating in Mangistau, there was rather high proportion of "no idea" selected as answer with a range of 20% to 40%.

This fact may indicate insufficiency in the dissemination of information on Mangistau Oblast as investment destination.

b) Mangistau Oblast is regarded very positively by Almaty companies as offering high business chance. The companies with high possibility of actually making investment there reached 80%.

c) Concerning the 15 questions about investment and business climate, the factors evaluated positively with proportions of "excellent" and "good" combined exceeding 50%, numbered four, while the factors judged negatively with proportions of "fair" and "bad" combined exceeding 50%, was eight as shown below. The remaining three questions were answered in a split manner, both positive and negative answers accounting for 50%.

(Positively judged factors)
- Incentive measures
- Quality of labor
- Easiness in procuring spare parts
- Simplicity in procedures

(Negatively judged factors)
- Infrastructure
- Wage level of labor
- Easiness in acquiring raw materials
- Clearness and consistency of laws and regulations
- Provision of information by government on investment climate
- Access to financial assistance by government
- Overall support by government
- Cleanliness of government

(Factors with split answers)
- Availability of qualified labor
- Access to domestic market
- Access to foreign market

Atyrau Oblast

Companies in Atyrau were included as target of the survey with a view to make a comparison of Mangistau Oblast and Atyrau Oblast, the two major investment destinations in the western part of Kazakhstan with rich endowment of oil and gas resources

a) Most of the companies interviewed (80%) made no comparison of Atyrau Oblast and Mangistau Oblast before making a decision in investing in Atyrau Oblast. This may be due to endogenous nature of the companies.

b) Concerning the 15 questions about investment and business climate, the factors evaluated positively with proportions of "excellent" and "good" combined exceeding 50%, numbered two, while the factors judged negatively with proportions of "fair" and "bad" combined exceeding 50%, was 13 as shown below.

(Positively judged factors)
- Infrastructure
- Wage level of labor

(Negatively judged factors)
- Incentive measures
- Quality of labor
- Availability of qualified labor
- Access to domestic market
- Access to foreign market

- Easiness in acquiring raw materials
- Easiness in acquiring spare parts
- Simplicity in procedures
- Clearness and consistency of laws and regulations
- Provision of information by government on investment climate
- Access to financial assistance by government
- Overall support by government
- Cleanliness of government

c) Overall, investment and business climate in Atyrau Oblast is evaluated negatively with negative view accounting for 67%.

d) Human resource is a problem for 78% of the companies interviewed. Shortage of skilled labor is cited as the problem.

e) The companies expect the government to extend support in skill development by strengthening skill development in Atyrau Oblast and other part of Kazakhstan, provision of financial assistance for skill training by companies and strengthening of basic education.

3) Other information

The condition in Mangistau Oblast seems to be lagging behind more advanced areas such as Almaty and Astana due to shorter history of being exposed to international economic cooperation. A survey was conducted in 2006 by the Forum of Entrepreneurs of Kazakhstan for three oblasts in Kazakhstan including Mangistau as part of a World Bank Program. This survey based on interviews with companies operating in Mangistau Oblast revealed views of the private companies with regard to constraints in business development such as follows.

- Difficulty in hiring qualified personnel for managers posts, professional workers, service people, engineers and human resource specialists.
- Type of professional works for which recruitment is difficult include “marketing and sales”, “finance, accounting and budgeting”, “management process”, “general management”, “engineering”, “management of factories and machinery” and “information technology”.
- The major constraints for business development are the following.
  - Shortage of qualified personnel
  - Limited access to credit resources
  - Corruption and incompetence of officials
  - Bureaucracy, absence of transparent procedures and delayed decisions by civil servants
  - Dishonest competition
  - High taxes and customs fees
  - Long time required to solve issues with authorities
  - Frequent change of rules and procedures of regulations
  - High and unpredictable costs
  - Unpredictable requirements from officials
  - Absence of clear norms
- Top management people spent all their time to sort out issues with officials.
- Average length for taxation inspection and customs inspection are 27.4 hours and 14.5 hours respectively. The longest tax inspection took as long as 93.3 hours.
- The following measures are expected to be taken by the central and oblast government.
  (1st place) Adjustment of rates of taxes and fees
  (2nd place) Improvement in access to credit resources and reduction of bank credit interest rate
  Improvement of akimat works in supporting business
  (3rd place) Improvement in the procedure of state purchases
  (4th place) Improvement in transportation infrastructure

- In terms of infrastructure, priority is given to automobile roads as first, buildings for business development as second and railroads as third.

An interview conducted by the JICA Study Team in July 2007 with a private company operating in Aktau made similar points as follows.

- It took them 4 months to acquire a business license. They had to approach 18 different departments.
- They have no problem in infrastructure. Land is provided. Privileges are beneficial for them.
- There are corruption and nepotism, especially with regard to allocation of railway wagons.
- Supply of spare parts and tools is a problem. They are importing all the parts from abroad, which is costly. This leads to high level of inventory with 2 to 3 months lead-time required.
- Communication with Mangistau Akimat is only one-way. No two-way communication exists.
- They want to join some kind of business association, but none is available.

7.2.3 Existing policies and organizations for human resources development

Human resources development holds the key for the development of Mangistau Oblast in a diversified manner. Mangistau Oblast has a high potential for economic growth led by non-energy activities. The energy sector development would create various opportunities for growth of related industries and strengthen financial base of Mangistau Akimat by increased tax revenue from the energy sector. With financial resources and opportunities there, the key for development is the provision of highly skilled labor matched to the demand of those non-energy economic activities. Preliminary observation, however, indicates that there is a vast gap between the demand and supply of good labor force.

An interview with a private factory operating in Aktau City indicated that human resource is at present a critical constraint for business development in Mangistau. The phenomenon that is taking place in Mangistau Akimat office is observed also in private companies in that qualified labors are mostly recruited by energy sector companies that pay much higher salary than non-energy sector companies and organizations. The shortage of workforce takes place both for management posts and at workers level. This company had to recruit managers from other province where they had previous experience of operation. The workers are sent to other oblasts and foreign countries for training, which is costly. Kinds of skills requiring training are welding, grinding and NDT (non-destructive testing), which are common skills for many industries in Mangistau according to them. There is no skill training programs available in Mangistau at present. They were advised by Akimat to raise salary to compete with energy companies for good labors, which is not feasible for them. This episode indicates lack of understanding and poor support by Mangistau Akimat.

Despite this kind of episode, Mangistau Akimat is well aware of the situation and has stipulated the importance of human resources development matched to demand by the private sector in its Medium-Term Development Plan for 2006-2008 as summarized below. The question now would be to what extent these policies for human resources development can be put into practice and begin to benefit individual private companies.

(1) Primary and intermediate vocational education

a) Target: to develop human resources with modern skill able to respond to technical requirements by the labor market

b) Issues
   - To improve and enhance physical environment for vocational education
   - To increase financing to support vocational education and training for technical and service jobs
   - Training of workers and experts with high quality and competitiveness matched to the requirements by the labor market

- Strengthening of social cooperation at vocational education institutions including practical application of the skills and strengthening of job placement function
- Introduction of a system of evaluation and certificate for skills

c) Specific measures
- To make vocational education compulsory
- Provision of teaching materials suited to production process of modern factories
- Improvement of accounting system
- IT promotion

(2) Advanced vocational education

a) Target: Improvement of advanced vocational education system under globalization and market economy circumstance

b) Issues:
- To improve and enhance physical environment for advanced vocational education
- Improvement of quality of advanced vocational training
- Promotion of collaboration with private companies, especially those with the most updated technology, for creating opportunities for students to experience on-the-job trainings

c) Specific measures
- Introduction of new subjects, especially practical subjects related with economy
- Implementation of Regional Plan "2006-2008 Training of Workforce" under preparation
- Training of experts matched with demand in the labor market
- Introduction and development of a job placement mechanism for graduates of higher education organizations in cooperation with private companies
- Upgrading of the quality of teaching faculty
- Implementation of collaborative academic research programs
- Prioritization of scientific areas and specialties conducive to regional development
- Development of educational system after higher education level

As part of the government program for human resources development, there is a plan to establish the Caspian University of Technology ("CUT" hereafter) as an upgrading of the existing Aktau State University after Sh. Esenov. Its outline is presented hereunder.

- The University is panned to be opened in the year 2008.
- Its objective is to provide highly qualified specialists familiar with international standards and foreign language and with work experience overseas and with international companies.
- Among a number of principles include combination of "fundamental" and practical" approaches, emphasis on "how to do" approach, multi-profile training of future specialists, integration of education, science and industry and emphasis on academic flexibility.
- There are going to be 36 disciplines at bachelor's level, 12 disciplines at master of science level and 4 disciplines at PhD level.
- Specialty areas include the following.

(Technical profile) geology and valuable fossil deposits, oilfield, chemical technology of inorganic matter, chemical technology of organic matter, machinery and equipment technology, mechanical engineering, transportation technology, offshore equipment, heat power systems, electrical power systems, ecology and environment, information technology (IT), computers and software, mathematical and computer modeling*, instrumentation and controls, construction, safety and environment, standardization, meteorology and certification, material science and technology of materials*, production of construction materials and structures*,

(Non-science/social profile) international diplomatic affairs, linguistics, law, law enforcement activities, economics, management, accounting and auditing, finance, government and administration, marketing, logistics and transportation, land development and land registry, customs, archaeology and ethnology*, social services*, tourism*

(Educational profile) Pedagogy and methods of primary education, pedagogy and psychology, mathematics, sports, physics, IT, chemistry, biology, history, land and economics, geography, Kazakh language and literature, Russian language and literature, two foreign language, music*,

Note: Those with "*" are the subjects to be newly taught in the University.

- The number of professors and students are planned to be 1,000 and 8,000 respectively.
- A land parcel with an area of 32ha is allocated in the micro region 32 of Aktau City. The construction works started in 2007 and is scheduled to finish in 2011. The total construction cost is estimated at KZT 21.4 billion, broken down into KZT 9.8 billion for buildings, KZT 4.9 billion for laboratories, parks, furniture and equipment and KZT 6.7 billion for housing on mortgage and territory development.

Table 77 presents the existing vocational training centers, vocational schools and colleges, both state and non-state. The information collected from some of these organizations is presented in Appendix.

Table 77 Existing Vocational Training Centers, Vocational Schools and Colleges

Category	Name of School
Vocational training center*	1. KADO – EDUCATION Ltd. - types of activity: training, retraining and improvement of professional skills by directions: • Operation, maintenance service and repair of sea techniques • Specialties of machine industry • Construction specialties • Working specialties for foundry manufacture • Roads construction • Welding manufacture • Electric mounting works 2. CTR PROJEKCTS Ltd - a professional training for construction industry 3. Caspian Technical Resource Ltd - a professional training for construction industry, servicing of pipelines 4. Corporate Educational Center Ltd of "Kazmunaigaz" JSC, Aktau city 5. Aktau Training Center, which will be opened after repair works completion in January, 2008. Its educational center has been established under support of « Nursultan Nazarbaev's Fund" Public Foundation and RKK Norway Foundation (comprising resources of 32 colleges in Rogaland district) for training, retraining and professional skills improvement of personnel and experts for oil-and-gas industry in accordance with international requirements.
Vocational school	Professional Lyceum No. 1, Aktau city Vocational School No. 3, Zhanaozen city Vocational School No. 5, Shetpe village in Mangistau rayon Beineu Casiptik Mektebi, Beineu village in Beineu rayon Karakiya Vocational School, Zhetybai village in Karakiya rayon Vocational School No. 018, Aktau city
State college	Mangistau Humanitarian College, Aktau city Mangistau College of Arts, Aktau city Mangistau Polytechnic College, Aktau city Mangistau Energy College, Aktau city Zhanaozen Oil and Gas College Named after O. Turmaganbetuly, Zhanaozen city Beineu Humanitarian-Economic College, Beineu village in Beineu rayon Mangistau College Affiliate, Bautino village in Tupkaragan rayon Mangistau Oblast Medical College, Zhanaozen city College of Aktau State University Named after S. Esenova, Aktau city College under Naval Institute, Aktau city

Category	Name of School
Non-state college	Meirbike Medical college, Aktau city
	Kainar College, Aktau city
	College of Foreign Languages, Aktau city
	College of "Bolashak" Kazakhstan Modern Academy, Aktau city
	Aktau Registration-Technological College, Aktau city
	Lingva College of Foreign Languages, Zhanaozen city
	Zhanaozen Polytechnical College, Zhanaozen city
	Aktau College Affiliate of Academy of Transport and Communications JSC Named after M. Tynyshbaev, Aktau city

*Information obtained from Mangistau Oblast akimat office

7.2.4 Private-public cooperation

Promotion of cooperation among private companies would be an important element of organizational capacity development for Mangistau Oblast. The ultimate goal would be for the private sector and Akimat office to regard each other as partners, exchange freely the views from respective perspective and moves forward hand in hand to achieve regional development goals. For this kind of mechanism to function, private companies should have some kind of body to represent them. This body could function as the channel of communication with the akimat office, integrating the voices from private companies, presenting them to the akimat office and also transmitting the messages from the akimat office to private companies.

This kind of mechanism is already functioning at the national level with two organizations identified as representing private sector: Foreign Investors' Council (FIC) and the Forum of Entrepreneurs of Kazakhstan (FEK). FIS was established in 1998 to ensure direct dialogue between investors and the government. FIC is chaired by the President of Kazakhstan. It holds meetings once or twice a year. Senior management of the international financial organizations and foreign companies represent the private sector. FIC has been instrumental in solving problems and improving business environment, tackling various problems in judicial, legislative, taxation, procedural, labor, educational and environmental aspects.

FEK is oriented more toward domestic medium and small scale entrepreneurs. Its mission is defined as contributing to creation of a favorable economic climate in which small and medium size businesses in Kazakhstan are able to create jobs and operate profitably. Its tasks include facilitation in the creation of business associations and strengthening their mutual cooperation, creation and development of opportunities for dialogue between business associations and the government at all levels and implementation of awareness programs by forums, public hearings etc. FEK supported establishment of business associations in 12 oblasts in Kazakhstan, but not yet in Aktau.

In Mangistau Oblast, the Council of the Mangistau Union of Entrepreneurs (Atameken) functions as an umbrella organization representing entrepreneurs in the oblast. Atameken was established in 2005. Most of its members are medium size companies with employees of 10 to 1,000. It is an organization independent from national Atameken, central government and local government. They maintain generally good relation with Department of Entrepreneurs. There is an opportunity called "Council of Entrepreneurs" taking place every three months where they can exchange information and opinions with Akim. Their expectation to Akimat office is for it to function as "soil where grass grows rather than asphalt."

Mangistau Chamber of Commerce was established 40 years ago, but does not seems to be functioning as the representative body of the companies in Mangistau.

7.3 Capacity Development Strategies

7.3.1 Individual capacity development for Akimat officers

(1) Capacity development in general

Capacity development of the Mangistau Akimat office is to be promoted on the basis of the following two principles.

- Contribution to the national policy of decentralization
- Realization of more efficient and appropriate planning and development properly accommodating local needs

Economic development of Kazakhstan could be achieved by growth of respective region capitalizing on unique resources each region is endowed with such as natural, cultural and human resources. Capacity development of respective stakeholders constituting a regional society holds the key to a balanced development of a region. In case of Mangistau Oblast, human resources development of government, private sector and civic society is of particular importance in order for the economy to grow in diverse directions. The role of the Mangistau akimat office should play would lie in providing a favorable environment for private sector and civic organizations to be able to act freely and actively for achieving respective target. Its role should be interpreted as facilitating private and civic activities rather than controlling them. There is considerable room for improvement in this area.

There are many training programs for local government officers in Japan. Since the curricula of such training programs are largely determined by cultural and social values and the structure of each country, it would be unrealistic to directly apply the same programs to Kazakhstan. The underlying principles of the training program, however, would be useful and applicable to Kazakhstan, which are emphasis on customer satisfaction and the sense of ownership by each local government officer.

"Customer satisfaction" is a term usually applied to private company's sales promotion. In the context of capacity development for Mangistau Oblast akimat officers, it should be interpreted as "satisfaction for private companies, civic organizations and local population". It indicates the importance of "serving the local society". Based on this idea, the major task of the akimat office would be to create an environment in which private companies, civic organizations and local population feel comfortable in undertaking their activities with appropriate and adequate support by the akimat office.

The organizational capacity of the akimat office as a whole would be largely enhanced once individual officer is placed in an environment where his/her own initiative in the work is respected with clear responsibility allocated to him/her. The superiors' role in this kind of environment would be to facilitate the subordinates with two-way communication rather than instructing them in one-way direction. A "sense of ownership" will be nurtured this way, resulting in more efficient generation of outputs for the akimat office as a whole. These principles can be translated into daily operation of works only after sufficient training provided to akimat officers.

(2) Capacity development in technical areas

The information collected in the Study indicates that the weakness of Mangistau Akimat office lies in the limited capability in planning function. Most planning is carried out by very limited management level officers of the akimat office or by central ministries. Implementation, operation and maintenance issues seem to be handled more appropriately. The planning capability of the akimat officers is proposed to be enhanced in the following two broad areas: integrated planning area and specific infrastructure planning areas. The existing institutions such as the Regional Center of Professional Development of Government Employees in Aktau should be fully made use of. Cooperation with higher education institutions is also to be pursued. Expertise input for training programs could be sought from economically advanced countries.

In integrated planning area, the following three subjects are proposed.

a) Project Cycle Management (PCM)
b) Integrated Regional Development Master Planning (IRDMP)
c) Environmental management

PCM is a tool for managing the whole cycle of a project starting from identification of stakeholders, clarification of problems and their interrelations, especially cause and effect relations, preparation of logical framework, monitoring methodology and evaluation techniques. PCM would enhance the capacity of individual officers and organization as a whole in addressing the most important issues effectively and efficiently through prioritization of problems, identification of most urgent actions and sharing of common understanding among officers toward project objective and scope and provision of a set of criteria that would ensure consistent monitoring and fair and objective evaluation. PCM would encourage each officer to play an active role in planning process, thus provide an opportunity to develop a sense of ownership to a project and initiative on the part of officers. This kind of improved mindset of officers would work favorably in accelerating public engagement by akimat office.

Whereas PCM is a useful tool for problem-solving approach, the integrated regional development master planning (IRDMP) approach is oriented more toward development of potentials endowed in a region. The present study is the very effort to prepare an integrated regional development master plan for Mangistau Oblast. A comprehensive approach of IRDPM encompassing all the sectors related with development in a region would create synergy effect of different sectors combined, thus resulting in more robust development than sector-focused approach. Officers and sections with different responsibilities would be able to share a common view toward the direction of development in the future and position activities of each officer and section in the overall context.

PCM and IRDMP are mutually complementary. In the stage after the present study is completed, the proposed programs and projects could be reviewed applying PCM method and promoted to implementation. The IRDMP will need to be constantly reviewed and whenever conditions change it should be modified.

Capacity development in environmental management will be vital in guiding a variety of development activities in an environmentally acceptable manner. Emphasis will be placed on procedural issues such as environmental impact assessment as well as specific technical subjects.

Table 78 presents typical curricula of these technical subjects. In infrastructure planning areas, the following subjects are proposed.

- Urban planning
- Land use planning
- Transportation: road, railroad, port and airport
- Water resources and water supply
- Wastewater
- Solid waste management
- Energy, power and telecommunications
- Port management and sea navigation
- Logistic operations

Table 78 Typical Curricula for Technical Training Programs for Mangistau Oblast Akmiat Officers

1. Project Cycle Management (5 days) a) Introduction b) Stakeholder analysis c) Problem analysis d) Objective analysis e) Project design matrix

f) Monitoring and evaluation

2. Integrated regional development master planning (5 days)
   a) Introduction
   b) Problem analysis
   c) Scenario preparation
   d) Land suitability analysis and land use planning
   e) Water resource potential analysis and water balance analysis
   f) Macro-framework preparation
   g) Regional development master plan preparation
   h) Action plan preparation

3. Environmental management (5 days)
   a) Introduction
   b) Management process
      - Initial environmental examination
      - Scoping
      - Environmental impact assessment
      - Strategic environmental assessment
   c) Specific issues
      - Water pollution
      - Soil pollution
      - Air pollution
      - Fauna and flora
      - Environmental infrastructure: sewerage, solid waste management

4. Urban planning (10 days)
   a) Introduction
   b) Population projection
   c) Land use planning
   d) Residential development
   e) Urban transportation planning
   f) Urban facilities
   g) Landscape/urban design
   h) Legal/institutional measures
   i) Urban economy/finance

5. Transportation Planning (5 days)
   a) Introduction
   b) Surveys and information collection
      - Person trip survey
      - Origin and destination survey
      - Existing land use
      - Road inventory
   c) Planning framework
      - Socio-economic framework: population and economy
      - Future land use
      - Traffic forecast
   d) Transportation planning
      - Road network
      - Public transportation
      - Airport
      - Port
   e) Project evaluation
      - Cost estimate
      - Financial evaluation
      - Economic evaluation: estimate of economic benefit, cost-benefit analysis
      - Environmental analysis

6. Sewerage Planning (5 days)
   a) Introduction
   b) Surveys and information collection

c) Establishment of planning framework and strategy
- Population projection
- Wastewater volume projection
- Defining service area
- Technical options

d) Plan formulation
e) Project evaluation
- Cost estimate
- Wastewater tariff/revenue projection
- Financial viability
- Economic analysis

f) Organizational and legal measures

7. Solid waste management (5 days)
a) Introduction
b) Surveys and information collection
- Solid waste discharge volume by type of waste and by season
- Condition of collection, transport and treatment
- Environmental pollution
- Awareness of local population

c) Establishment of planning framework and strategy
- Projection of population and economy
- Projection of solid waste generation by type and season

d) Plan formulation
- Collection
- Transportation
- Treatment
- Promotion of people's awareness

e) Project evaluation
f) Organizational and legal measures

8. Water resources and water supply (5 days)
a) Introduction
b) Surveys and information collection
- Natural condition
- Existing water utilization
- Household survey
- Un-accounted-for water

c) Establishment of planning framework and strategy
- Population projection
- Water demand projection
- Service area demarcation

d) Plan formulation
- Water resources
- Water conveyance
- Water treatment and distribution

e) Project evaluation
f) Organizational and legal measures

9. Power and telecommunication/information technology (5 days)
a) Introduction

(Power)
b) Demand and supply analysis
c) Power generation: hydro, solar, renewable sources
d) Power transmission
e) Power distribution
f) Project evaluation

(Telecommunication)
g) Demand forecast
h) Network planning
i) Exchange/switchboard

j) Radio/transmission
k) Project evaluation
(Information technology)
l) Laws and regulations
m) Demand forecast
n) Technical options
o) Promotional measures for private investment

10. Port operation and sea navigation
a) Introduction
(Port Operation)
b) Port operation
- Ship entry arrangement
- Ship departure arrangement
c) Terminal operation
- Berth works
- Handling of import cargo and export cargo
d) Customs procedures
e) Compensation for damages
(Sea navigation)
f) Navigation techniques
g) Laws and regulations
h) Sea climatology
i) Machines
j) Navigational English language

11. Logistic operation
a) Introduction
b) Customs clearance
c) Supply chain management
d) Laws and regulations
e) Inventory management
f) Quality management
g) Logistic accounting
h) Cargo handling
i) Air and sea cargo
j) Information technology application

7.3.2 Institutional and organizational capacity development for Akimat office

(1) Enhancement of Competitiveness of Public Service as an Employer

Brain drain is the crucial problem facing almost all the departments and management units of the Mangistau Oblast Akimat office. The first step to be pursued would be to enhance the competitiveness of public service as an opportunity for work against booming private sector. To secure staff with high quality is the first goal. Instead of single-aimed approach focusing on salary increase as pointed out by many directors, a comprehensive approach comprising wage system improvement coupled with other necessary measures is recommended. The following presents a basic idea.

a) Wage system reform should be planned and implemented in the context of national policy and in consideration of all relevant factors such as impact on macro-economy, fiscal viability, detailed analysis of the situation and priority area for reform. Previous and ongoing reform efforts at central government level should carefully be monitored and positive outcomes integrated into the wage system reform in Mangistau Oblast.

b) The wage system reform should be undertaken based on a clear principle of “equity, accountability and transparency”, which is compatible with the Civil Service Law setting forth “equal pay for equal work” principle.

c) Wage system reform needs to be promoted in phases over a certain period of time and with priority placed on the sections for which delay in reform could create more serious problems. Environmental management could be the first priority, because it is only the public sector that can play a major role in properly managing environmental resources unlike economic development promotion whose engine is the private sector.

d) Measures to be coupled with wage increase include the following.
   - Adoption of a specific legal instrument on salaries that defines the basic principles for the salary system
   - A review of vacant posts and elimination of redundant posts
   - A review of the existing job classification system and modification where necessary
   - Introduction of a mandatory performance appraisal system
   - Provision of training programs compatible with job classification and performance appraisal criteria

Reduction of posts should be reviewed in the light of streamlining of procedures for improving investment climate as well as shifting regulation function more to environmental management aspect.

(2) Promotion of human resource mobility between public and private sectors

One possibility for tackling brain drain problem would be to enhance mobility of personnel from government office to private organizations and vice versa. Currently there is no such a system like seconding a staff to a private company on the part of Mangistau Oblast akimat office. This kind of system, once introduced, would contribute to enhancing capacity of government officers, especially in acquiring practical skills based on experiences on field. Private organizations would benefit from this kind of system through dispatch of their staff to government organizations. Those staff dispatched will be able to grow familiar with laws, regulations and practices of the government, which will contribute to higher efficiency in the company's operation.

(3) Division of responsibilities between central ministries and Oblast Akimat

One fundamental issue requiring improvement is division of responsibilities between central ministries and Mangistau Oblast Akimat office. Some functions currently tasked to central ministries need to be transferred to Oblast akimat. This of course should be associated with capacity development of oblast akimat staff. Transportation planning function is one of them. Considering the importance role the transportation sector would play in developing Mangistau Oblast as a major hub of distribution and transportation network representing the western Kazakhstan, planning function at regional level at least should be transferred to Akimat office, while the responsibility for planning from a national point of view could remain with the central ministry. In case of environmental management, better communication and coordination activities between central ministries and oblast akimat are required.

(4) Specific institutional measures

There could be a number of specific practices creating problems at operational level such as the case of tender system dependent on "low cost principle". All kinds of shortfalls should be listed and improvement measures be adopted.

(5) Need for public engagement

An area where more flexible management is required on the part of Mangistau Akmat office would be balance between leadership and public engagement. The driving force of economic development away from the energy-sector would be motivation of small and medium scale entrepreneurs for business development. Improvement of living condition in the rural area and urban poverty area would have to engage participation of direct beneficiaries. The participation of these stakeholders in the planning and implementation stages would lead to more successful achievement of the goals. Kind of leadership

required in this context would be to open channels for dialogues with the private sector and civil society groups as partners in a true sense and promote collaborative efforts toward common goals with a facilitative role rather than commander role.

The Mangistau Akimat office should support formation and capacity development of civil society groups. Guidance should be provided by the akimat office in such a way that the people's "wait and see" mindset be improved and a sense of ownership be nurtured. It is only when the capacity on both side, that of administration and that of people, is developed that development efforts under equal partnership is realized. Project Cycle Management (PCM) is a practical tool to promote this kind of partnership.

(6) Support of private educational institutes

The important role that private educational organizations could play should be keenly recognized by Mangistau Akimat office. Specific support measures for them should be worked out and offered, in consideration of their important role. The principle in allocating responsibilities between public educational organizations and private ones would be for the former to be responsible for providing basic skills that would be constantly required under any kind of circumstance at a reasonable price for any income class families and the latter to accommodate kinds of skills that might vary depending on economic development situation for families with some level of financial capability.

There are a number of technical and general colleges operated privately in Mangistau Oblast. Interviews with some of them revealed that there is almost no support provided to them by Mangistau Oblast Akimat. Many of these organizations are struggling to survive and continue their operation on their own despite hardships. It is strongly recommended that the Mangistau Oblast Akimat extends support to them on the basis that they are greatly contributing to human resource development of the Oblast. Kinds of support practiced in other countries and that can be applied in Mangistau would include provision of subsidy, exemption of taxes and various supports in daily operation. Since they are non-governmental, they can operate more flexibly and swiftly in response to labor market situation. The same amount of investment by the akimat office could generate far greater impact by these measures than by investment on creating new state educational institutions.

(7) Establishment of Human Resources Development Fund (HRDF)

It is recommended that a Human Resources Development Fund (HRDF) be established by the initiative of Mangistau Akimat Office. Its objective is to promote human resources development efficiently depending on initiatives by the private sector. Fund sources could be pursued in akimat office budget and private sources. HRDF extends financial support to various uses such as follows.

- Support of human resources development initiatives by private companies: support for the expenditures for internal training and subsidizing salary for employees receiving training
- Support of non-governmental educational organizations in operation and capital investment

With regard to supporting non-governmental education organizations for capital investment, a new type of public-private partnership should be promoted. Government assets could be effectively used by introducing private initiative with a sense of efficiency, which often lacks in public-led projects. For example, a building on a public land owned by state could be rented to private educational organizations to run education programs.

7.3.3 Improvement of investment and business climate

It is advised that Mangistau Oblast Akimat office make further effort in improving investment and business climate of Mangistau Oblast. It seems that there is a gap between the view of private companies and that of Oblast akimat officers concerning the investment and business climate in the oblast. The level of satisfaction of the companies seems to be lower than the akimat office assumes.

The following directions should be pursued.

a) High potential of Mangistau Oblast as investment destination will be augmented by strengthening of promotional programs aiming at wider and more thorough penetration of information into potential investors outside Mangistau Oblast.

b) The Mangistau's attractiveness as investment destination should be augmented focusing on streamlining various procedures related with license, export and import, registration, closing of business and other issues. The emphasis of the public sector's involvement should be shifted away from these procedural issues and directed more toward environmental management. Dispatch of akimat officers to countries advanced in investment promotion for training and inviting experts from those countries would be effective in paving the way for improving investment climate of Mangistau Oblast. Candidate countries would include those ranked higher than Kazakhstan by the World Bank survey such as Singapore (1st), Thailand (15th) and Malaysia (24th).

c) There should be increased opportunities of dialogue between the akimat office and private organizations on a regular and frequent basis for promoting exchange of information.

d) Problems in accessing market, both domestic and foreign, and difficulty in procuring raw materials and spare parts could be overcome by tackling both physical and institutional factors such as improvement of communication infrastructure, streamlining of complicated and time consuming procedures and consistent and clear application of laws and regulations.

e) More supportive role of the akimat office will be required in extending financial support schemes to private companies. Existing financial assistance schemes could be utilized more effectively once private companies are guided by the akimat office more elaborately in making application and implementing the projects

f) The akimat office should strengthen its effort in eradicating corruptive practices.

g) The Caspian University of Technology is expected to contribute greatly in solving the gap between demand and supply of qualified personnel once it starts to send graduates to the society. Continuous effort will be required to monitor the performance of the graduates, especially paying attention to matching of kind of specialties required by the private sector and the educational curriculum. For it to upgrade its academic level and grow as an international educational and research center in the Caspian Sea region, cooperation with higher technical education institutions in developed countries should be encouraged.

h) The level of post to be filled by the graduates from the State Caspian University of Technology, however, will be limited to those of managers and experts. Specific measures need to be taken to enhance the vocational training function for general labors so that qualified workers with suitable skills are supplied to the labor market in a sufficient number both for energy-sector and non-energy sector companies. The following steps needs be followed in working out a plan for enhancing the vocational education programs.

    - Estimate of job opportunities to be created in the future
    - Clarification of kind of jobs to be created
    - Clarification of the capability of the existing vocational training organizations, both in quantity and quality
    - Comparison of demand and supply capacity both in quantity and quality
    - Identification of need for strengthening vocational education programs
    - Preparation of specific plans for strengthening vocational education programs

i) Improvement of basic education and higher education, which has been degrading since independence is also an important issue from the perspective of investment and business climate.

7.4 Capacity Development Programs

The following two programs are proposed for capacity development promotion and their outlines are presented in Table 79.

- Caspian Capacity Development Program (CCDP)
- Integrated Investment Promotion Initiative (IIPI)

Table 79a Capacity Development Programs (1/2)

Program Outline-1

Caspian Capacity Development Program (CCDP)

1. Background
Mangistau Oblast is situated in the western end of Kazakhstan facing the Caspian Sea to the west. Its land area is 165,000km^2, accounting for 6.1% of the national territory. The oblast is inhabited by a population of 374,000, 2.5% of the national population. The Mangistau's economy started to grow at an amazing rate of 17.5% per year since 2000 due to rapid expansion of oil production. While the economic boom is expected to continue in the coming years, it begins to pose a number of problems such as social disparity and environmental degradation. The national and oblast policy is to accelerate growth of non-oil/gas industries, especially medium to small size enterprises, thus spreading the fruits of economic development to wider segments of the population. Vulnerable environment of the oblast needs to be managed appropriately while maintaining the momentum of economic growth.

2. Objective
The objective of "Caspian Capacity Development Program (CCDP)" is to provide opportunities for higher education faculty members, government public servants and private business people of the five countries around the Caspian Sea (Kazakhstan, Russia, Turkmenistan, Iran, and Azerbaijan) to enhance their capacity in technological and social-economic areas so that they will be able to contribute to the economic development of the Caspian Region based on non-fossil energy activities with appropriate environmental management.

3. Rationale
Capacity development holds the key to development of non-fossil energy industrial activities and proper environmental management. While Mangistau Oblast will play the major role in this program, its benefit should be shared by neighboring regions and countries around the Caspian Sea.

4. Duration
The duration of the program is 5 years from 2009 to 2014.

5. Stakeholders
- Kazakhstan: Caspian University of Technology, Mangistau Oblast Akimat
- Other Caspian countries: Higher education institutes/universities, central/local authorities
- Japan: Japan International Cooperation Agency, Higher Education institutes/universities in Japan, Japan Center
- Other developed countries: Higher education institutes/universities, business people

6. Program Components
Core components
a) Academic cooperation between the Caspian University of Technology (CUT) and Japanese higher education institutes/universities in technical and social-economic areas, capitalizing on the existing international support programs such as technical cooperation program by JICA (to be pursued, no commitment). The activities would include intensive dispatch of Japanese faculty members to CUT as well as general exchange of faculty members and students. The subjects are proposed as follows.
- Oil/gas technology
- Mechanical engineering
- Marine technology
- Business administration
- Computer science
- Energy engineering
- Physics and mathematics
- Environmental management

b) Technical training program for Mangistau Oblast Akimat officers in planning and management subjects capitalizing on the existing Regional Center of Professional Development of Government Employees in Aktau and support by the existing Japan Center in Kazakhstan (to be pursued, no commitment). The subjects would include the following.

Cross-cutting approach
- Project cycle management (PCM)
- Integrated regional development master planning (IRDMP)
- Environmental management

Specific subjects
- Urban planning
- Land use planning
- Transportation
- Water resources and water supply
- Wastewater
- Solid waste management
- Power and telecommunications/information technology
- Port management and sea navigation
- Logistic operations

Sub-components

c) Expansion of the CUT-Japan cooperation to other existing vocational colleges in Mangistau Oblast

d) Expansion of the CUT-Japan cooperation to faculty members and students of the higher education institutes in the other 4 countries around the Caspian Sea

e) Expansion of the Japan Center programs to business related-issues for private businessmen in Mangistau Oblast and other 4 countries

f) Development and application of multi-media education programs for CUT, other higher-educations institutes in the Caspian region and Japanese higher education institutes, utilizing satellite telecommunication network and internet TV system.

Table 79b Capacity Development Programs (2/2)

Program Outline-2

Integrated Investment Promotion Initiative (IIPI)

1. Background

Mangistau Oblast is situated in the western end of Kazakhstan facing the Caspian Sea to the west. Its land area is 165,000km^2, accounting for 6.1% of the national territory. The oblast is inhabited by a population of 374,000, 2.5% of the national population. The Mangistau's economy started to grow at an amazing rate of 17.5% per year since 2000 due to rapid expansion of oil production. While the economic boom is expected to continue in the coming years, it begins to pose a number of problems such as social disparity and environmental degradation. The national and oblast policy is to accelerate growth of non-oil/gas industries, especially medium to small size enterprises, thus spreading the fruits of economic development to wider segments of the population. Vulnerable environment of the oblast needs to be managed appropriately while maintaining the momentum of economic growth.

2. Objective

The objective of "Integrated Investment Promotion Initiative (IIPI)" is for Mangistau Oblast Akimat office to create a functional mechanism that would enable effective and efficient attraction of investments to Mangistau Oblast.

3. Rationale

Various activities concerning investment promotion in Mangistau Oblast are carried out separately without sufficient coordination among them. It would be important that a new unit be created directly under Akim's office and it will guide related organizations and sections under a specific framework and coordinate their activities. The new unit is positioned at a level higher than departments and management units.

4. Duration

Duration of the initiative is 5 years from 2008 to 2013.

5. Stakeholders
- Mangistau Akimat Office
- Department of Economy and Budget Planning
- Department of Entrepreneurs

6. Program Components

a) Creation of a unit responsible for all activities related with investment promotion directly under Akim's office. It is tentatively called "Investment Promotion Office (IPO)". IPO is positioned at a level higher than departments and management units, exerting strong initiative in investment promotion.

b) To enhance the capacity of Investment Promotion Unit, training programs for the officers will be provided in other countries such as Singapore where economic growth was achieved by successful investment promotion. Experts will also be invited from these countries to provide guidance to IPO.

c) The Investment Promotion Office functions as the headquarters of investment promotion in Mangistau Oblast. Its tasks broadly include preparation of investment promotion strategy, dissemination of information, improvement of investment climate and coordination of related organizations and sections. They are detailed as follows.

<u>Preparation of investment promotion strategy</u>
- Selection of target industries for promotion
- Clarification of demarcation of responsibilities among related organizations and sections
- Preparation of an action plan for investment promotion

<u>Dissemination of information</u>
- Dissemination of information on investment climate in Mangistau Oblast to all possible markets both outside and inside Kazakhstan through internet, contact with relevant organizations, media, etc.

<u>Improvement of investment climate</u>
- Regular communication with private organizations and companies to broaden understanding on the needs of the private sector
- Promotion of deregulation through guidance of and coordination with organizations and sections responsible for regulations and licenses
- Promotion of human resources development by guiding and coordinating with Caspian University of Technology, vocational colleges and basic education institutes
- Promotion of infrastructure development through guidance and coordination with organizations and sections responsible for various infrastructure facilities
- Eradication of improper conducts of akimat officers
- Promotion of awareness on environmental management

<u>Coordination with other organizations and sections</u>
- Coordination with departments and management units of Mangistau Oblast Akimat office
- Coordination with state organizations and sections
- Coordination with the private sector

Appendix (1/4): Results of Interview with College of Transportation and Communication

(Interviewed on May 15, 2008)

a) The College of Transportation and Communication was established in 2007. Its activities started in September 1, 2007. It was established as a joint venture of the Academy of Transportation and Communication, Ministry of Transport and Kazakh Rail. The objective is to provide qualified technical experts to the railway sector in which construction of new railway lines to Russia, Iran and Turkmenistan is planned and sea transport and oil sectors. Currently good work force is short in supply.

b) The college deals with railway, sea and oil transportation but does not cover road and air transportation. Four courses exist now while additional four courses will start in September 2008 as follows.

Existing courses:
- Transportation organization and management
- Sea navigation
- Oil transportation and storage
- Transportation economy and accounting

Planned courses
- Development of transportation electrical equipment and automitization
- Railway communication network
- Distant management
- Railway construction and services

c) The number of students is 290 now and will be increased to 1,000 eventually. Only those students who have finished the 11th grade are admitted. The youngest students are 18 years old.

d) There are 20 teachers now. It will be increased to 55. Most of them were formerly university professors and college teachers.

e) The duration of the education program is 2 years and 10 months for full time students and 3 years and 10 months for part time students. They are expected to work with railway companies, seaport and oil companies.

f) They maintain good cooperation with private companies by sending their students to the companies for on-the-job training and inviting private company experts as trainers.

g) They have no major problem. Their students are able to commute to the college by the bus operated by the college. The shortage of teacher in marine transport may become a problem soon. There is only one teacher from Kyrgyz in this area.

Appendix (2/4): Results of Interview with Aktau College of Technology

(Interviewed on May 15, 2008)

a) Aktau College of Technology established in 1997 as a branch of Almaty Cooperative College, a state college, which was run on the basis of school fee paid by students, and became purely private in 2002. The director used to be working in another technical college. There were many cases of unemployment after independence and she saw the need for a new technological college. Then the akimat supported her in proving the building.

b) It is now situated on the 4th floor of state technical school building based on an annual agreement. Their status for the next year is not secured.

c) They offer 8 courses as follows. These subjects followed the program of Almaty Cooperative College.
   - Economy, accounting and auditing
   - Banking
   - Business and trade management
   - Finance and tax
   - Quality of products
   - Maintenance and repair of refrigerators, compressors and machines
   - Technology and organization of food production
   - Technology of bakery, macaroni and confectioneries

d) There are 40 teachers and 300 students. The age range of students is 16-45. The duration of the program is 3 years for the students after 9th grade and 2 years for the students after 11th grade.

e) They suffer from lack of space, which limits the full use of equipment and laboratories. They have a specific plan to construct a new building and are looking for investor to support it.

f) They are financially independent. They receive neither subsidy from the government nor donation from private companies. The college is run solely on the basis of fee paid by students at KZT 75,000 per year per student. The fee is discounted by 10-15% for students with financial difficulty. They want to improve the situation to pay better for teachers, help students and improve building.

g) They cooperate with private companies, for example, through providing short-term training programs and sending students for on-the-job training for 8 weeks.

h) They would like to improve the program by removing “bakery, macaroni, confectioneries” and adding “tourism/hotel” and “agro-business” as soon as they have the new building. Many private people request her to start these courses. No other schools are providing these courses yet.

i) Akimat office does not support them, because they are private. The college provides some cooperation to the akimat office, but receives no feedback. They pay all kinds of taxes and fees.

Appendix (3/4): Results of Interview with Kainar College

(Interviewed on May 19, 2008)

a) Kainar College was established in 1997. In 1995, a branch of Kainar University, a private university based in Almaty, was established. Now there are a primary school (age 7-16), Kainar College (16 and up) and Kaninar University branch (18 and up) in the same building.

b) After independence, opportunities for higher education were limited to Aktau University. People were suffering financially. The college started with providing primary school education for children 15-16 years old.

c) The college is run solely on the basis of the tuition and fees paid by the students at a range of KZT 80,000-120,000 per student per year. Discount of 10-30% on the tuition is granted to those who are disadvantaged or regarded as special cases such as returnees (*oralman*). Although the college loses KZT 2.5 million per year because of this discount system, it needs to be continued.

d) They receive no donation from private companies. There is no good system of cooperation between private colleges and private companies. Only case was an oil company providing financial support to a student with financial difficulty. There is an agreement that allows donation by private companies only to state colleges. There was a case in which a Lingaphone set and a room was donated to a state college by a private company.

e) Although there was a message by President that emphasized the need to support all types of schools, both governmental and non-governmental, government regards non-government schools just as executors.

f) There are 863 full time students. The following courses are taught.
   - Kazakh language and literature
   - Translation and foreign language (English)
   - Primary school education (teacher education)
   - Information system
   - Management automatization
   - Economy, marketing and commerce
   - Construction

g) There are 78 teachers. They suffer from the general problem of shortage of good teachers due to low salaries for teachers.

h) Their graduates are placed in good jobs.

i) They have been requesting Akimat office to support them in acquisition of a land area and constructing a building for their school to secure larger floor space especially for primary school so that it can operate until 17:00 without difficulty. They have not received any positive response from akimat office. It would be all right for them to rent new building if rent is not too high. There is, however, a law in Kazakhstan that designates that schools should be operated in the building on a land owned by the school itself. They are renting a gymnasium of polytechnical college at a high rate.

j) There is a union of directors of colleges, both state and non-governmental. The director of this union is from a state college. They discuss only teaching process and are not interested in problems of non-governmental colleges. There is an association within republican Atameken, an organization of private companies, dealing with law on private education. A seminar held in February in Almaty was not so successful due to low interest of government.

Appendix (4/4): Results of Interview with Vocational Lyceum No.1

(Interviewed on May 20, 2008)

a) The Vocational Lyceum No.1 was established in 1986 by a plastic production company called "SAT operating company", aiming at training workers for the company. The factory was soon closed as a result of turmoil around the independence time and the lyceum went through difficult time. It is now supervised by Oblast Department of Education. The lyceum is now waiting for upgrading to a republican college. The Ministry of Education decided to upgrade the lyceum to a state college to make it a center for not only training and retraining, but also training of teachers in Mangistau Oblast.

b) The following seven courses are provided.
   - Cooking
   - Metal worker on control and measuring devices and automatic equipment
   - Repair of electric equipment
   - Electrical communication and wire broad casting line construction wireman
   - Tailor-universal
   - Computers operator
   - Technician-operator to service a calculator technician

c) There is a set of documents titled "State Overall Compulsory Educational Standard of Republic of Kazakhstan". The lyceum has to follow this document for 85% of their practices, while the remaining 15% lies in their judgment.

d) A company called Nurecom Ltd. is distributing an educational device called "interactive board", an electronic device to display teaching contents to students.

e) There are a total of 690 students, of which 570 are grant students for whom the state pays the fee. The remaining 120 students are short-term students for 3 months or 6 months, for example. Many cases are students sent by small companies for retraining.

f) The duration of education is 2 years and 10 months for students of age 15-18.

g) The graduates mostly start to work after graduation and are placed in good jobs at such organizations as Maek, Kazakhtelecom, Skysilk, Munaitelecom, Renaissance Hotel and restaurants.

h) There are in total about 70 teachers, out of which 38 are ordinary teachers and 25 are masters in industrial education. It is difficult for them to recruit good teachers due to low salary (KZT 17,000/month or more). Technical experts in chemistry and electricity are needed, but many of them get jobs at private companies that pay salary at around KZT 65,000 or 70,000 per month. What they do is to recruit pensioners with good skill. Much part of their time for preparation and other works is unpaid.

i) Their relation with private companies is not so good. They send their students to some companies for on-the-job training (OJT), but not to all. Some companies refuse to provide OJT for safety reason. Because the courses they provide are diverse, they have to contact many companies for OJT.

j) They would like to add new courses such "oil" and "construction". The oils subject, however, is already undertaken by other organizations. Although "construction" subject is prospective, Department of Education has lost interest due to change of the lyceum's status to college to take place in the near future.

k) They suffer from such problems as i) shortage of computers, ii) shortage of good teachers, iii) lack of welding workshop, and iv) shortage of books, especially for technical subjects. While general books are provided by Department of Education, teaching materials for technical subjects have to be prepared by teachers. Their request to Department of Education has not been met so far. There are a total of 33,000 books, out of which those on technical subjects are

less than 1,000. They plan to open an electronic library, but there is no material ready in Kazakh language.

l) Kinds of support they expect from Akimat office are, in the order of priority, i) provision of books for technical subjects, ii) resolving shortage of equipment, materials and laboratories and iii) improving salary for teachers.

m) The plan by Oblast titled "Program of Primary and Secondary Vocational Training Development" for the 2007-2009 period allocated KZT 133 million for the lyceum, but as of May 2008 it has been only KZT 33 million that was disbursed.

CHAPTER 8 DERIVATIVE INDUSTRIES IN KAZAKHSTAN AND MANGISTAU

8.1 Overview of Derivative Industries

8.1.1 Scope of derivative industries

Derivative industries are defined here as the entire streams of inter-related industries derived from the oil and gas industry. They are broadly divided into oil refineries and petrochemical industries, and gas based industries. The scope of the derivative industries is illustrated in Figure 12.

To develop these industries in Kazakhstan, the following basic conditions need to be satisfied:

i) High productivity for price competitive products in the international market
ii) High demand growth expected for the products in the medium term (5-10 years)
iii) Balanced mix of export products for neighboring markets

Related to the third point, promising markets may be parts of China and Europe as well as neighboring countries, for which the transportation costs would be modest. To satisfy these conditions, the total marketing strategy is indispensable.

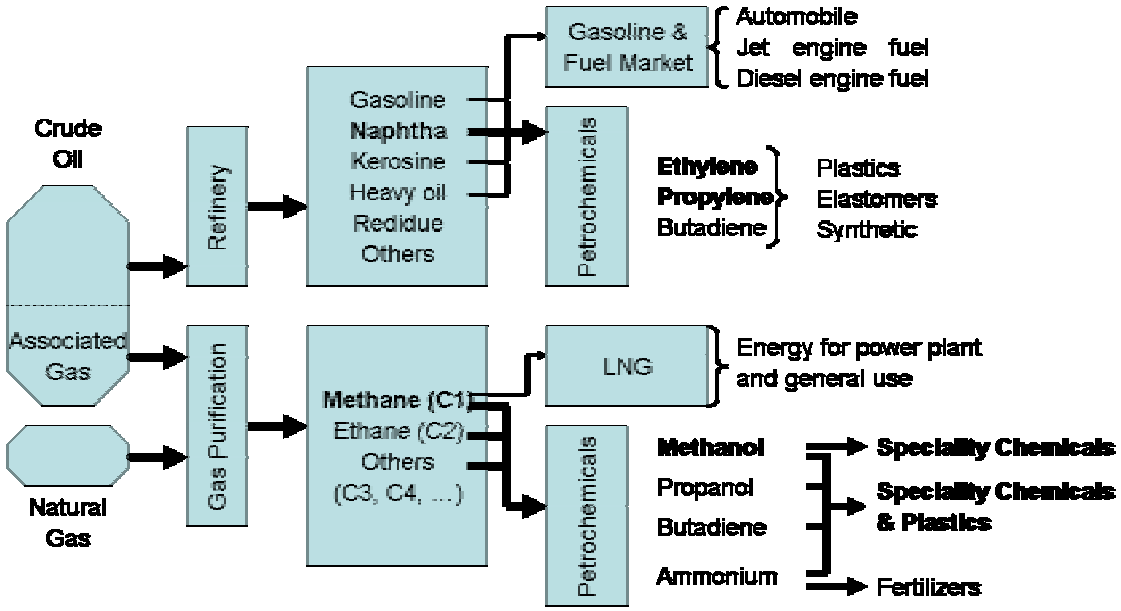


Figure 12 Products Derived from Oil and Gas Industry

8.1.2 Prospects for derivative industries

Oil refining and petrochemical industries

Oil refining is commonly to produce mainly gasoline, naphtha, and kerosene. High quality products are demanded, especially for gasoline to comply with stringent environmental standards in developed countries. To ensure profitability, it is now a common practice to establish a petrochemical plant next to the refinery to form a petrochemical complex (kombinat).

Of the products produced from naphtha, 60% of ethylene and 70% of propylene are used to produce plastics such as polyethylene and polypropylene. These products are further processed or

transformed into various consumer goods. These lines of production for commodities in the world are characterized by very large-scale production to reduce costs and to produce high quality products, and the market is highly competitive.

Gas chemistry products

A typical production line based on natural gas is to separate methane and use it to produce methanol and ammonium. The latter is further processed into fertilizer such as ammonium nitrate and ammonium sulfate. Methane and ammonium are utilized also to produce various chemicals and chemical intermediates, and special plastics such as PMMA (Figure 13).

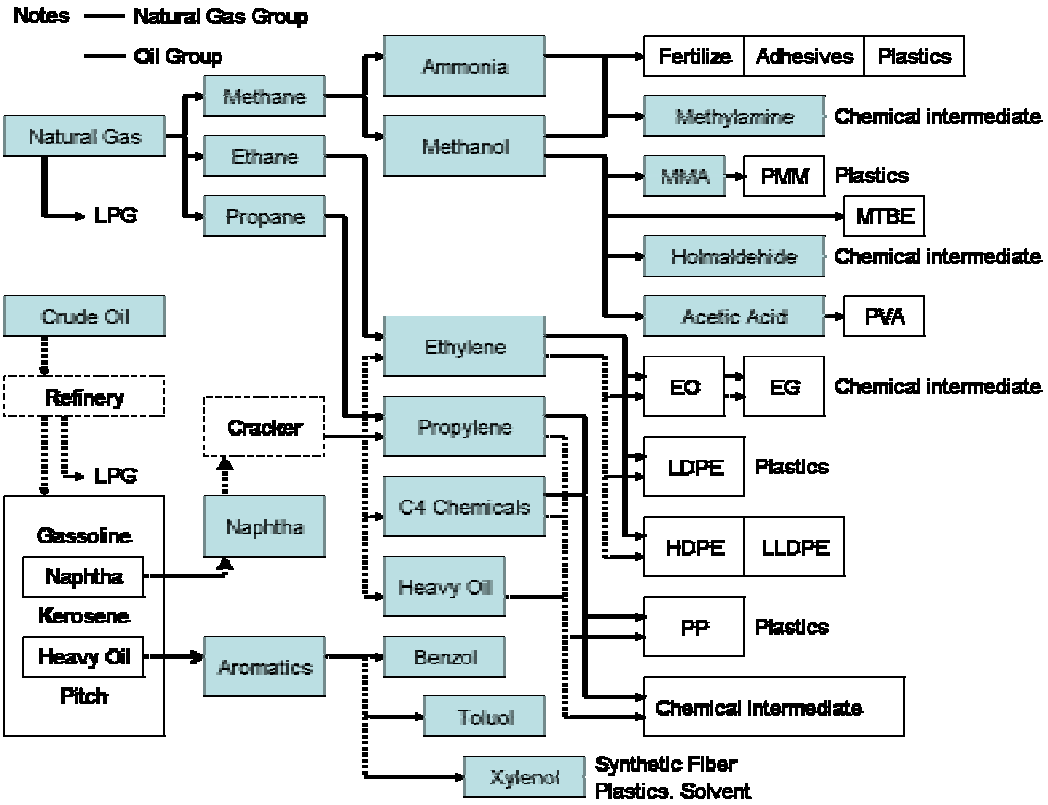
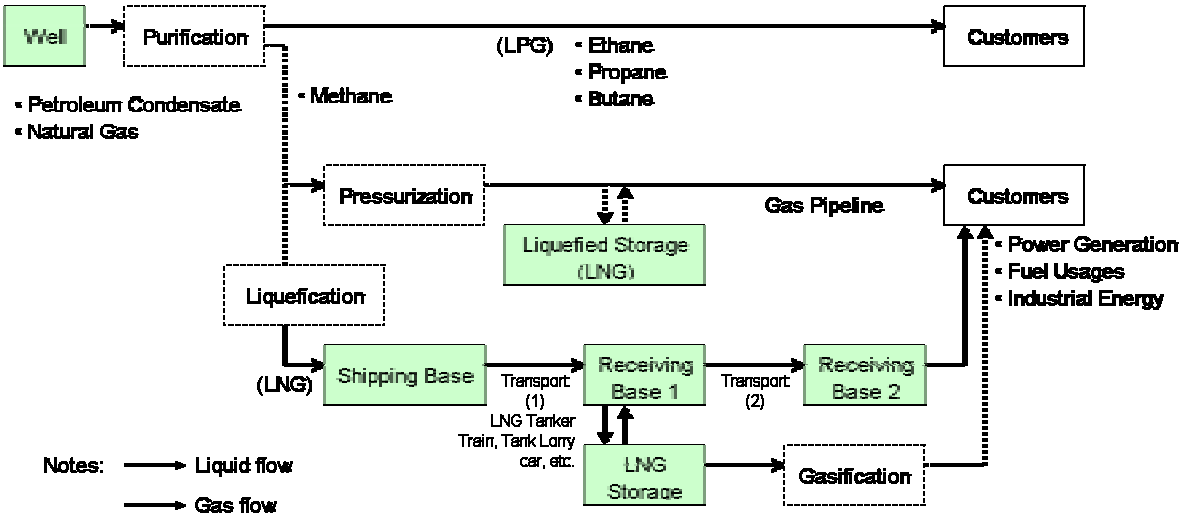


Figure 13 Product Flow of Natural Gas and Oil Refinery

Another line of natural gas based production is to produce liquefied petroleum gas (LNG) by compressing ethane, propane, butane and other products derived from refining and associated condensate (Figure 14). In Kazakhstan, gases having larger molecule size than methane are separated and consumed locally as LPG gas or sold as tank gas since gas chemistry has not been much developed.

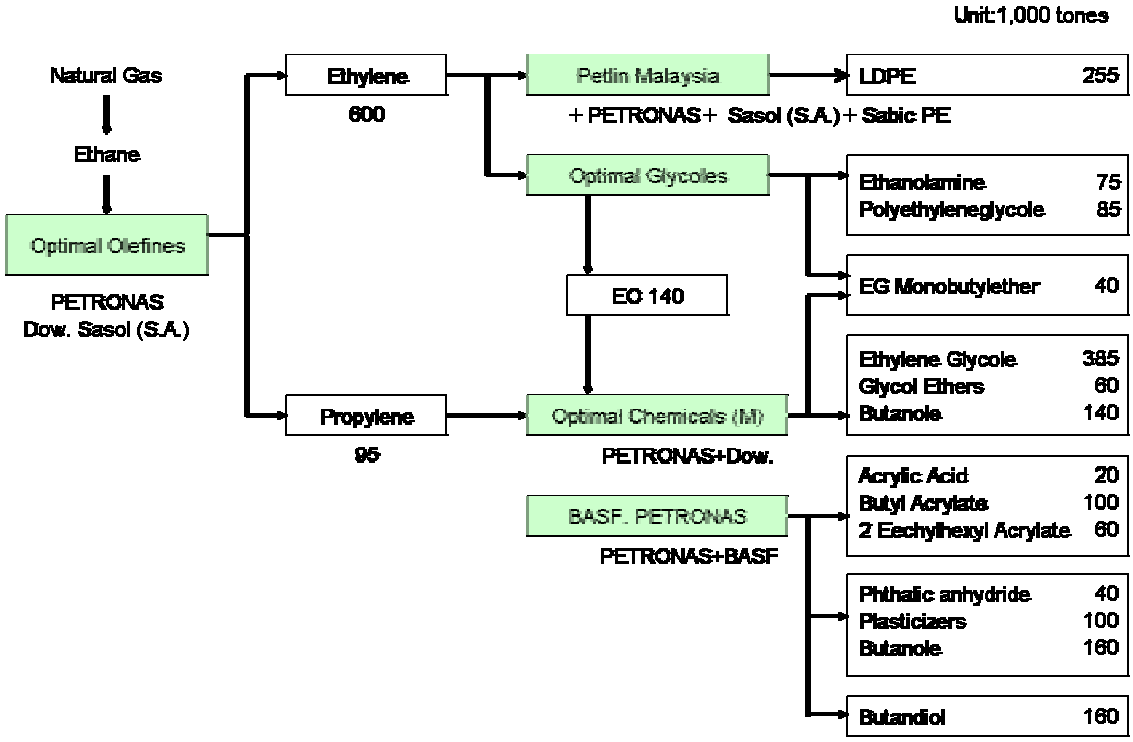
Cases in developing countries

The natural gas based gas chemistry utilizes methane, ethane and propane separated from the natural gas to produce methanol, ethylene and propylene, which are further processed into various derivatives. Final products are either high value-added materials for chemical industry as in the case of Malaysia, or common products such as polyethylene in the case of Thailand (Figures 15 and 16). Important factors to determine product lines are contents of methane and ethane in the gas as well as the gas reserves.



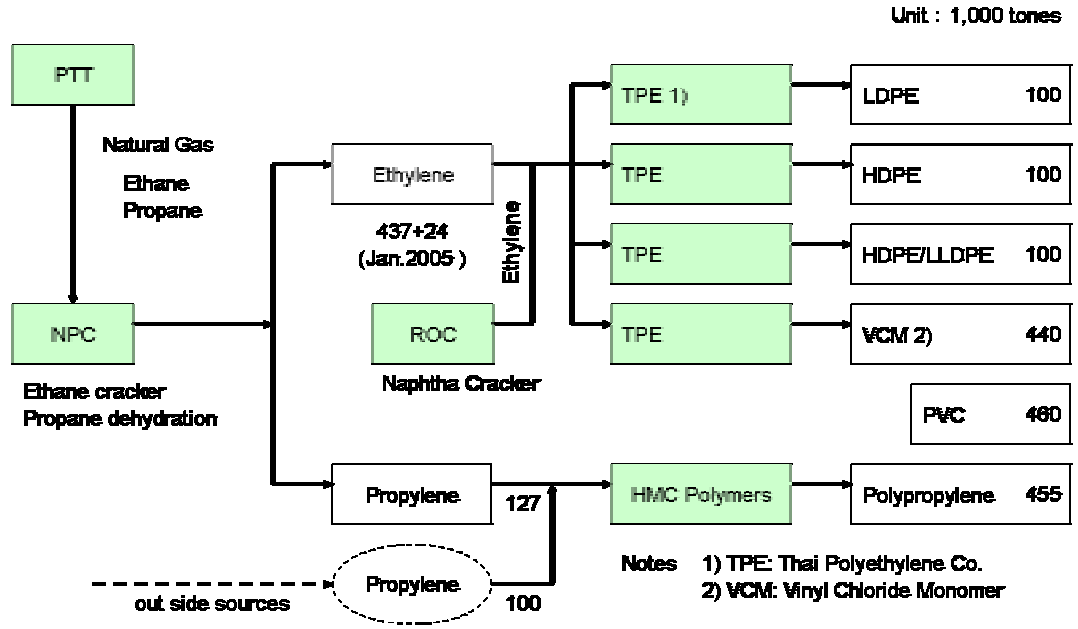
Source: Chemical Handbook by Chem. Soc. of Japan (modified by the JICA Study Team)

Figure 14 Natural Gas Flow from LPG Production to Consumption



Source: Information 1), 2) modified by Study Team.
1) http://Kaznak.web.infoseek.co.jp/Petronas/
2) "Major Petrochemical Center in Asia" published by Chemical Industry Communications of Japan.

Figure 15 Optimal Olefines Complex in Kertih Region in Malaysia



Source: Information 1) modified by The JICA Study Team.
1) "Major Petrochemical Center in Asia" published by Chemical Industry Communications of Japan.

Figure 16 NPC-1 Complex on Map Tha Put Region in Thailand

Use of associated gases

The natural gas produced in Kazakhstan is mostly in the form of associated gas produced with crude oil. Flare processing of the associated gas is now forbidden in Kazakhstan, except in emergency cases, by the legal revision in 2004. In Mangistau, the part of associated gas has been used as LPG. The associated gas can be utilized as fuels for industrial and home uses and also raw materials for various products.

The composition of associated gases from the Dolinnoe oil field owned by BMB-MUNAY is summarized in Table 80. As seen from the table, the associated gas contains 62% methane, 14% ethane and 8% propane. Gas from oil fields around Zhanaozen does not contain hydrogen-sulfide (H_2S), and therefore sulfur removal is not necessary during gas purification, methane separation and gas chemistry operation, resulting in cost reduction.

Table 80 Gas Composition of Associated Gas in Dolinnoe Oil Field

	Ingredient	Mol %	Wt %*
1	CH_4 Methane	62.4	53.1
2	C_2H_6 Ethane	14.3	13.1
3	C_3H_8 Propane	8.4	11.2
4	C_4H_{10} Butane	4.8	8.5
5	C_5H_{12}	2.1	4.6
6	C_6+	1.0	2.4
7	CO_2	2.3	3.1
8	N_2	4.7	4.0
9	H_2S	00	0
10	Others	00	0

*Calculated
Source: JETRO, Study on Effective Use of Associated Gas.

Use of associated gas has not been much developed in Kazakhstan. This is due to the low gas prices, insufficient gas transport infrastructure, and limited capacity of gas refining facilities. Responding to the ban on flare processing of associated gas, effective uses of the associated gas are pursued by oil companies. Most companies, however, are planning to recharge the gas into the underground rather than using it for productive purposes.

8.2 Existing Conditions of Gas Production and Processing in Kazakhstan and Mangistau

8.2.1 Existing conditions of gas production and processing in Kazakhstan

Kazakhstan has three gas refining plants, of which one is located in Zhanaozen (Table 81). The total refining capacity is 16.2 billion m^3/year. Oil and gas reserves and production in the oil fields around Zhanaozen are summarized in Table 82.

Table 81 Existing Gas Refining Plants in Kazakhstan

1. Kazkh Refining Plant		
Location	Zhanaozen	Merit: Sulfer free gas
Capacity		2.9 billion m^3/yr, modernized in 1979
Gas source	Associated Gas	Uzen Field (Uzen East, Tenge West)
		Zhetibai field (Zhetibai South, Tasbulat, Aktas, Normaul East)
2. Tengis Refining Plant in Atyrau (Planned)		
Location	Tengis	Feature:High hydrogensulfide contents
Capacity		2.55 billion m^3/yr
Gas source	Associated Gas	Tengis field
3. Zhanazhol Refining Plant		
Location	Zhanazhol	
Capacity	First Plant was upgraded	9 billion m^3/yr, built up in 2000
	Second Plant	1.4 billion m^3/yr, started in 2003
Gas source	Associated Gas	Tengis field
Total capacity	About 16 billion m^3/yr	Actual capacity: 6.9 billion m^3/yr (43%)

Table 82 Oil and Gas Reserves and Production in Mangistau

Field name	Owner	Estimated reserved oil (10^6t)	Reserved gas (10^9m^3)	Associated gas intake (10^6m^3/yr)	Oil production (10^6t/yr)	Gas production (10^6m^3/yr)
Aksas	RBM MUNAI		5.0			
Dolinnoe	RBM MUNAI	8	4.5			
Emir	RBM MUNAI	10	2.0			
Zetybay	Mangistau Munai Gas			21		
Uzen	Uzenmunaigaz	20			5.61	3.07
North Buzachi	CNPC/NelsonR	200			0.33	
Total		238	11.5			

A study was carried out recently on the enforcement of power generation and development of new industries using the associated gas in Kazakhstan (Japan External Trade Organization; JETRO). The study covered a comparatively large oilfields (Aksaz, Dolinnoe and Emir oilfields) located 50km east of the Aktau city. A development plan has been formulated for a 100MW power generation, production of LPG at some 33,000t and condensate at 18,000t annually, and possible manufacturing of sulfur pre-cast concrete.

To proceed with gas chemistry operation, the expansion of gas production is necessary. At present, no definite plan exists to expand the gas production in Mangistau.

In Aktau, the project to produce 1,500t ammonia, 1,700t carbamide and 440t ammonium nitrate has started to be constructed for completion in 2009. The fertilizer to be produced will substitute the import. The production of carbamide represents the value-added processing as carbamide is the basic chemical for the production of urethane, which has a wide range of uses including urethane rubber, urethane binding agent, additive to dynamite, combustion control agent and intermediates for medicines.

8.2.2 Related initiatives in neighboring regions and countries

The Kazakh government has identified the petrochemical industry as a priority in diversifying the Kazakh economy, and provides tax incentives for companies planning to set up petrochemical plants. The Ministry of Energy and Natural Resources and Kazmunaigaz prepared the long-term national development plan for the Caspian Sea region to 2015, entitled "oil and gas sector national project in the Caspian Sea region," which was approved on May 16, 2003 as the Presidential Ordinance No. 1095. The plan envisages the construction and operation of petrochemical facilities as one of the third stage activities for 2010-15 to satisfy the demand for petrochemical products in Kazakhstan and to develop domestic petrochemical industry including related infrastructure improvement. Related initiatives are outlined.

Gas chemistry plant in Atyrau

KazMunayGaz (KMG) and the Arab International Petroleum Investment Company (IPIC) have signed a memorandum of understanding on the IPIC's potential involvement in the project of constructing the first integrated gas chemical facilities in Atyrau in the western Kazakhstan. IPIC and KMG will exchange technology and experience if the memorandum of understanding is fulfilled. The cost of constructing the facility is US$5.3 billion. Its design capacity is 800,000t of polyethylene and 400,000t of polypropylene a year. The project is expected to be completed in 2013 (Central Asia Investment Bulletin, December 2007 and February 2008).

Petrochemical complex in Atyrau

The renovation of the existing oil refinery in Atyrau was completed, and a new refinery and petrochemical plant based on naphtha are planned. The Kazakh government was to hold a tender to choose a foreign partner to build the petrochemical plant in May 2008. The plant is expected to produce 400,000t of polyethylene of high and low density, 400,000t of linear polyethylene of low density and 400,000t of polypropylene a year ("Kazakhstan Economic Report by Institute for Economic Strategy", Central Asia: January−February 2008).

Large refinery and petrochemical complex in Tengis

A large refinery is planned in Tengis in the southeast of Atyrau. Associated with it, a petrochemical plant is also conceived based on naphtha (JICA Study on Capacity Development on Pollution Prevention and Control in the Ptroleum Industry in the Caspian Sea and Its coastal Areas, August 2006). The project outline is provided below.

- Location: near Tengiz oilfield (Karaton)
- Raw materials: associated gas (surplus gas) from Tengiz and Kashagan fields to be transported by pipeline
- Process: gas cracking after refining to produce ethylene and propylene)
- Secondary process: production of ethylene, propylene derivatives (plastics, chemicals)
- Shipping: from the Aktau port or new port at the north coast of Mangistau Oblast
- Production: operation to be started by 2015

Renovation of oil refinery in Turkmenistan

The renovation of the existing oil refinery in Turkmenbash near the border with Mangistau is proceeding at the cost of US$1.2 billion together with the construction of related facilities. It aims at the production increase of polypropylene for export. Also, the Government plans to establish the second refinery in Seidi near the border with Uzbekistan to process 32 million ton of crude oil, and is now seeking foreign investors for the refinery and ancillary facilities.

8.2.3 Proven reserve of natural gas

The total proven reserve of natural gas in the world is 180.2 trillion m^3. The proven reserve of

natural gas in Kazakhstan is 3.0 trillion m^3, ranked at the 11th in the world, accounting for 1.7% of the total in the world (Table 83).

Table 83 Proven Reserves of Natural Gas in the World

(Unit: $10^{12}m^3$)

Country	Proven reserves, 2005	Proven reserves, 2006	Share of total at end 2006 (%)
World Total	180.2	181.6	100
Kazakhstan	3.00	3.00	1.7
Russian Federation	46.66	47.66	26.3
Azerbaijan	1.35	1.35	0.7
Uzbekistan	1.85	1.87	1.0
Turkmenistan	2.86	2.86	1.6
Iran	27.58	28.13	15.5
Qatar	25.36	25.36	14.0
Saudi Arabia	6.82	7.07	3.9

Source: BP, Statistical Review of World Energy, June 2007

8.2.4 Production and expansion plan of natural gas in Kazakhstan

Kazakhstan intends to expand the natural gas production from 29.6 billion m^3 in 2007 to 114 billion m^3 by 2020, according to the president of KazMunayGas. This will increase the share of Kazakhstan in the world production of natural gas significantly from 0.8% in 2006 (Table 84). Of the increased production, 80% will be exported after the removal of sulfur content and refining, and 16% or 18.7 billion m^3 devoted to domestic consumption but not in Mangistau.

Table 84 Production of Natural Gas in Major Countries

Country	Gas production in 2005 (10^9m^3)	Gas production in 2006 (10^9m^3)	Share of total at end of 2006 (%)
World Total	2,779.8	2,865.3	100
Kazakhstan	23.3	23.9	0.8
Russian Federation	598.0	612.1	21.3
Azerbaijan	5.3	6.3	0.2
Uzbekistan	55.0	55.4	1.9
Turkmenistan	58.8	62.2	2.2
Iran	100.9	105.0	3.7
Qatar	45.8	49.5	1.7
Saudi Arabia	71.2	73.7	2.6
UAE (United Arab Emirates)	47.0	47.4	1.6
Indonesia	73.8	74.0	2.6
Malaysia	59.9	60.2	2.1
Australia	37.1	38.9	1.4
USA	511.8	524.1	18.5
Canada	185.9	187.0	6.5
China	50.0	58.6	6.5

Source: ibid.

8.2.5 Production and consumption of natural gas in Mangistau

Proven gas reserves

The proven natural gas reserve in Mangistau, 11.5 billion m^3, accounts only for 0.4% of the total proven reserve of 3.0 trillion m^3 in Kazakhstan (Table 85). Additional reserves are expected, although not confirmed yet. The present consumption of natural gas in Mangistau is much smaller than the amount necessary for establishing natural gas chemistry. After the expansion of the natural gas production by 2020 as mentioned above, there will be sufficient supply for gas chemistry.

Besides, some gas used for power generation at oil fields may be replaced by nuclear power to make additional gas available for industrial use.

Table 85 Oil and Gas Reserves and Production in Mangistau Oblast, 2004- 2005

Field name	Owner	Estimated reserved oil (10^6t)	Reserved gas (10^9m^3)	Associated gas intake (10^6m^3/yr)	Oil production (10^6t/yr)	Gas production (10^6m^3/yr)
Aksas	RBM MUNAI		5.0			
Dolinnoe	RBM MUNAI	8	4.5			
Emir	RBM MUNAI	10	2.0			
Zetybay	Mangistau Munai Gas			21		
Uzen	Uzenmunaigaz	20			5.61	3.07
North Buzachi	CNPC/NelsonR=50/50	200			0.33	
Total		238	11.5			

Gas production

Two major enterprises are producing natural gas in Mangistau: Gazpolmunai Co., Ltd. and Tolkynneftengaz Co., Ltd. Their production plans are summarized in Table 86. The total production by these enterprises is 2.53 billion m^3 in 2014. Gazpolmunai does not show its production plan after 2015 as the condensate production is not expected to produce profits. Gas production and consumption balances projected by these enterprises are summarized in Tables 87 and 88, respectively.

Consumption of natural gas

The natural gas consumption in Mangistau for industrial, housing and other uses is planned to expand to 3.12 billion m^3 in 2020 and 3.71 billion m^3 in 2030, of which 64% is for heat and energy producing enterprises (Table 89). Of the total consumption in 2020, 2.50 billion m^3 or 80% will be produced by Tolkynneftegaz Co., Ltd., and 95% of the production is expected for sale as tank gas. The volume of flare gas is small since the gas contains low sulfur and used more readily as fuel.

Table 86 Production Plans for Natural Gas

(Unit: 10^6m^3)

	2012	2014	2020
Gazpolmunai Co.			
Production	52.0	33.7	-
Tank gas sales	44.9	29.8	-
Flaring	2.5	1.6	-
Tolkynneftegaz Co.			
Production	2500.0	2500.0	2500.0
Tank gas sales	2386.0	2386.0	2396.6
Flaring	85.5	85.5	78.0
Total production	2552.0	2534.0	2500.0

Table 87 Balance of Gas Production and Consumption by Kazpolmunai Co., Ltd., 2007-14

(Unit: 10^6m^3)

Indices	2007	2008	2009	2010	2011	2012	2013	2014	2015	2020
Gas production	53.2	53.8	53.2	52.4	53.2	52	49.9	33.7	-	-
Gas flow for auxiliaries	4.7	4.8	4.7	4.6	4.7	4.6	4.4	3	-	-
Tank gas for selling	45.95	46.42	45.95	45.28	45.95	44.9	43.1	29.08	-	-
Volume of flare gas	2.55	2.58	2.55	2.52	2.55	2.5	2.4	1.62	-	-

Note: This form was filled in till 2015 because according to the project development of gas-condensate field becomes unprofitable starting from 2015. Gas Volume is flaring constantly 2.5 million cubic meters until on 2012 and has also continued flaring 1.6cubic meters on 2014 by Kazpolmunai Co., Ltd.

Table 88 Balance of Gas Production and Consumption by Tolkynneftegaz Co., Ltd., 2008-20

Indices	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Gas production (10^6m^3)	2,500.0	2,500.0	2,500.0	2,500.0	2,500.0	2,500.0	2,500.0	2,500.0	2,500.0	2,500.0	2,500.0	2,500.0	2,500.0
Gas flow for auxiliaries (10^6m^3)	22.4	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	25.4	25.4	25.4	25.4
Tank gas for selling (10^6m^3)	2,311.8	2,120.5	2,386.9	2,386.9	2,386.9	2,386.9	2,386.9	2,384.4	2,384.4	2,393.6	2,398.0	2,398.0	2,396.6
Volume of flare gas (10^6m^3)	165.8	351.9	85.5	85.5	85.5	85.5	85.5	88.0	88.0	81.0	76.7	76.7	78.0
Gas utilization (%)	93.3	85.9	96.6	96.6	96.6	96.6	96.6	96.5	96.5	96.8	96.9	96.9	96.9

Notes: Gas utilization means ratio sum of gas for auxiliaries and tank gas for selling to gas production.

Table 89 Projection of Gas Consumption in Mangistau Oblast, 2007-2030

Year	Population	Municipal enterprises	Industrial enterprises	Heat & energy producing enterprises	Total by oblast
2007	132.276	14.332	285.719	1687.572	2119.899
2008	140.875	19.652	304.326	1699.110	2163.963
2009	143.211	19.953	611.272	1734.106	2508.542
2010	150.486	20.102	857.130	1756.905	2784.623
2015	154.081	29.769	860.774	1838.978	2883.602
2020	166.623	32.192	931.213	1989.900	3119.928
2025	180.916	34.953	1011.1	2162.150	3389.119
2030	198.426	38.337	1109.017	2367.782	3713.562

8.3 Demand and Supply of Oil and Gas Products in Neighboring Countries

8.3.1 Russia

Four neighboring districts and 11 oblasts of Russia are bordering on Kazakhstan: South, Volga, Siberian and Ural districts. There are 10 major refineries existing in these districts, including the biggest one in Novo Kuibyshev, Samaraskaya. They have huge rated capacity, although effective capacity is not known (Table 90). A few petrochemical complexes are operational associated with these refineries.

Table 90 Major Refineries and Their Capacity

Refinery	Operating company/ shareholder	Location (city)	Capacity (10^6t/yr)
Volgograd	Lukoil	Volgograd	8.51
Kraking Saratov	Sidanko	Saratov	7.95
Samara Kuibishev	Yukos	Samara	6.93
Novo Kuibyshev	Yukos	Samara	13.90
Syzran	Yukos	Samara	8.98
Surgut	Gazprom	Samara	3.96
Omsk	Sibneft	Omsk	8.41
Orsk	Onako	Orenburg	7.16
Astrakhan	Gazprom	Astrakhan	2.97
Kkogalym	Lukoil	Tyumen	0.05

Of these, petrochemical complexes in four districts produce plastic products (Table 91). The production in a few years up to 2005 was 100,000t in Volgagradskaya, 160-190,000t in Samaraskaya and 35,000t in Omskaya. No data are reported for Altayskiy Kray. Details are not known, but the production scale indicates polyethylene, polypropylene and polystyrene production in Volgagradskaya,

and vinyl chloride or polystyrene in Omscaya. The production quantity is more than sufficient to meet the demand of these four districts having the total population of about 10.0 million and the urban population of some 7 million. The production levels and types of products do not fit for international competition, but aim at the local and neighboring markets.

Table 91 Russian Five Neighboring States to Kazakhstan Producing Plastic Products

Production	2003	2004	2005
1) Volgogradskaya (Chemical Co. 4)			
Crude Oil* (10^6t)	3.4	3.3	3.5
Temporally refining (10^6t)	7.7	9.0	9.2
Natural gas (10^9m^3)			
Chemicals (1,000t)			
Potassium	77.0		
Plastics	95.8	97.3	98.6
Synthetic fiber	19.2	16.5	16.1
2) Samaraskaya (Chemical Co. 2)			
Crude oil* (10^6t)	13.0	13.4	10.7
Temporally refining (10^6t)	17.3	17.4	18.8
Chemicals (1,000t)			
Synthetic ammonium	2.2	-	-
Synthetic fertilizer	464	694	682
Plastics	156	188	173
Synthetic fiber	249	254	239
3) Altayskiy Kray (Chemical Co. 1)	Intimate economic relations with Kazakh.		
Cokes (10^6t)	3.6	--	--
Chemicals (1,000t)			
Plastics	NA	NA	NA
Synthetic fiber	10.9	10.9	5.1
4) Omskaya (Chemical Co. 2)	Second largest city in Siberia		
Crude oil* (10^6t)	286	497	--
Temporally refining (10^6t)	13.8	14.3	--
Chemicals (1,000t)			
Plastics	32.4	26.6	25.7
Synthetic rubber	83.1	83.9	78.5

* Including gas condensate

The economic conditions of these districts vary widely as shown in Table 92. The average wage in Samaraskaya and Volgogradskaya is 50% and 20% higher than the level in Altayskiy Kray, respectively. The import value of petrochemical products in Samaraskaya is US$155 million, 3.5-4.0 times larger than the respective value in the other three districts. This is presumably due to the import of terephtharic acid raw material to rpoduce systhetic fibers at some 30,000t annual production.

Kazakhstan imports small quantities of plastics and ethyl benzene as raw material for styrene from Russia. In addition, plastic transformed products are imported by towns near the borders.

Table 92 Comparison of Four Neighboring Oblasts of Russia by Socioeconomic Indices

	Oblast	Volgogradskaya	Samaraskaya	Altayskiy Kray	Omskaya	(Ref) Moscow	(Ref) Moscow City	(Ref) Saint Petersburg (City and Oblast)
Population (2005)		2655	3200	2566	2047			
Share		75.3	80.3	53.5	69			
Unemployment (10^3persons)		9.4	5.3	9	9.1			
Per capita (Ruble)	Local gross production	60,691	108,756	129,669	101,926	6,563.30	19,108.30	7,416.40
	Ratio to Russian average	59.5	106.6	127.1	99.9	9,508.20	13,735.70	10,791.30

	Oblast	Volgogradskaya	Samaraskaya	Altayskiy Kray	Omskaya	(Ref) Moscow	(Ref) Moscow City	(Ref) Saint Petersburg (City and Oblast)
Per capita (Ruble)	Monthly consumption expenditure (Nov. 2005)	4,466.80	8,169.40	4,124.80	4,864.60	985	985	850
	Monthly av. wages (2005)	6,032.00	7,666.30	4,960.00	7,242.10		103	71
Per 1,000 persons	Cellular phones in town	511	619	245	356			
	Video cameras, VCR's	52	67	59	54			
Classified import products (US10^6$)	Food, agricultural goods	41.6	102.6	152.4	82.8			
	Energy, fuel	9.7	4	3.4	31.8			
	Petrochemical products	41.2	155.7	9.4	9.9			

Sources: Statistical Department of the Russian Federation

8.3.2 Southern neighbors

There are five refineries in the three neighboring countries of Turkmenistan, Uzbekistan and Kyrgystan (Table 93). The combined capacity is 20.6 million ton/year, but the operating rate is low at 50-60%. As mentioned above, the Turkmenbash refinery has a plan for renovation and expansion, including a plan to produce polyethylene and polypropylene from naphtha.

Table 93 Refineries in Turkmenistan, Uzbekistan and Kyrgystan

Turkmenistan	(Location)	(Capacity)
Seidi Refinery	Chardzhou	5.40 million t/year
Turkmenbashi Refinery	Balkanskaya	5.22 million t/year
Uzbekistan		
Ferghana Refinery	Ferghana valley	4.77 million t/year
Alty-Arik Refinery	Ferghana valley	2.97 million t/year
Bukhara Refinery	Bukhara	2.25 million t/year
Kyrgyzstan		
Jalalabad Refinery	Dzhalalabad	0.05 million t/year

The export and import value for chemical products, including those of non-petrochemical origins in these countries are summarized in Table 94. Import from Uzbekistan was US$6.48 million in 2006. Import from Turkmenistan was only 30% of that from Uzbekistan, and export value was merely US$0.13 million in 2006. Import and export values are particularly large for Russia, EU and East Asia.

Assuming all the chemical products in Table 87 derive from plastics, the average consumption of plastics in Kazakhstan is calculated to be 23.4kg annually at the unit price of US$1.5/kg. Prices of transformed plastic products made of polypropylene and polyethylene are in the range of US$1.0-2.0/kg.

Table 94 Import and Export of Plastic Products of Kazakhstan

Country	Rank[*1]	2003	(%)[*3]	2004	(%)[*3]	2005	(%)[*3]	2006	(%)[*3]	Growth[*2](%)
Import from:										
Russian Federation	9	67.3	2.1	104.5	2.2	145.1	2.2	183.1	2.0	39.6
CIS except Russia	13	13.3	2.0	22.6	1.7	29.6	1.9	41.6	2.1	46.2
EU (25 countries)	7	72.8	3.1	99.2	2.8	126	2.9	173.1	2.8	33.5
East Asia	5	34.9	4.1	43.8	3.1	66.9	3.2	133.6	4.2	56.4
Iran	5	0.635	5.0	0.810	6.2	0.889	6.0	1.1340	5.2	21.3
Azerbaujan	9	0.867	6.3	1.524	9.5	0.652	3.1	0.785	1.1	-3.3
Uzbekistan	8	2.737	3.1	5.150	2.3	5.813	2.3	6.486	2.0	33.3
Turkmenistan	4	0.0	-	0.374	0.5	0.403	0.8	1.890	1.4	-
Total		192.5		278.0		375.4		541.7		

Country	Rank[*1]	2003	(%)[*3]	2004	(%)[*3]	2005	(%)[*3]	2006	(%)[*3]	Growth[*2](%)
Export to:										
Azerbaujan	9	0.113	0.1	0.586	0.2	1.349	1	1.210	0.5	120.3
Uzbekistan	10	0.327	0.2	2.015	1	1.205	0.5	2.943	0.8	108
Turknenistan	16	0.099	0.3	0.399	1.5	0.262	1.5	0.130	0.6	9.5
Total		0.5		3.0		2.8		4.3		

[*1] Assigned in 20th in each country.
[*2] Annual Growth 2003-2006 Sources: Interim Report, Jan. 2008, JICA Study Team
[*3] % means share of total chemical trade in HC 39 file to total Kazakhstan trade of the country
[*4] Total means Sum of listed country, Kazakhstan has other trade value of unlisted country in this table.

8.3.3 Caucasian region

There are three refineries in Azerbaijan and Georgia as shown in Table 95. The total capacity is 24.6 million ton/year, which is larger by 30% than the existing capacity of 19.2 million ton/year in Kazakhstan.

Table 95 Refineries in Azerbaijan and Georgia

Azerbaijan	(Location)	(Capacity)
Baku Refinery	Baku	10.76 million t/year
Novo-Baku Refinery	Baku,	9.14 million t/year
Georgia		
Batumi Refinery	Ajaria region	4.77 million t/year

In 2006, Georgia consumed 2.27 billion m^3 of natural gas, which is mostly produced in Kazakhstan and imported by the Russia pipeline of Gazprom. The natural gas from Kazakhstan is provided to Georgia under a supply agreement between the two countries. The natural gas import to the region comes primarily from Russia, and in recent years from Turkmenistan and Kazakhstan (piped through Russia).

Azerbaijan has large reserves and production of oil owing to its Baku offshore oilfields (Table 96 and Figure 17). Oil production in Azerbaijan in 2007 totaled 840,000bbl/day (115,000t/day), including the condensates from the Shah Denis natural gas field. Oil production from the Central and West Azeri platforms in the ACG complex increased AIOC production from 140,000bbl/day (19,100t/day) in January 2005 to average 650,000bbl/day (88,600t/day) during the first nine months of 2007.

Figure 17 Azerbaijan Offshore Oil and Gas Production Fields

Table 96 Energy Status in Caucasus Region, 2004

	Reserves	Production	Consumption
Oil (Unit)	(10^6t)	(1,000t/day)	(1,000t/day)
Azerbaijan	95-107	44.7	15.5
Georgia	41.0	0.27	1.71
Natural gas (Unit)	(10^9m^3)	(10^9m^3/day)	(10^9m^3/day)
Azerbaijan	850	5.10	9.34
Georgia	8.5	0.02	1.00

Sources: CIS & European energy data book CIA, EIA, IEA, Oil and Gas Journal

The West Azeri platform began production in late December 2005 and is expected to reach a plateau rate of 300,000bbl/day (41,000t/day). Production of oil from the East Azeri platform came online in October 2006 as part of the second phase of ACG, and that field is expected to reach up to 260,000bbl/day (35,500t/day). With the addition of the Shah Deniz natural gas field, around 40,000bbl/day (5,500t/day) of condensate production is also being blended into AIOC's export blend. In total, oil production from AIOC and SOCAR fields is slated to average 840,000bbl/day (115,000t/day) during 2007.

Azeri natural gas

With the addition of the Shah Deniz natural gas and condensate field and the South Caucasus Pipeline (SCP), Azerbaijan will become a large natural gas provider to Turkey and to Europe in the upcoming decade. According to the Oil and Gas Journal, Azerbaijan has proven natural gas reserves of roughly 30 trillion cubic feet (TCF) or 0.85 trillion m^3, and BP estimates the country has 48 TCF (1.36 trillion m^3) of proven reserves (CF=0.028317m^3).

IHS Energy estimates that ultimate recoverable resources are approximately 67 TCF (1.9 trillion m^3). In 2006, the country produced 241 billion cubic feet (BCF) or 6.8 billion m^3, a 17 % increase from 2005. Roughly 60% of natural gas production in Azerbaijan is produced by Azneft, a subsidiary of SOCAR, and the rest is produced by joint ventures, the largest of which is AIOC. . The Azeri government sources expect the country to produce up to 1.1 TCF or 0.03 trillion m^3 by 2011.

Over the next 10 years, SOCAR plans to invest US$224 million to expand natural gas production in Azerbaijan by drilling 23 gas wells in the shallow-water Gunashli field, by expanding existing platforms, and by building underwater gas pipelines. The company hopes this will help to increase (SOCAR-only) production to around 330 BCF by 2010.

Azerbaijan's major natural gas production increases in the future are expected to come from the development of the Shah Deniz offshore natural gas and condensate field. According to the project's operator, BP, the field contains "potential recoverable resources" of roughly 15 TCF or 0.4 trillion m^3 of natural gas and 600 million barrels of condensate. With the confirmation of a major new natural gas discovery below the existing reservoir, BP now says there is enough gas to justify Phase 2 development. Shah Deniz is located offshore, approximately 60 miles southeast of Baku (Figure 17).

8.4 Demand and Supply of Oil and Gas Products in Europe, Middle East and CIS Countries

The demand and supply balance of oil and gas products was examined by the Japanese government as summarized in this section. The results are shown by product. It is concluded that the demand and supply for ethylene and propylene are more or less balanced by 2010. Petrochemical derivatives based on these such as polyethylene, polypropylene, vinyl chloride and polystyrene would not face any shortages, but some products may face shortages due to rapid demand growth.

8.4.1 Ethylene and propylene raw materials

(1) Ethylene monomer

Ethylene would face supply shortages by 278,000t in Western Europe and 20,000t in the CIS countries by 2010, while excess supply by 522,000t would be observed in the Middle East (Table 97). As a whole, the excess in the Middle East surpasses the shortages in Europe and the CIS countries.

Table 97 Production and Demand of Ethylene Monomer

	1997	2002	2003	2004	2005	2006	2007	2008	2009	2010	Growth (97-04)	Growth (04-10)
Western Europe (incl. Turkey)	18,931	20,595	21,038	21,900	22,239	22,529	22,928	23,197	23,323	23,573	2.1	1.2
Middle East (excl. Turkey)	4,266	8,040	8,777	9,202	10,043	12,121	13,999	17,914	20,299	23,629	11.6	17
CIS and Eastern Europe	3,458	3,930	4,150	4,540	5,046	4,555	5,550	5,550	6,050	7,750	4	9.3
Total	26,655		32,565	33,965	35,642	37,328	39,205	42,477	46,661	49,672	54,952	
Total world production	78,644	95,076	98,149	103,813	107,338	112,712	121,194	126,242	134,230	141,631	4	5.3
Western Europe (incl. Turkey)	19,231	21,150	21,190	22,044	22,445	22,763	23,174	23,446	23,567	23,851	2	1.3
Middle East (excl. Turkey)	3,979	7,789	8,285	8,749	9,568	11,792	13,516	17,448	19,682	23,107	11.9	17.6
CIS and Eastern Europe	3,531	4,120	4,220	4,750	4,797	4,432	5,469	5,580	6,150	7,810	4.3	8.6
Total	33,059	33,695	35,543	36,810	38,987	42,159	46,474	49,399	54,768			
Total world demand	79,203	95,853	97,936	103,953	107,028	112,976	118,943	124,201	131,060	138,913	4	5

(2) Propylene monomer

The of propylene monomer would be short of the demand by 343,000t in Europe, middle East, CIS countries in 2010 (Table 98). This is due to the supply shortage in Europe.

Table 98 Production and Demand of Propylene Monomer

	1997	2002	2003	2004	2005	2006	2007	2008	2009	2010	Growth (97-04)	Growth (04-10)
Western Europe (incl. Turkey)	12,610	14,307	14,657	14,925	14,985	15,181	15,450	15,554	15,555	15,555	2.4	0.7
Middle East (excl. Turkey)	847	1,528	1,731	1,940	1,990	2,803	2,984	4,700	5,940	6,660	12.6	22.8
CIS and Eastern Europe	1,543	2,120	2,250	2,600	2,828	2,650	3,210	3,180	3,190	3,590	7.7	5.5
Total	15,000	17,955	18,638	19,465	19,803	20,634	21,644	23,434	24,685	25,805		
Total world production	43,624	58,521	62,140	64,274	66,355	69,875	73,445	76,382	80,461	83,311	5.7	4.4
Western Europe (incl. Turkey)	12,881	14,700	14,871	15,112	15,333	15,529	15,698	15,797	15,848	16,001	2.3	1
Middle East (excl. Turkey)	672	1,375	1,570	1,758	1,838	2,671	2,763	4,621	5,760	6,557	14.7	24.5
CIS and Eastern Europe	1,421	2,120	2,220	2,620	2,591	2,517	3,001	2,998	3,070	3,590	9.1	5.4
Total	14,974	18,195	18,661	19,490	19,762	20,717	21,462	23,416	24,678	26,148		
Total world demand	43,564	58,610	61,714	64,539	66,597	69,160	71,577	74,254	78,057	81,366	5.8	3.9

8.4.2 Plastic products

The demand and supply would be largely balanced for polyethylene, polypropylene, polystyrene and vinyl chloride with minor shortages up to 2010. The demand for polypropylene is expected to grow rapidly in the future, and the timing for investment to increase supply capacity is an issue among related enterprises. The demand and supply for vinyl chloride are balanced in Europe, but the demand for construction materials, civil structures and materials for water supply and sewerage makes the market steadily growing especially in Southeast Asia, China and developing countries.

Low density polyethylene (LDPE)

LDPE would be short of supply in Europe by 793,000t in 2010, while the Middle East would face excess supply at 6.63 million ton and excess production of 100,000t in CIS countries as well (Table 99). As a whole, the supply would exceed the demand by 5.94 million ton in 2010.

High density polypropylene (HDPE)

It is projected that HDPE would face the supply shortages of 1.18 million ton in Europe in 2010, while in the Middle East and the CIS countries, the supply would exceed the demand by 6.17 million and

0.39 million, respectively (Table 100). Consequently, there would be the excess supply of 5.39 million in these regions as a whole in 2010.

Table 99 Production and Demand of LDPE

	1997	2002	2003	2004	2005	2006	2007	2008	2009	2010	Growth (97-04)	Growth (04-10)
Western Europe (incl. Turkey)	6,567	7,466	7,303	7,361	7,608	7,836	8,140	8,247	8,247	8,354	1.6	2.1
Middle East (excl. Turkey)	1,330	2,502	2,686	2,988	3,191	3,911	4,586	5,846	6,670	7,875	12.3	17.5
CIS and Eastern Europe	882	1,310	1,480	1,570	2,122	1,900	2,020	2,040	2,040	2,270	8.6	6.3
Total	8,779	11,278	11,469	11,919	12,921	13,647	14,746	16,133	16,957	18,499		
Total world production	24,648	31,672	32,254	34,003	35,840	37,728	40,297	42,383	44,857	47,646	4.7	5.8
Western Europe (incl. Turkey)	6,464	7,644	7,621	7,980	8,164	8,351	8,543	8,740	8,941	9,147	3.1	2
Middle East (excl. Turkey)	457	672	726	784	846	914	987	1,066	1,151	1,243	8	8
CIS and Eastern Europe	745	1,090	1,250	1,380	1,911	1,722	1,887	1,913	1,960	2,170	9.2	7.8
Total	7,666	9,406	9,597	10,144	10,921	10,987	11,417	11,719	12,052	12,560		
Total world demand	24,778	31,375	31,715	33,545	35,504	37,071	38,939	40,530	42,008	43,675	4.4	4.5

Table 100 Production and Demand of HDPE

	1997	2002	2003	2004	2005	2006	2007	2008	2009	2010	Growth (97-04)	Growth (04-10)
Western Europe (incl. Turkey)	4,019	4,840	5,039	5,208	5,317	5,379	5,442	5,567	5,620	5,755	3.8	1.7
Middle East (excl. Turkey)	784	2,100	2,462	2,743	3,107	3,912	4,337	5,527	6,194	7,188	19.6	17.4
CIS and Eastern Europe	489	880	1,030	1,180	1,124	1,500	1,500	1,540	1,600	2,790	13.4	15.4
Total	5,292	7,820	8,531	9,131	9,548	10,791	11,279	12,634	13,414	15,733		
Total world production	18,673	24,077	25,337	27,085	28,460	31,105	32,355	34,071	36,180	39,112	5.5	6.3
Western Europe (incl. Turkey)	4,074	4,964	5,153	5,478	5,697	5,925	6,162	6,408	6,665	6,931	4.3	4
Middle East (excl. Turkey)	337	595	636	680	726	777	830	887	949	1,014	10.5	6.9
CIS and Eastern Europe	477	870	1,030	1,170	1,161	1,145	1,379	1,467	1,350	2,400	13.7	
Total	4,888	6,429	6,819	7,328	7,584	7,847	8,371	8,762	8,964	10,345		
Total world demand	18,190	24,002	24,883	26,776	28,071	29,650	31,398	32,864	34,015	36,356	5.7	5.2

Polypropylene

Polypropylene is projected to be in short supply in Europe by 1.29 million ton in 2010, while it would be over-supplied in the Middle East by 3.80 million ton and in the CIS countries by 80,000t in the same year (Table 101). As a whole, the supply excess is expected with 2.57 million ton. In this connection, the supply expansion of polypropylene and LNG is planned at the Turkmenbashi refinery, following the renovation at the US$1.2 billion as mentioned earlier.

Table 101 Production & Demand of Polypropylene

	1997	2002	2003	2004	2005	2006	2007	2008	2009	2010	Growth (97-04)	Growth (04-10)
Western Europe (incl. Turkey)	6,455	8,211	8,770	9,030	9,146	9,282	9,380	9,428	9,428	9,527	4.9	0.9
Middle East (excl. Turkey)	488	1,267	1,267	1,442	1,512	2,312	2,393	4,043	4,980	5,580	16.7	25.3
CIS and Eastern Europe	626	1,010	1,150	1,290	1,237	1,590	1,750	1,800	1,800	2,430	10.9	11.1
Total	7,569	10,488	11,187	11,762	11,895	13,184	13,523	15,271	16,208	17,537		
Total world production	23,480	34,223	36,445	38,608	39,702	42,570	44,434	47,377	50,666	52,850	7.4	5.4
Western Europe (incl. Turkey)	6,295	7,700	8,023	8,800	9,108	9,427	9,757	10,098	10,452	10,817	4.9	3.5
Middle East (excl. Turkey)	620	1,065	1,171	1,242	1,321	1,406	1,496	1,591	1,693	1,801	10.4	6.4
CIS and Eastern Europe	432	1,080	1,070	1,260	1,176	1,257	1,440	1,598	1,660	2,350	16.5	10.9
Total	7,347	9,845	10,264	11,302	11,605	12,090	12,693	13,287	13,805	14,968		
Total world demand	23,309	33,940	35,535	38,161	39,760	42,280	44,858	47,298	49,600	52,551	7.3	5.5

PVC

The production of PVC in Europe, Middle East and CIS countries would total 6.87 million ton in 2010 against the total demand of 7.05 million ton, resulting in the shortages of 180,000t (Table 102). As there will be excess production capacity of 200,000t in the CIS countries, the demand and supply would balance in Europe, Middle East and CIS countries as a whole.

Table 102 Production and Demand of PVC

	1997	2002	2003	2004	2005	2006	2007	2008	2009	2010	Growth (97-04)	Growth (04-10)
Western Europe (incl. Turkey)	5,644	5,910	5,960	6,232	6,226	6,208	6,208	6,208	6,208	6,208	1.4	-0.1
Middle East (excl. Turkey)	602	652	645	551	551	568	665	665	665	665	-1.3	3.2
CIS and Eastern Europe	1,152	1,500	1,450	1,500	1,704	1,600	2,010	2,010	2,110	2,000	3.8	4.9
Total	7,398	8,062	8,055	8,283	8,481	8,376	8,883	8,883	8,983	8,873		
Total world production	23,321	27,316	28,223	30,255	31,710	32,287	34,306	35,575	36,917	37,699	3.8	3.7
Western Europe (incl. Turkey)	5,815	5,917	5,918	6,190	6,209	6,227	6,246	6,265	6,283	6,302	0.9	0.3
Middle East (excl. Turkey)	433	641	654	667	680	694	707	722	736	750	6.4	2
CIS and Eastern Europe	772	1,070	1,060	1,260	1,280	1,212	1,426	1,450	1,710	1,800	7.3	6.1
Total	7,020	7,628	7,632	8,117	8,169	8,133	8,379	8,437	8,729	8,852		
Total world demand	23,206	27,248	27,721	29,976	30,960	32,408	33,958	35,317	36,832	38,118	3.7	4.1

8.5 Derivative Industries Cluster in Mangistau

8.5.1 Strategy to establish derivative industries cluster

Methanol based production line

It is not advisable to establish gas chemistry operation in Mangistau aiming at the production of common commodities such as polyethylene and polypropylene. The gas chemistry in Mangistau should aim at selected commodities and high value-added specialty products. In particular, the production of methanol and other products of its downstream production line should be pursued.

Selection of specific production line and product set should be carefully examined in view of the access to markets, price competitiveness, and comparative advantage of Kazakhstan as well as the demand-supply situations of various potential products.

Greenhouse and industrial agriculture

Another way to utilize the gas energy in a small scale is to practice large scale greenhouse agriculture or industrial agriculture. Greenhouse agriculture by using gas and drip irrigation are already practiced in Kazakhstan. To establish these as economically viable undertakings, however, state-of-art technology needs to be introduced and experiences gained through pilot or experimental projects.

There exist alternative methods of greenhouse agriculture, and their applicability varies depending on climatic conditions, energy sources and materials for greenhouses among others. Promising products generally include fresh vegetables, berries, flowers and office plants. In Mangistau, tree seedlings may also deserve consideration in view of reforestation needs.

Environmental considerations

The production of fresh vegetables and berries by greenhouse or industrial agriculture would contribute to the improvement of diet for the local people. These and other products would supply to the growing tourism market as well. The development of green business would symbolize the Mangistau regional development, which the residents can be proud of. Together with tree planting supported by seedlings produced by greenhouse or industrial agriculture, residents in Mangistau would enjoy more pleasant living environment.

Possible negative effects of the development of derivative industries should also be noted. As the petrochemical industry and gas chemistry operation develop, plastic-transforming plants will be established as downstream production. In fact, consumption of plastics tends to increase as the income levels increase. This may result in serious littering of plastic bags and films, PET bottles and other plastic products. Countermeasures should be formulated together with the planning for derivative industries. The cluster approach would be effective in utilizing wastes and byproducts to minimize the overall wastes. The introduction of plastic recycling business and environmental education should be planned as part of the planning for the derivative industries cluster.

8.5.2 Planning for derivative industries cluster

(1) Proposed methanol derivative industries for Mangistau

Demand-supply for methanol derivatives

Major methanol producing regions in the world are Asia, Middle East, and South America, where the total production increased at over 10% per annum during 2003-06 (Table 103). The major methanol producing countries are all natural gas producers. The world demand for methanol increased at the average annual rate of 4.2% during 2003-06, although the demand in North America and Europe declined (Table 104).

Table 103 Supply of Methanol in Major Areas in the World

Unit: 10^6t

Supply in Area	2003	2004	2005	2006	'06 share (%)	Av. growth ('03-'06)
Asia	5.8	7.3	7.6	9	24	15.8
Middle East	6.1	7.1	7.8	8.7	24	12.6
North America	4.9	4.4	2.6	1.5	4	-32.6
South America	7.5	8	9.8	11.5	31	15.3
Europe	3.4	3.3	3.4	3.0	8	-4.1
Others	5.0	3.9	3.9	3.3	9	-12.9
Total	32.7	34.0	35.1	37.0	100	4.2

Table 104 Demand for Methanol in Major Areas in the World

Unit: 10^6t

Demand in Area	2003	2004	2005	2006	'06 Share (%)	Av. growth ('03-'06)
Asia	10.9	12.7	13.9	15.1	40.8	11.5
North America	9.5	8.9	8.8	8.1	21.9	-5.2
Europe	6.8	6.7	6.6	6.6	17.8	-4.1
Others	5.5	5.7	5.8	7.2	19.5	9.4
Total	32.7	34.0	35.1	37.0	100	4.2

The demand for methanol concentrates in a few derivative products with 60% for formaldehyde, acetic acid and MTBE (Table 105). Formaldehyde is a basic raw material for many kinds of chemicals such as paints, polyacetal plastics, a component of urethane-elastomer MDI and others. Acetic acid is used also as a basic material for chemical products such as adhesives, modifiers of PVC and polyethylene. MTBE is used as a gasoline additive to enhance the octane value, but its use was reduced significantly in the U.S. due to change in regulation.

Table 105 Demand for Methanol Products

Unit: 10^6t

Demand for uses	2003	2004	2005	2006	'06 share (%)	Annual growth ('03-'06)
Holmaldehide	10.7	11.5	12	12.2	33.0	4.5
Acetic Acid	3.1	3.3	3.4	3.8	10.3	7.0
MTBE	7.4	6.7	6.4	6	16.2	-6.8
MMA	1	1.1	1.2	1.2	3.2	6.3
Others	10.5	11.4	12.1	13.8	37.3	9.5
Total	32.7	34.0	35.1	37.0	100	4.2

The application of MMA is increasing to attain 6.3% per annum during 2003-06. While the demand is still small, its properties as a plastic glass with surface brightness, hardness against scratching, and transparency are valuable for automobile industry, LCD panel for digital machine display and other uses. The basic material of MMA is acrylic acid, which is also a starting material for AA polymer

having a large market of high water absorbent polymer such as disposable diapers for babies.

Model methanol derivative industries

The gas chemistry operation in Mangistau should be established for methanol derivatives of high value-added. A model may be derived from a Japanese firm operating worldwide a chain of methanol related business with the annual turnover of US$2.4 billion based on methanol plants in major natural gas producing countries such as Saudi Arabia, Indonesia and Venezuela (Figure 18). The chain encompasses not only production but also transport, storage, marketing and logistics, and R&D.

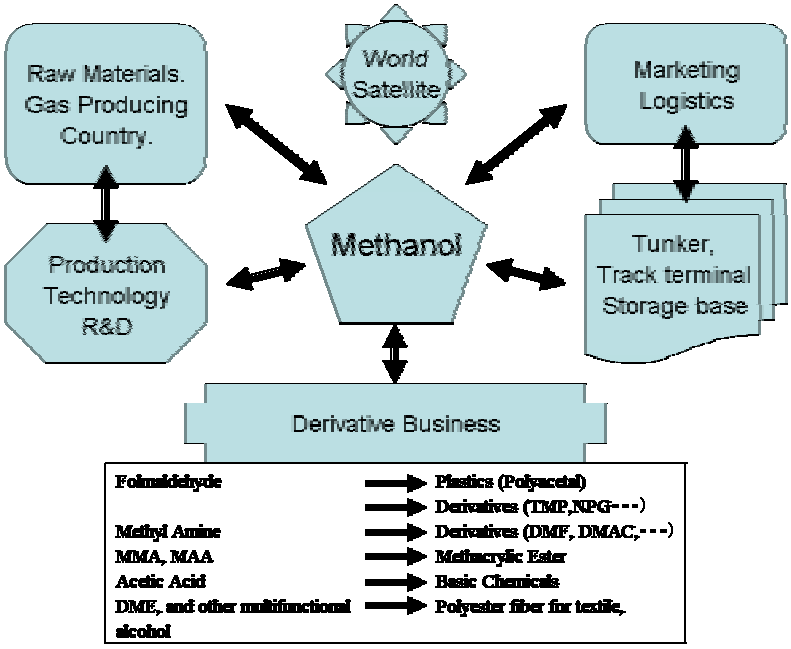


Figure 18 Methanol Chain Business Model

A case for Mangistau is worked out here for the production of methanol, formalin and MMA. The production, use of input, and investment cost are summarized in Table 106. The annual production consists of 415,000t methanol, 20,000t formalin, and 50,000t MMA. The production of polyacetal is also included.

Table 106 Model Production of Methanol, Formalin, MMA and Polyacetal in Mangistau

Methanol	Production	415,000t/year	Formalin	Production	20,000t/year
	Investment	US$230 million		Investment	US$30 million
	Annual consumption of natural gas	380 million m^3		Consumption of methanol	85,000t
	Other input			Other input	
	Plant coolant	136,000t/day		Plant coolant	24t/day
	Process water (clean water)	1500t/d		Steam	303t/day
	Power generation	4,150kWh		Power generation	30kWh
MMA	Production	50,000t/year	Polyacetal	Production	100,000t/year
	Investment	US$90 million		Investment	US$62 million
	Consumption of methanol	17,000t		Consumption of methanol	134,000t/year
	Auxiliary material: Isobutylene	370,500t		Auxiliary material: E Oxide	5.500t/year
	Others input			Others input	
	Plant coolant	54,100t/day		Plant coolant	162,000t/day
	Steam	530t/day		Steam	2,636t/day
	Power generation	25,200kWh		Power generation	160,000kWh

(2) Properties and applications of derivative products

Properties and applications of methanol derivative products are summarized in Table 107. Use of

main products is outlined.

Table 107 Properties and Applications of Methanol Derived Products

Product	Property and application
Formaldehyde	Largest application of methanol, consuming 30 % as raw materials; sources of surfactant, agrochemicals, and antiseptic solution.
Plastics (Polyacetal)	Largest users, 2.93t formalin for one ton polyacetal
Derivatives (TMP, NPG)	Sources of polyurethane resins and powder coating paint.
Amine Derivatives (DMF, DMAC, Others)	Sources of polyurethane elastomer and elastic fiber; pharmaceutical base; rinsing agent of electric device; emulsifying agent and anticorrosive paint
Methacrylic Ester	High value-added product; market price in US$5-10/kg; sources for adhesives ”superglue”; agents for dental, textile softener, paints etc.
MMA, MAA	MMA: excellent weatherability, hard & crystal appearance; door panels, outside signboards, and an illuminator; high temperature coating. MAA: high water absorbing property; disposable diapers, sanitary napkins etc.
DME, other multifunctional alcohol	Sources for polyester fiber of textile, polyurethane resins (coating, plastics etc); sources for multifunctional amine chemicals.

Formalin

Formalin is generally used as a preservative, embalming agent and disinfectant. Large amount of formaldehyde is used in the manufacturing of various common plastics and chemicals. Bakelite is well known as a first completely synthetic plastic composed of formaldehyde and phenol polymer.

MMA

The production of methylmethacrylate (MMA) was over 1.0 million ton in 2005, and its demand is expected to grow rapidly. The world market for MMA is dominated by the Altuglas International, Degussa AG., Lucite International having a 50% share. The remaining 50% is shared by Mitsubishi Rayon Co., Ltd., Sumitomo Chemical Co., Ltd, and LG MMA Corporation. Major uses are for home electronics, and liquid crystal display for device of information technology.

AA and MAA

AA is produced from propylene produced by thermal cracking of carbon three (C_3) component such as propane parts of natural gas. The natural gas produced in Mangistau does not have high C2 (ethane) content. MAA can be produced in the process of MMA synthesis process, if necessary. If the demand for propylene increases in the future, it can be produced by thermal cracking of methane. The ration of ethylene and propylene is normally 60% ethylene and 40% propylene. Propylene is most useful as sources of value-added products. An additional process is available in Japan to produce higher yield of propylene, called the methasesis process. Four large petrochemical companies in Japan are operating this process with mixed sources of ethylene and buten-1.

AA is used for super absorbent polymer (SAP), and acrylic acid ester (AES). The world market for AA is 3.0 million ton in 2006, of which most (60%) were consumed as SAE and the rest as AFS and others. SAE is used for disposable diapers and sanitary goods.

Polyacetal

There are two kinds of polyacetal plastics: homo-polymer and co-polymer. Homo-polymer has properties of high mechanical property, low frictional resistance and high oil- and chemical- resistance. Co-polymer also has similar properties, but at slightly lower levels than those of homo-polymer. Co-polymer, however, has excellent transformability and good appearance with precise shapes of transformed products.

The major uses are for automobile parts, electronic device, machine parts for precision instruments and measuring device. The world market for polyacetal has a size of 800,000t per annum and increasing. Japan has the dominant production capacity with 85% share, and 15% of products are

used for high quality transformed products.

Amine and its derivatives

There are three methanol derivatives: mono-methylamine, di-methylamine and tri-methylamine. These are produced as reaction products with methanol and ammonia under the pressure of 10-20 atm and temperature of 450-500 degrees, with dehaydration catalyst of aluminum complex. The investment cost of facilities to produce di-methylamine was about US$40 million for 40,000t annual production.

Mono-methylamine has several kinds of uses such as starting chemicals for medicine, chemicals of photograph development, slurry explosive, softener and supplement agent of dyeing for textile, inhibitor for chemical polymerization and others. Major uses of di-methylamine are medicine base materials for an anesthetic, herbicide for agriculture, accelerator of rubber vulcanization, anti-oxidant of plastics and others. The largest market is for products for co-synthesis materials for MMA plastics, one of raw materials for expandable urethane elastomer and urethane elastic strings. The latter uses are increasing in China and East Asia.

Tri-methylamine is use as starting chemicals of chlorine chloride for supplement of animal feed, softener of textile, and basic chemicals for an insect attractant. The largest use is as a base material for ion exchange resin.

(3) Production processes for selected derivatives

Methanol

Details of the methanol production are given in Table 108, based on the data obtained from an engineering company in Japan. The investment cost varies depending on the process, location and other specifics of a company. The natural gas is steam reformed at the temperature around 871°C and under the pressure 18-22 atm to obtain synthetic gas feed. Methane is synthesized over a proprietary ICI copper-based catalyst at 249-282°C and 70-110 atm. Methane is condensed from reaction gasses, and the un-reacted gases are recycled after taking out a purge stream, used as the fuel in the reformer furnace.

Table 108 Methanol Production from Natural Gas by ICI Copper-based Catalyst Process

Production capacity of Methanol		415,000t/year	
	Unit consumption/t	Total consumption/t	Daily unit (330 operation days/year)
Raw materials	Consumption/t		
Catalyst and others	0.00021t	87.15t	
Natural gas feed	7,778 MMcal[*1]	358.56 million m^3	
Natural gas fuel	450 MMcal[*1]	20.75 million m^3	
(Natural gas total)[*2]		(379.31 million m^3)	1.15 million m^3
Utilities			
Cooling water	108m^3	44.82 million m^3	135,800m^3
Steam	0.01t	0.00415 million t	12.58t
Process water	1.2	0.498 million m^3	1510m^3
Electricity	33kWh	1.37 million kWh	4150kWh

[*1] MMcal = 1,000kcal as thermal energy units. 7,778MMcal = 864 normal cubic meters (nM^3) with 98% purity of refined Methane gas; 450MMcal = 50nM^3 of refined methane gas

[*2] 1.15 mln m^3/day changed to 1.82 mln m^3/day of make up gas with 62.4% methane purity

Formalin

Details of formalin production are given in Table 109. The mixed methane and air are reacted in contact with catalyzer under an atmospheric pressure. Reacted formaldehyde gas is absorbed into water, and changed to 37% solution of "formalin." The synthesis process is selected in the lower or

higher limit of the explosion range, 6-37 volume % of methanol. Recently, a new processing at the lower limit has been established to obtain higher contents of formaldehyde rather than excess methanol mixed in the product. Another way to produce formalin is by the direct oxidation process, which produces mixed products with 34-36% methane, 20-23% formaldehyde, and 5-6% acetoaldehyde.

Table 109 Formalin Production from Methanol

Production capacity of Folmalin		200,000t/year	
	Unit consumption	Total consumption/t	Daily unit (330 operation days/year)
Raw materials	Consumption/t		
Methanol	0.4250t	85,000t	
Utilities			
Cooling water	0.04m^3	8,000m^3	24m^3
Steam	0.5t	100,000t	303t
Electricity	0.05kWh	10,000kWh	30kWh

MMA

Methyl methacrylic acid (MMA) is produced by the aceto-cyan-hydrine (ACH) method to synthethize MMA from acetone and hydrocyanic acid, or by the isobutylene method. The total production capacity in the world is 125,000t by the ACH method and 322,999t by the isobutylene method. Details of production by the isobutylene method are given in Table 110.

The process to produce MMA from isobutylene through methacrolein is comparable to the ACH method. The latter, however, has several difficulties such as the acquisition of hydrocyanic acid (HCN), toxicity of HCN, transportation of HCN, and disposal of used sulfuric acid. By the ACH method, raw materials can be easily acquired such as isobutylene (IB), tertiary butanol and methanol. IB oxidation is followed by direct oxidative-esterification of methacrolein (MA) without intermediate MMA production.

Table 110 MMA Production from Methanol and Isobutylene via Methacroleine

Production capacity of MMA		50,000t/year	
	Unit consumption	Total consumption/t	Daily unit (330 operation days/year)
Raw materials	Consumption/t		
Catalyst and others	0.0007t	0.035 thousand t	
Caustic soda	0.010438t	0.522 thousand t	
Isobutylene	0.750360t	37.50 thousand t	114t/day
Methanol	0.340639t	17.03 thousand t	51.6t/day
Hydroquinone	0.0007t	0.035 thousand t	
Utilities			
Cooling water	357m^3	17.85 million m^3	54100m^3/day
Steam	3.5t	0.175 million t	530t
Natural gas	430,000kcal	2.39 million m^{3*}	7,240m^3
Electricity	166kWh	8.30 million kWh	25,200kWh

* Natural gas of 430,000kcal was calculated to 2.39 mln m^3 for total 50,000 MMA ton by the factor 9,000kcal/normal m^3.

IB undergoes vapor-phase oxidation at 350°C and 3.4 atm in a multitubular reactor to produce MA. The conversion of IB is 97.4% and the selectivity to MA is 87.2 mol % by the specific mixed metal catalyst. MA stream is then oxidized and esterified with oxygen, and the excess methanol in a single reactor. The slurry-phase reaction takes place at 80°C and 3.77 atm in a stirred tank reactor with other catalysts. The conversion of MA is 84.7% and the selectivity to MMA 88.8 mol %. The overall yield of MMA through other additional processing processes is 75.5 mol % on IB and 94.2 mol % on methane.

For this model, the IB raw material is purchased from the refinery or the naphtha cracker of petrochemical complex in Atyrau. IB is included in the extraction residue of butadiene and butane-1 of carbon-4 parts at the plant. For instance, contents of IB are estimated 8% of feed oil on the refinery plant in general, varied in 3-10% depending on the feed oil quality. The Atyrau refinery with the planned capacity of 104 barrels/day has a potential content of 240,000t/year of IB ingredients, calculated based on 60% of yearly operation of the facilities.

Polyacetal

Japan is most advanced in the technology for production and use of polyacetal (POM) polymers. The domestic demand for POM polymers in Japan increased by 12.9% in 2006 to reach 106,000t. This is due primarily to the expansion of its application to automobile parts. The application is 55% for automobile parts, 32% for electronic devices, and 13% for others. A new application is the POM use of 400g per a set of fuel pump module necessary for the use of bio-gasoline. The application is expanding for electronic devices, precision equipments and others to replace polyamide resin as POM has better properties.

The production process is based on a patent assigned to Celanese Corporation and some information supported by an engineering company in Japan (Table 111). Formaldehyde is produced by dehydrogenating methanol over a silver catalyst at 700 degrees C and 1.2-1.3 atm. The HCHO gas produced is absorbed in water to give in the presence of sulfuric acid catalyst, followed by solvent extraction with 1-chloro-naphthalene. Molten trioxane is co-polymized with ethylene oxide gas at 65-80°C in a continuous mixer reactor using another catalyst. The polymer is withdrawn from the reactor as a finely divided powder. The polymer undergoes chain0end stabilization using ammonium in methanol solution at about 165°C. The stabilized polymer is precipitated with water, washed, dried and palletized for sale.

Table 111 Production Model of Polyacetal Copolymer from Methanol via Trioxane and Ethylene Oxide

Production capacity of polyacetal		100,000t/year	
	Unit consumption	Total consumption	Daily unit (330 operation days/year)
Raw materials	Consumption/t		
Ethylene oxide	0.055t	5,500t	17
Methanol	1.3425t	134,300t	407t/day
Catalyst and other	---	---	---
Utilities			
Cooling water	535m^3	53.5 million m^3	162,000m^3/day
Steam	8.7t	870,000t	2,636t/day
Processing water	14m^3	1.4 million m^3	4,242m^3/day
Electricity	529kWh	52.9 million kWh	160,000kWh/day
Inert (nitrogen) gas	35nm^3	3.5 million m^3	11,000m^3/day
Natural gas	531MMcal*	5.9 million m^3	18,000m^3/day

* 531Mмcal is equal to 59nm^3 of refined natural gas (98 mol% methane gas) calculated by the factor 9,000kcal/nm^3 of refined natural gas.

Total investment cost was estimated at about US$62 million in 2002 but it may vary depending on the construction company.

8.5.3 Measures to promote the derivative industries cluster

The proposed derivative industries cluster consists of the main methanol based derivatives production, and other related downstream activities of the oil and gas industries. The latter include the gas use as thermal energy for greenhouse or industrial agriculture, plastic transformation and others. The environmental considerations should also be part of the cluster not only to minimize the pollution by littering of plastic products but also to recover utilize waster materials for production purposes.

(1) Methanol based derivatives production

Locational conditions

The following conditions need to be satisfied for successful establishment of methanol based derivatives production as proposed.

1) Availability of air transport option for some raw materials to reduce the risk of production disruption
2) Availability of container port for export of products
3) Stable supply of electricity
4) Availability of cooling water
5) Availability of land to establish the complex facilities (kombinat)

These conditions are mostly satisfied already, but the full satisfaction is the absolute prerequisite for the establishment of the gas chemistry operation.

Promotional measures

The following promotional measures should to taken in steps to establish the operation.

i) Accelerated exploration of additional gas reserves
ii) Planning for expansion of gas production
iii) Identification of gas extraction companies
iv) Establishment of promotion policy for the derivative industries

(2) Related activities

Greenhouse or industrial agriculture

Greenhouse or industrial agriculture should be promoted to produce high value crops. Promising crops include fresh vegetables, berries, flowers and ornamental plants, and tree seedlings. Support measures are proposed in the rural livelihood development program under the Living Environment Improvement Initiative. Greenhouse agriculture may be experimented first by the Oblast initiative, including the local manufacturing of materials and equipment. A lesson may be learned from successful application in other countries such as Japan. Large-scale greenhouses in Japan cost typically KZT 100-300 million. Some examples are presented in Attachment to this chapter.

Plastic transforming plants

The establishment of plastic transforming plants should be encouraged to add depth to the petrochemical industries in Mangistau. They would produce mainly common commodities to substitute import products. Possible products include plastic emission products, packaging films manufacturing, PVC cast products such as window frames, and fishery and leisure boats manufacturing. These industries would naturally develop as the main activities of methane based derivative industries in Mangistau and the petrochemical complex in Atyrau develop. A model plastic transforming factory is presented in Table 112.

Table 112 Model Plastic Transforming Factory

Component	Production cap. (t/year)	Investment cost (10^6 yen)	Note
Plastic emission plant	1,000	500-1,000	
Packaging film plant	1,000	300-500	
PVC casting plant			Import substitution and new domestic demand
Fishing and leisure boats manufacturing			Extension of existing pipes manufacturing

Environmental measures

The development of green business would symbolize the Mangistau regional development, which the residents can be proud of. The development of the derivative industries cluster would contribute to it through improving the diet of local people, supplying fresh vegetables and berries, and flowers and ornamental plants to urban and tourism markets, and producing seedlings for tree planting.

To minimize possible negative effects of the development of derivative industries, countermeasures should be formulated together with the planning for derivative industries. The cluster approach would be effective in utilizing wastes and byproducts to minimize the overall wastes. The plastic recycling business should be introduced with incentive measures, and environmental education should be strengthened to enhance the environmental awareness of people and enterprises.

To dispose plastic wastes by incineration, the temperature over 1,000°C is required to avoid the generation of dioxin. In Japan, such an incinerator costs some 25 billion Japanese yen for the population of 300,000, each consuming 110kg of plastics annually.